Ministry of Health
The Republic of Vanuatu

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR THE REDEVELOPMENT
OF
VILA CENTRAL HOSPITAL
IN
THE REPUBLIC OF VANUATU

January 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

THE CONSORTIUM OF
NIHON SEKKEI, INC., NIHON SEKKEI INTERNATIONAL INC.
AND EARL CONSULTANTS, INC.

PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to consist of Nihon Sekkei, Inc., Nihon Sekkei International Inc. and Earl Consultants, Inc.

The survey team held a series of discussions with the officials concerned of the Government of the Republic of Vanuatu, and conducted a 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 Republic of Vanuatu for their close cooperation extended to the survey team.

January, 2012

Nobuko Kayashima
Director General,
Human Development Department
Japan International Cooperation Agency

Summary

1. Country Overview

The Republic of Vanuatu (hereafter "Vanuatu") is an island country comprised of 83 large and small islands scattered over an area with a north-south axis of 1200 km in the Pacific Ocean. Because the country belongs to the circum-Pacific volcanic belt, many islands have steep geographic features with active volcanic activity. Its land area is approximately 12,000 km^2 (almost equivalent to Niigata Prefecture) and it has a population of approximately 234,000 in 2009.

The project site is located in the capital city, Port Villa, on Efate Island, an island almost in the center of Vanuatu land. Efate is the third largest island (the area of the island is approximately 899.5 km^2) in Vanuatu. It is the most densely populated island (approximately 65,000 people).

The weather of Vanuatu belongs to a tropical maritime zone. The annual precipitation varies from island to island. The annual precipitation of Port Villa has been approximately 2,500 mm on average over the last five years. The summer from November to April is the rainy season, characterized by high temperature and humidity with frequent cyclones. The period from June to September is the winter season (dry season) characterized by relatively cool weather and sunny days. The temperature exceeds 30°C in the summer season and may drop lower than 20°C in the winter season.

The dominant industries of Vanuatu are agriculture and tourism. The gross domestic product (GDP) in 2010 was 69.6 billion VUV(Vanuatu Vatu) (US$ 72.8 million) and the GDP per capita was 290,000 VUV (US$ 3,000). The percentages of primary, secondary and tertiary sectors of industry versus total GDP are 26%, 12% and 62% respectively. The contribution that the tertiary sector including tourism makes to GDP is overwhelmingly high. Its GDP growth rate has been on a declining trend, marking 3.5% in 2009 and 3.0% in 2010. The unit prices for material and equipment including construction materials have been increasing in general because most of them are imported. On the other hand, based on FY2009 statistics of import and export trading, there is an obvious sign of trade deficits with an excess of imports (imports: 30.1 billion VUV, exports: 5 billion VUV) on a continuous basis. With regard to national finance in 2009, 4.9 billion (25%) VUV out of a total income of 19.5 billion VUV depended on support from overseas.

2. Background and Overview of the Project

The national strategy of Vanuatu is "Priority Action and Agenda (PAA) 2006–2015" and the development plan in Health Sector is "Health Sector Strategy 2010–2016." In HSS, "Improvement of national health condition" is identified as the ultimate goal which is reached through improvement of access, quality and efficiency of health services at all levels.

With regard to the Corporate Plan (2011–2013) developed as a mid-term action plan within the Health Sector Strategies, five priority areas (provision of quality healthcare, development of healthcare human resources, improvement of appropriate infrastructures, provision of healthcare information systems and reinforcement of healthcare financial systems) and six programs (infection prevention program; non-infectious disease prevention program; procurement, supply and management program;

treatment service program in hospital; treatment service program in community; and program for Vanuatu College of Nursing Education for Nurses).

The annual population growth rate is around 2.4%. Currently, 45% of total population is made up of children younger than 15 years old, indicating an age structure characteristic to developing countries. The average life span is about 68. While the average life span in women is rising (70.4), 12% of the population die under 40. The mortality of babies younger than 12 months is 26 out of 1,000. Due to these trends, it is predicted that both demand for healthcare services characteristic to developing countries in general, such as infectious diseases, and those for non-infectious diseases observed in developed countries, such as lifestyle diseases, will increase in future. This would put pressure on Vanuatu's healthcare finance.

The Villa Central Hospital (hereafter "VCH"), the target of the current cooperation, was established in 1974. Since then, it has been providing various services as the top referral hospital in Vanuatu. Further, VCH serves an education facility since it is a post-graduate training facility for specialist doctors and also as an intern training facility for graduates of Vanuatu College of Nursing Education for Nurses. The total number of outpatients was 117,589 and the total number of inpatients was 6,120 in 2010. The hospital has 152 beds with an availability rate of 60–100%. These values show there is high demand for VCH. Nevertheless, they are being affected by aging-related degradation because little refurbishing has been carried out for about 37 years since its foundation. Further, due to the scattered layout of the facilities and so on, an environment suitable for providing adequate services is not available. On top of this, there are many large challenges that the hospital needs to tackle urgently such as a lack of healthcare human resources, a lack of medical equipment, a lack of medical supplies (pharmaceuticals, oxygen gas, etc.) and the poor financial situation for operating the facility.

In Vanuatu, 80% of the government budget for the Health Sector is dedicated to personnel expenses and operating costs related to the health care services. The increase in expenditure for this budget in recent years has been compensated by assistance from overseas. Therefore, the healthcare sector is not enough to cover the renovation of facilities and renewal of medical equipment. Under these circumstances, Vanuatu requested Japan to provide Grant Aid so that it could construct new hospital facilities and procure medical equipment. The details of the request are as below:

Request details

(1) Facilities: Outpatients' Department, Emergency Department, Laboratory Department, Radiology Department, Maternity Department, Operation Theater, ICU, Administration Department
(Total floor area: 4,630 m^2)

(2) Equipment: Equipment for Outpatients' Department, equipment for Emergency Department, equipment for Laboratory Department, equipment for Radiology Department, equipment for Gynecology Department, equipment for Operation Theater and equipment for ICU
(217 items in total)

Based on this request, Preparatory Survey (1) (Preliminary Survey) (hereafter “Preliminary Survey”) was carried out in February 2010. As a consequence, while the necessity and appropriateness of a VCH improvement program was adequately verified, the syrvey team reached the conclusion that consideration should be given so that the details and scale of the cooperation should be appropriate while taking into account the financial situation of Vanuatu and difficulty of securing healthcare staff. Then, among the requested items, it was agreed that i) the Maternity Department and ICU should be removed from the scope of cooperation based on the understanding that these departments should be improved by modifying the existing facilities, ii) the lowest priority should be given to the Administration Department among the facilities within the scope of cooperation based on the understanding that the department is not directly involved with healthcare services.

3. Overview of Preparatory Survey and Contents of the Project

Based on above, JICA further determined to implement Preparatory Survey (2) (Basic design) (hereafter “Preparatory Survey”) and delegated the Preparatory Survey team (Basic design) during the period from March 6 to April 4, 2011. The research team had consultations with Vanuatu’s concerned parties, investigated the related facilities, collected the necessary data and carried out a walk-down inspection of the planned construction site. After the domestic analysis as well as the explanation of the Draft Report on Preparatory Survey (hereafter “Draft”), carried out in October 2011, this full-scale Report on Preparatory Survey was compiled.

In this research, the aforementioned dominant challenges are verified. Then, based on the request details and the results of the field investigation and consultation as well as the facility master plan agreed upon between Japan and the Vanuatu side, a decision was made to improve healthcare services by constructing some facilities and procuring the equipment necessary for this purpose. With regard to the details of facilities to be included in the cooperation project, the scope of the project was determined based on the standpoints as follows: “Facility requiring improvement because the degradation affects medical services and safety due to the aging.” “Facility that are to yield significant beneficial effect on the tertiary medical services and high cost effectivness” and “Facilities requiring advanced construction engineering capability.” Among the Outpatients’ Departments included in the request, Vanuatu side confirmed that Special Clinics should not be included in the scope of this cooperation project in the following reason. Those are that i) it was more appropriate to use the existing facility for the time being and to treat it as an item for future improvement. ii) Special Cinics have been consolidated already in the existing facility to a certain degree while the necessity to improve this area was acknowledged. iii) this configuration is not extremely inconvenient to provide clinical services for Special Clinics, although the situation is not ideal. iv) the content of the request is relatively easy to implement in terms of construction. Similarly, it was agreed upon that the Administration Department should be removed from the scope of the project, because the priority for this area was placed at the lowest level during the Preliminary Survey.

Based on above, as suitable contents and scale of the current cooperation, it was concluded as appropriate to accommodate the Outpatients’ Department (General Clinic), Emergency Department,

Operation Theater, Radiology Department and Laboratory Department in the new facility building and to procure the minimum necessary equipment for these departments.

An outline of the Villa Central Hospital Improvement Project is as below:

Responsible organization: Ministry of Health, the Republic of Vanuatu

Implementing organization: Villa Central Hospital

Planned construction site: Port Villa

Construction structure: Reinforced concrete structure, with steel frames used partially

Content of the plan

Division	Major project breakdown	Facility
Facility 3,157.56m^2 (Interior 2,623.50m^2 + Exterior common 534.06m^2)	OPD Building Two storied building (new construction) 2,501.88m^2 (Interior) Exterior common 534.06m^2 RC structure, Some S structure	First floor: Operation Theater: Operation rooms (2), Recovery, Operation Hall, Central Sterilization and Supply, Equipment room, Changing Room Radiology Department: X-ray(2), Control room, Ultrasound Scanning, CRT room, Reception, Office Laboratory Department: Hematology/ Serology/ Blood bank/Biochemistry /Cytology/ Histology/ Microbiology/ STI/ Virology/TB/Wash room/ Media room/ Malaria/Blood Sampling/ Blood Donation/Tea room/ WC/ Reception/ Office/ Locker room Second floor: Emergency Department: Waiting, Reception/Staff room, Resuscitation room, Treatment room, Observation room, Dirty room, Sterilization room Outpatients' Department (General Clinic): Waiting, General Consultation room (7), Nurse Station, Treatment room, Plaster room, Medical Record, Reception, Pharmacy, Locker room, Conference room Specialized Equipment: Rainwater Utilization System
	Ancillary facilities One-story (new construction) Total 121.62m^2 RC structure	Elevated Water Tank (44.55m^2) Pump room (25.85m^2) Transformer room (35.24m^2) Blower room (15.98m^2) Sewage Treatment Plant (142.55m^{2}BF) Soak Pit
Medical equipment	The Equipment necessary the Project facilities; Emergency Department, Outpatients' Department, Operation theater, Radiology Department and Laboratory Department.	

4. Construction Period and approximate Costs for the Project

The project is comprised of the following phases: Detailed design: 5 months; tender period: 4 months; construction of facilities and procurement of equipment: 18 months.

The costs of obligation works to be borne by Vanuatu side has been confirmed and guaranteed by Vanuatu's Ministry of Health (hereafter MOH). The secure implementation of this budget has been

pledged based on the Minutes of Discussion (hereafter “M/D”) at the Draft explanation (executed on October 27, 2011). This amount is judged as acceptable to be borne because the percentage of costs to be borne by the Vanuatu side versus the total budget related to healthcare services in the MOH in 2010 is 2.3%.

5. Project Evaluation

(1) Relevance of the Project

The project is in line with “Health Sector Strategies (2010–2016),” the above-mentioned development plan of the Vanuatu Health Sector. The project contributes directly to the improved access and quality improvement for the healthcare services out of four policy goals. These correspond directly to “Improvement of infrastructures for appropriate equipment and machines” and “Provision of effective, efficient and high-quality clinical services” out of 10 specific agenda stipulated in these strategies. Further, when comparing the project with “Corporate Plan (2011–2013),” which is the mid-term action plan within the “Health Sector Strategies”, the project is expected to significantly contribute to the realization of “Improvement of appropriate infrastructures” among five priority areas. Thus, the project shows high level of consistency with the health policy of Vanuatu. Besides, Because VCH is positioned as the top referral hospital in Vanuatu, all people of the country (234,000 people) are the beneficiaries of the project. By enhancing the qualities of healthcare services and clinical educations, nationwide propagation of the benefits of the project is expected.

As mentioned above, VCH is providing versatile services as the top referral hospital in the recipient country and plays a significant role as an educational facility for healthcare human resources. While the demand for VCH is high with its significant number of patients, appropriate clinical activities have been made difficult due to aging-related degradation and the scattered configuration of the hospital functions. To address this situation, it is urgent to improve healthcare services by consolidating the functions of the Outpatients’ (General Clinic) and Emergency Department and Central Clinical Service Department, particularly, in a new facility.

The scope of the project is the departments with particularly complicated functions among hospital facilities. Unlike an inpatient ward, these departments require sophisticated design technologies. Sophisticated quality control is necessary also during the construction phase. Therefore, we consider that it is necessary and advantageous to use Japanese technologies.

Considering this situation, the necessity to carry out improvement of VCH through the project is high.

(2) Effectiveness of the Project

Effectiveness of the project within the scope of this cooperation is assessed as below. The baseline year is set as 2010 and the target year as 2017 (three years after the completion of the project).

1) Quantitative Indicator

Quantitative indicators to assess effectiveness of the project are as below:

① The number of surgeries is increased from 2,183 cases to 2,416 cases.

② Approximately 82,000 general clinic patients receive healthcare services in a more appropriate environment.

③ Approximately 480 referral cases are accepted by VCH in a more appropriate environment.

④ Approximately 360 colonoscopies are implemented annually.

While the numbers of surgeries and general clinic patients have dropped temporarily in 2010 these numbers are expected to recover to the average level during the previous three years (2007–2009) in a more appropriate environment. Besides, an increase in the number of surgeries is expected by making it possible to carry out small surgeries in the new Emergency Department, while they are conducted in the theatre now. With regard to the number of General Clinic patients, the possibility of handling more outpatients is expected by adopting a design that takes future scalability into consideration. The precondition for realizing these expectations is that “no drastic decrease of medical supplies and healthcare professionals should occur.”

With regard to the number of referrals to VCH, a temporary drop was observed in 2010. It is expected that the implementation of the project contributes to the project recover the number to the average level during the previous three years in a more appropriate environment, unless there is any change in the positioning of VCH as the top referral hospital or the equipment of any other hospital exceeds the equipment level of VCH.

With regard to the colonoscopy inspection, VCH is expected to address 7–10 cases/week after introduction of the colonoscopy system based on the assumption that the specialist doctor is available on a continuous basis.

2) Qualitative Indicators

Qualitative indicators to assess effectiveness of the project are as below:

① The project contributes to the improvement of performance of doctors and nurses

② The project contributes to the reduction of post-surgery infection risks

③ Efficiency in healthcare services is improved

The provision of medical equipment to VCH will reinforce its training function and contribute to the improvement of performance of doctors and nurses, because VCH is the educational facility for healthcare human resources in Vanuatu. The effect of reducing post-surgery infection risks can be expected, because the Operation Theatre is designed to be

separated between the clean area and the contaminated area. Further, the effect of improving the efficiency of healthcare services can be expected, because the facility is designed so that each patient should be directly referred to an appropriate department (General Clinic, Operation Theatre, Emergency Department), and, the necessary equipment can be used at an appropriate timing by implementing the Soft Component .

In conclusion, it is relevant to implement the project within the framework of Japanese grant aid, and the appropriateness and necessity of the project is considered to be high.

For more smooth and effective operation of VCH to be improved in the project, following points should be improved and addressed:

① With regard to the facilities to be newly built in this cooperation project, it is requested to ensure continuous usage of facilities and equipment in a good condition by securing the necessary budget for their appropriate operation and maintenance as well as by giving adequate guidance to healthcare staffs on proper handling.

② By reflecting the maintenance cost of medical equipment in the budget, it is possible to implement necessary periodical inspections and to prevent serious equipment failure. This will help minimize any degradation of the healthcare services. Further, in future, it is desirable to budget reserves for purchasing replacement equipment in future so that smooth renewal of the equipment at the end of its life cycle could be achieved.

③ To realize autonomic development of the hospital based on sound operation, it is imperative to plan appropriate financial and funding plans, to capture the income / expenditure status continuously and to feedback the results in the operation of the facilities for further improvement.

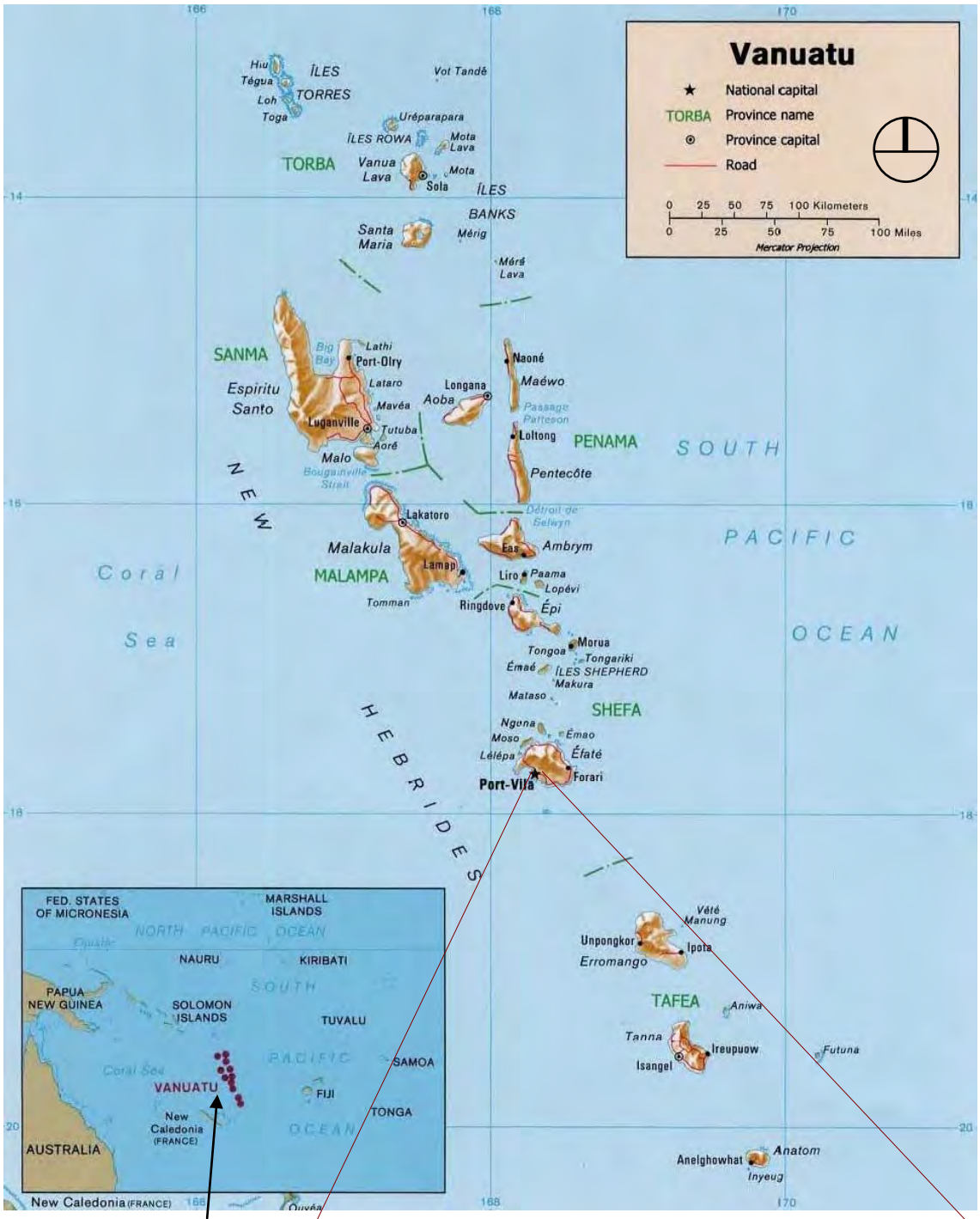
④ To improve performance of maintenance, technical guidance is planned before commissioning. Accordingly, the MOH and VCH should get the maintenance staff in charge of the medical equipment and facility equipment prepared for the technical guidance well in advance of the timing of technical training.

Table of Contents

Appendices

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions
5. Soft Component (Technical Assistance) Plan

Location Map



The Republic of Vanuatu

Legend

● **Project Site**

Perspective

List of Figures & Tables

Chapter 2

Chapter 3

ABBREVIATIONS

A/P	Authorization to Pay
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
B/A	Banking Arrangement
CPI	Consumer Price Index
CR	Computed Radiography
CSSD	Central Sterilizing and Supply Department
EPI	Expanded Program on Immunization
E/N	Exchange of Notes
G/A	Grant Agreement
GDP	Gross Domestic Product
GNI	Gross National Income
HIS	Health Information System
HIV	Human Immunodeficiency Virus
IMCI	Integrated Management of Childhood Illness
JASS	Japanese Architectural Standard Specification
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standard
MDF	Main Distribution Frame
MDGs	Millennium Development Goals
MOH	Ministry of Health
NGO	Non-Governmental Organization
NPH	Northern Provincial Hospital
ODA	Official Development Assistance
PABX	Private Automatic Branch Exchange
PHC	Primary Healthcare
SWAPs	Sector-wide Approaches
UNDP	United Nations Development Programme
UNELCO	Union Electrique du Vanuatu
UNFPA	UN Population Fund
UNICEF	United Nations Children's Fund
VCH	Vila Central Hospital
VUV	Vanuatu Vatu
WHO	World Health Organization

Chapter 1. Background of the Project

CHAPTER 1. BACKGROUND OF THE PROJECT

(1) Background of the Request

VCH has been playing a role as a core hospital in Shefa Province (the province with the largest population in Vanuatu) for about 37 years since its construction by England in 1974, while being positioned as the top medical organization in the country. Nevertheless, they are affected by age-related degradation because little refurbishing has been carried out for some time. On top of this, due to scattered layout of the facilities and so on, there is no environment suitable for providing the adequate services. In addition, there are many large challenges that the hospital needs to tackle urgently such as a lack of healthcare human resources, a lack of medical equipment, a lack of medical supplies (pharmaceuticals, oxygen gas, etc.) and the poor financial situation for operating the facility.

In Vanuatu, 80% of the budget of the healthcare sector is dedicated to personnel expenses and operating costs related to the health care services. The increase in expenditure for this budget in recent years has been compensated by assistance from overseas. Therefore, the healthcare sector is not enough to cover the improvement of facilities and renewal of medical equipment. Under these circumstances, Vanuatu requested Japan to provide Grant Aid so that it could construct new hospital facilities and procure medical equipment.

(2) Outline of the Project

1) Overall goal

Medical services in quality and quantity in Vanuatu are improved.

2) Project purpose

Medical services at VCH are improved.

3) Expected output

① New facilities are constructed.
② Medical equipment is in place.
③ Capacities in maintenance of medical facilities and equipment are strengthened at VCH.

4) Contents of the project

The contents of the request to the government of Japan（in October, 2006）:

① Facilities: Outpatients' Department, Emergency Department, Laboratory Department, Radiology Department, Maternity Department, Operation Theater, ICU, Administration Department
② Equipment: Equipment for Outpatients' Department, equipment for Emergency Department, equipment for Laboratory Department, equipment for Radiology Department, equipment for Gynecology Department, equipment for Operation Theater and equipment for ICU

(3) Natural Conditions

1) Temperature, humidity

The weather of Vanuatu belongs to a tropical maritime zone. The annual average temperature is approximately 25.0°C, where the average maximum temperature is 29.1°C and the average minimum temperature is 20.4°C. The somewhat wide range of temperatures is characteristic of the weather of this country. The period from May to October is cool, influenced by the east or southeast trade wind. Humidity is relatively high with an annual average of 76%, ranging between 73% and 79%.

2) Precipitation

The annual precipitation of Vanuatu is approximately 2,500 mm as an average of the last five years in Port Villa, where the site of the current project is located, while the precipitation fluctuates from island to island. This precipitation level is much higher than in Tokyo (approximately 1,500 mm). There is high precipitation throughout the year on average. Particularly, the period from November to April is the rainy season.

3) Wind direction, wind force

Vanuatu is located in the south east trade wind zone. According to records of the Port Villa Meteorological Observatory, the wind direction is ranges between the east and the south. The east-southeast wind is the most frequent throughout the year. The wind speed is approximately 1.6 m/sec on average throughout the year. The southeast wind is observed in April, while the prevailing wind between September and November is the east wind of approximately 2.6–3.0 m/sec.

4) Sunshine

Port Villa, where the VCH is located, is north of the Tropic of Capricorn at lat. 17° 45’S. The solar altitude is relatively high and the sunshine at the top of buildings is intense.

5) Cyclones

Many cyclones are generated in the vicinity of the Fiji Islands located to the north and northwest of Vanuatu. The period from November to April is the cyclone season. Vanuatu is hit by cyclones 2 to 3 times a year. A maximum instantaneous wind speed of 51.4 m/sec was recorded in the past. It is higher than the maximum instantaneous wind speed ever recorded in Japan.

6) Earthquakes

Vanuatu is located on the border of the Pacific Plate and Australian Plate geographically, making it one of the global areas where earthquakes are observed most frequently. Earthquakes of Magnitude 7 or higher occur frequently in the vicinity. In August 2010, an

earthquake of Magnitude 7.3 occurred with the hypocenter located 35 km west-northwest of Port Villa.

(4) Consideration to Environment and Society

In implementing this project, the following factors are considered to be factors that may have impacts on the environment. However, their negative impacts are judged to be kept within the minimum level when taking the countermeasures into consideration.

1) Water quality

Because no sewerage system is available in Port Vila, the drain water from each facility is individually treated and allowed to penetrate the site ground. Little impact on the environment is expected in the new sewage treatment plant. This is because the water is treated to obtain an appropriate drain water quality based on the drain water criteria in Vanuatu before draining the water through ground penetration. Our penetration test demonstrated that the penetration efficiency is excellent because of the coral soil. Neutralization treatment and sterilization treatment are carried out on the contaminated drain water from the Laboratory Department.

2) Atmospheric quality

It is thought the air conditioning system's coolant gas will have an impact on the environment. However, the number of units is limited to the minimum level and a product type with a low environmental impact is selected basically in this product.

3) Wastes

Wastes are categorized into general wastes and medical wastes currently and they are separately disposed of. General wastes are collected on a daily basis by a municipal garbage truck that transports the wastes to the waste disposal facility. The facility 8 km west away from Port Vila city center is located in the mountains. While its total area is 12 ha, only 4 ha is used currently. In 2008, a drain water treatment program was implemented with the assistance of the Japanese government.

Medical wastes are collected in an on-site medical wastes depot and incinerated every other day in an existing incinerator. This 2-burner type incinerator was installed in 2009 within the framework of Japanese Grass Root Assistance.

Regarding the disposal of renewing medical equipment, the MOH is committed to having such equipment used in other facilities or recycling them by disassembling and sorting them.

4) Topography

While the elevation of the project site differs largely, the existing topology of the site is maintained as much as possible in the exterior plan so as to minimize any impact on the environment.

The Department of Environmental Protection and Conservation of Vanuatu is carrying out a preliminary environmental assessment (PEA) on the project. On November 18, 2011 it issued an announcement saying that an Environment Impact Assessment (EIA) is not necessary and an Environment Management and Monitoring Plan is required, which includes appointing a monitoring manager by MOH. The effect on the environment is judged as being only small and to a degree not requiring the EIA.

Chapter 2. Contents of the Project

CHAPTER 2. Contents of the Project

2-1 Basic concept of the Project

(1) Overall Goal and Project Purpose

The Project Purpose is "Medical services (in quality and quantity) at VCH are improved". Three Outputs (Components) to reach the Project Purpose are set as "New medical facilities are constructed", "Medical equipment is in place" and Capacities in maintenance of medical facilities and equipment at VCH is strengthened"[1] as shown in Table 2-1.

Considering expected roles of VCH in the health sector of Vanuatu as the top referral hospital and the core training institution as well as health development policies/strategies of the country to which the project should be aligned, the Overall Goal is set as "Medical services in Vanuatu are improved."

Table 2-1 Project Framework

Overall Goal	Medical services in quality and quantity in Vanuatu are improved.
Project Purpose	Medical services at VCH are improved.
Output 1	New facilities are constructed.
Output 2	Medical equipment is in place.
Output 3	Capacities in maintenance of medical facilities and equipments are strengthened at VCH.

(2) Basic Concept of the Project

The purpose of this Grand Aid Scheme is to solve safety issues caused by aging-related degradation of facilities in VCH as the top referral hospital. It also aims to address degradation of functions associated with the scattering of its facilities. Based on the master zoning plan agreed upon with Vanuatu, practice functions are consolidated and medical services are improved. This is done by accommodating General Clinic of Outpatients' Department, Emergency Department, Operation Theater, Radiology Department and Laboratory Department in a new facility, and procuring the minimum necessary medical equipment for the aforementioned departments.

The outline of the Project is indicated in the table 2-2. The medical equipment necessary for the facility and its operation are to be procured.

[1] Originally Output 3 was designed "Capacities in hospital management are strengthened" and proposed areas of intervention to strengthen capacities in hospital management are "Maintenance of medical facilities and equipment", "Financial management" and "Human resource management." During the first field investigation in Vanuatu it was agreed between the Japanese side and the Vanuatu side that the final decision on areas of intervention under Output 3 would be made based on such criteria as (a) priorities of the Vanuatu side, (b) availability of Japanese financial/human resources, (c) impact on Component 1 and 2 toward the achievement of the Project Purpose, (d) needs arose as a result of coordination with other development partners and (e) possibilities in coordination with other Japanese assistance scheme. The final decision was made with the conclusion that focusing on area of maintenance of medical facilities and equipment would lead the Project to its purpose most effectively.

Table 2-2 Outline of the Cooperation Project for VCH

Division	Major project breakdown	Facility
Facility 3,157.56m^2 (Interior 2,623.50 m^2 + Exterior common 534.06 m^2)	OPD Building Two storied building (new construction) 2,501.88 m^2 (Interior) Exterior common 534.06 m^2 RC structure, Some S structure	First floor: Operation Theater: Operation rooms (2), Recovery, Operation Hall, Central Sterilization and Supply, Equipment room, Changing Room Radiology Department: X-ray(2), Control room, Ultrasound Scanning, CRT room, Reception, Office Laboratory Department: Hematology/ Serology/ Blood bank/Biochemistry /Cytology/ Histology/ Microbiology/ STI/ Virology/TB/Wash room/ Media room/ Malaria/Blood Sampling/ Blood Donation/Tea room/ WC/ Reception/ Office/ Locker room Second floor: Emergency Department: Waiting, Reception/Staff room, Resuscitation room, Treatment room, Observation room, Dirty room, Sterilization room Outpatients' Department (General Clinic): Waiting, General Consultation room (7), Nurse Station, Treatment room, Plaster room, Medical Record, Reception, Pharmacy, Locker room, Conference room Specialized Equipment: Rainwater Utilization System
	Ancillary facilities One-story (new construction) Total 121.62 m^2 RC structure	Elevated Water Tank (44.55 m^2) Pump room (25.85 m^2) Transformer room (35.24 m^2) Blower room(15.98 m^2) Sewage Treatment Plant(142.55 m^{2}BF) Soak Pit
Medical equipment	The Equipment necessary for the Project facilities; Emergency Department, General Clinic of Outpatients' Department, Operation theater, Radiology Department and Laboratory Department.	

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

The purpose of the project is to solve safety issues caused by aging-facilities in VCH as the top referral hospital in Vanuatu and degradation of functions associated with the scattering of its facilities. To improve medical services by constructing some facilities and also procure the necessary medical equipment for the facilities based on the facility master plan agreed upon with Vanuatu, the basic policy is set the following under the results of field investigation and mutual consultations with the government of Vanuatu.

1) Scope of cooperation

After determining the details of facilities that fall under the scope of cooperation, facility requiring improvement because the degradation affects medical services and safety due to the aging, facility that are to yield significant beneficial effect on the tertiary medical services and high cost effectiveness and facilities requiring advanced construction engineering capability shall be the evaluation criteria. Then, among the items requested, the necessary equipment shall be procured for facilities such as the Outpatients' Department (General Clinic), Emergency Department, Operation Theater, Radiology Department, and Laboratory Department, as facilities within the scope of cooperation

2) Scale for project facilities

VCH is suffering from a serious understaffing issue. Therefore, the scale of the facility development and procurement of medical equipment shall be kept within the extent that allows optimal use by the current manpower instead of reflecting a future staffing plan. This approach is to be effective to improve the quality of clinical services. With regard to the setting of the facility scale, the necessary number of rooms is calculated on the basis of the current and previous clinical service records while giving consideration to the current status of the existing facilities.

3) Facility master plan

In implementing the facility improvement, facility master plan as a future concept shall be agreed upon with the government of Vanuatu. The configuration plan shall be formulated rationally to ensure interaction of various hospital functions upon completing this project based on this master plan.

4) Separation of traffic lines

The project shall ensure smooth operation of clinical activities by separating the traffic lines of medical professionals, patients and the related logistics as much as possible.

5) Countermeasure against nosocomial infections

From the standpoint of preventing nosocomial infections, the probability of nosocomial infections shall be minimized by the series of countermeasures shown below: The separation of traffic lines mentioned above, the separation of the clean area and contamination area in the Operation Theater; arrangement of a general consultation room dedicated to infection patients in the Outpatients' Department. Sufficient consideration shall be given to maintain cleanliness in the indoor environment to minimize the risk of nosocomial infections.

6) Effective use and control of natural energy

By effective use and control of natural energy sources such as natural lighting, natural ventilation, heat insulation and sun shading, the facility plan shall offer a comfortable and clean environment for both patients and medical professionals.

7) Selection of construction materials and equipment

Sturdy materials requiring minimum maintenance as well as those locally accessible that allow easy repair and replacement shall be adopted.

8) Use of rain water

Rain water is reserved in the water tank and filtered for tap water mainly for use of medical equipment other than those requiring distilled water or pure water to reduce the hospital operation costs.

9) Medical equipment plan

- The scope of assistance shall include the minimum necessary medical equipment for the project facilities.
- The item, quantity and specifications of the medical equipment shall be determined while giving consideration to the consistency with facility plan and common types.
- In formulating the medical equipment plan, it shall be ensured, basically, that the operation and maintenance is possible with the current medical manpower, current technology level and the current budget.

10) Autonomic development of technology and financial capabilities

The scope of the facility plan and the medical equipment plan shall be limited to the extent that ensures autonomic development of technology and financial capabilities based on the

current operation capabilities (size of medical manpower, technology level, financial ability to bear costs and expenses, accessibilities to consumables and spare parts etc.).

11) Operation and maintenance

Because a drastic increase in budgets for VCH operation and maintenance is unlikely in the future, we will provide recommendations to reduce costs and expenses based on the financial analysis and maximize efficient use of current resources. Further, to reinforce effective operation of medical equipment and to rationalize maintenance activities, we will provide Technical Assistance (Soft Component). This shall include the instruction for routine inspection approach, annual maintenance plan and budget planning.

12) Plan for continuous medical services in existing facilities even during construction work

Because the project should be carried out while clinical activities are continued in the existing facilities, the traffic lines of the construction work shall not disturb the medical services in the existing facilities.

13) Facilities not tot be carried out in the initial request

Maternity Department and ICU:
At the time of the Preparatory Survey (1) (Preliminary Survey) (hereafter "Preliminary Survey") (February 2010), as facilities that should be developed by refurbishing the existing facilities, in the Minutes of Discussion (hereafter "M/D") (signed on February 25, 2010) it was agreed that the Maternity Department and ICU would not fall under the scope of cooperation.

Administration Department:
In the M/D of the "Preliminary Survey" and Preparatory Survey (2) (Basic design) (hereafter "Preparatory Survey") (March 2011), because they do not directly contribute to medical care services, they shall be given the lowest priority among the facilities within the scope of cooperation. And in the M/D in explaining the Report on Preparatory Survey for Draft Report (hereinafter "Draft") (signed on October 27, 2011) it was agreed that they would not fall under the scope of cooperation.

Special Clinics (ENT, Eye Clinic, NCD, Dental, and Physiotherapy):
Special Clinics is recognized as needing development. However, in the existing facilities each department is arranged so that they are somewhat aggregated in one place. And though they cannot be said to be in the best state, the clinic services of the Special Clinics are judged as being not markedly defective. Also, their construction is relatively easy as compared with the facilities within the scope of cooperation. So it has been deemed reasonable to continue to use them for the time being, and develop them in the future. In the M/D in explaining the Draft

(signed on October 27, 2011) it was agreed that they would not fall under the scope of cooperation.

(2) Policy toward Natural Conditions

1) Temperature and humidity

The roofs of the main facility shall be designed to ensure heat insulation efficiency because those have the highest heat in the periphery of the building due to a high solar altitude. The large air volume shall be ensured through a sufficiently high ceiling, allowing an aeration effect through a natural draught, where fresh air can be taken from the bottom section and vented to the upper section of the building even when there is no wind. Air conditioning units shall be arranged in the space requiring functional air conditioning for the purpose of medical activities.

2) Precipitation

The roof gradient and the size of rain water piping shall be determined carefully, because the precipitation in Vanuatu occurs over a short time period. At the same time, it is necessary to arrange overflows to prevent potential trouble in the drain water system. A plan for using on-site rain water outside the building shall be implemented in this project. Rain water is reserved in the water tank and filtered for tap water mainly for use of medical equipment other than those requiring distilled water or pure water to reduce the hospital operation costs.

3) Wind direction and wind speed

Natural draught and ventilation shall be actively utilized in accordance with directions of natural wind. They are also used as reference to determine the facility configuration and the opening positions in the buildings. Similar to the existing facility, natural draught and ceiling fans shall be planed for the general consultation rooms.

4) Sunlight and salt damage

Deep eaves and high windows shall be adopted to shield intense sunlight. Materials and techniques that resist degradation shall be selected for the finish of the sections exposed to direct sunlight.

Because the site of the project are located in vicinity of the coast, finish materials durable to salt damage are used for the exterior walls. Other countermeasures against salt damage shall be implemented also for the equipment and materials in the exterior, such as air conditioning unit, control panel, electric panel, fittings and street lights etc.

5) Natural disasters (cyclones, earthquakes, etc)

Structural members and specifications of windows and doors shall be determined based on the local design standards to be prepared for possible risks associated with cyclones and earthquakes.

The project site is unlikely to be affected by a tsunami, because the project site is located on the lagoon side of the island instead of the ocean side and it is located in an area with a fairly high elevation from the lagoon sea level (approx. 40m above sea level).

(3) Policy toward Socioeconomic Conditions

The growth rate of Gross Domestic Product (GDP) in Vanuatu was 3.5% in 2009 and 3.0% in 2010. The Consumer Price Index (CPI) of the country indicates a decreasing trend, showing 4.3% in 2009 and 2.8% in 2010.

The material prices are significantly influenced by the prices of exporting countries, since most of them are imported from neighboring countries such as Australia and New Zealand or China. Material prices are susceptible to international pricing trends associated with price elevations of raw materials including petroleum and iron ore. Therefore, a trend of elevation prices is anticipated in future, generally.

With regard to the medical equipment, imported products from Japan, the United States and European countries are used, because they are not produced in Vanuatu. In the current project, gradual elevation of the prices is anticipated based on the recent pricing trends.

(4) Policies on Construction/Procurement Situations or Special Situations/Business Practices

The construction market in Vanuatu is not large, and mainstream projects are middle-size ones such as for warehouses single-story shopping centers, middle- or low-rise hotels and apartment buildings. As a result of visits of two construction sites of shopping centers in the urban area of the city of Port Vila, where construction work is being conducted by local contractors. There are some construction companies that can construct buildings independently, while there is no large construction company. As a matter of course, they can provide their labor force and there are some construction companies with experience working under Japanese contractors.

Preparation for material procurement and arrangement for construction workers are important, since there are not many building as large as this Project in the city of Port Vila.

The working hours for construction are basically eight hours a day, a half day off in the afternoon on Saturday and a full day off on Sunday. The working time can be set flexibly such as “from 9 a.m. to 5 p.m.”, “from 8 a.m. to 4 p.m.” or “from 10 a.m. to 6 p.m.”

(5) Policy on the Utilization of Local Companies

It is essential that the construction work be carried out by construction companies with sufficient technical experience, because the Project involves medical facilities and the level of the

construction work is fairly difficult. There will be no problem in securing a local labor force, because some construction companies have experience working for Japanese ODA-related construction work or a hospital construction of French ODA. Since Japanese general contractors use local contractors as their subcontractors, construction processes based on good partnerships with the local labor force will result in good qualities of construction work.

Because local representatives of machines and equipment manufacturers are not available in Vanuatu, it is assumed that the technicians of machines and equipment manufacturers from Japan and neighboring countries (Australia, New Zealand and the Philippines) will be dispatched to the project site to train people in machine operation and equipment installation.

(6) Policy on the Management and Maintenance Ability of Implementation Agency

The management and maintenance system of the existing hospital is operated by seven staff members including the managers of medical equipment and facility maintenance. Currently, the position of chief technician is vacant since the previous personnel retired and a construction staff member (a carpenter) is in charge of the assignments in this area. Accordingly, the seven staff members in charge of management and maintenance are comprised of a construction staff member, an electrician who was employed recently, a plumber, a person in charge of an oxygen generator, a person in charge of a plumbing and drain water treatment facility and two waste collection staff members. Besides, AusAID dispatched an engineer to support the maintenance management.

1) Facility plan

In the facility planning for the Project, ensuring easy maintainability of the facility and reducing the facility running costs are the most important. Selecting appropriate specifications for machines and equipment is imperative so as to enable facility operation by the current maintenance and management staff and support staff. Procurement shall be implemented from the neighboring countries to ensure easy access to spare parts in terms of the ease of maintenance and management.

2) Equipment plan

In the maintenance department of VCH, one electrical engineer is newly hired in December, last year, and the staff has trained about medical equipment maintenance by the dispatch engineer of AusAID over three months, and has fundamental maintenance knowledge and skill. However, in order to respond with various kinds of medical equipment maintenance and repair, it is necessary to train the staff and secure budget for the purchase of replacement parts.

The operation and maintenance expenses incurred in the Project will be covered mostly by Ministry of Health (hereafter “MOH”) as usual. Since the planed equipment is renewal of the existing equipment in which the equipment was obsoleted in most cases, the operation

and maintenance expenses of the equipment do not increase compared with the present ones. Moreover, it is likely to reduce operation and maintenance expenses by introducing semi-digitization in the Radiology Department reflecting on the expense reduction of consumables, such as the conventional film and a chemistry article.

In addition to the policy implementation for MOH to improve problems such as shortage of operational expenses, under the instruction of the Ministry of Finance, MOH agrees to secure budget to VCH which is based on the direct health financial support by SWAPs (Sector-wide approaches) which AusAID leads from this year.

As mentioned above, the planned equipment should be the one which corresponds with the service contents which the current departments have been offered. And as for the specifications, it will be planned the equipment of which structure is simple and do not break down easily to reduce operation and maintenance expenses.

Furthermore, priority of the equipment to be selected is given to the equipment which has been popular in VCH and Northern Provincial Hospital (hereafter "NPH") in terms of the ease of maintenance and management.

(7) Policy toward Setting Grades of Facilities, Equipment, etc

1) Facility plan

It shall be ensured that VCH serves as a top referral medical facility in Vanuatu and also functions as a core hospital in Shefa Province, the area with the largest population in the country. The VCH shall be compliant with various requirements specific to medical institutes such as environmental consideration, prevention of nosocomial infection, consideration for people with limited physical abilities and the preparedness for natural disasters (earthquake, cyclone etc.).

The regulations and standards to serve as the basis for the project shall be domestic regulations in Vanuatu mainly. The procurement of materials and equipment shall be conducted via imports from Japan as well as via positive use of locally accessible resources imported from New Zealand and Australia. They shall conform to the following standards and grade criteria.

Table 2-3 Standard and Grade for the Project Item

Project item	Standard and Grade
Building design standard, Barrier-free standard, Quality of construction materials	Building standards in Vanuatu; Japanese Building standards and industrial standards are applicable to the items not stipulated by local ones.
Anti-seismic plan	Building standards in Vanuatu
Architectural plan	The grade shall be conformant to the grade of tertian medical institute. The plan shall satisfy the requested performance for each department and room while maximizing the cost efficiency.

2) Equipment plan

The procurement of indispensable medical equipment for VCH is the main purpose for this plan. And the improvement of medical services will be aimed to achieve by updating the obsolete equipment and making use of the existing ones which can continue to use.
In addition, it sets out that the level of the procured equipment should be equivalent to the existing ones considering the suitability of the current technical levels and service contents of the hospital and special care should be taken that the maintenance costs may not increase.

(8) Construction/Procurement Method and Construction Period Policies

1) Construction method policies

Various types of buildings of a relatively large size (airport, port facilities, hospitals etc.) are observed in Vanuatu including those constructed by Australia, New Zealand, France, the World Bank and Japanese Grant Aid. Standard methods for local large structures are reinforced concrete frames and concrete block walls basically works susceptible to frequent defects in terms of sturdiness and seal tightness such as sash work, refer to Japanese construction method.

2) Policy on the procurement method

Priority of the procurement should be given to the equipment which has a local agent in neighboring countries as much as possible in order to make maintenance properly after the procurement. Since the local agents of Japanese equipment have been already established in the neighboring countries in the same case of other pacific nations, the procurement is planned to carry out from Japan in principle. However, the procurement from the third countries will also be considered because items of Operation Theater and Laboratory Department need the manufacturers' agents for maintenance service, and in case limited to Japanese products, the competitive and fair bidding could not be secured in some cases. Bulky items such as beds etc. they are also planned to procure from the third countries as transportation fee from Japan becomes remarkably expensive.

The container liner from Japan to Port villa is in service in every 40 days. And also it is in service from Australia, New Zealand and both of it take around 2 weeks, depending on the difference of the ports of call. Cargo is taken down at the port of Port-villa, and after the customs clearance, the cargo is carried to VCH for about 5 kilometers. Since the road is paved, it is convenient for the transportation to the site.

3) Policy on the construction period

The construction site of the Project is an area in which there is an access route of patients to the existing facilities. During the construction period, a temporary access path shall be arranged to separate traffic lines of parties and vehicles engaged in the construction works and those of patients. The entrance to the construction site shall be set to face the road in front of the current hospital and safety of third parties shall be ensured by arranging security staff. The entire site area of the VCH is wide and roomy, there is a no problem related to the construction space in the project site.

The essential requirement to ensure punctuality in the construction period and processes is recruitment of human resources involved in the construction work. It is considered there is problem in securing local human resources in Vanuatu.

As November is the beginning of the rainy season and the country is often hit by cyclones and strong wind in March and April. Inappropriate countermeasures against these seasonal issues shall be considered to meet the due construction period, particularly when the ground work and foundation and frame work are to be conducted in these seasons. Countermeasures against heavy rain are also important, because the building of the Project is set in a slope area.

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

2-2-2-1 Overall Project Description (Study of the Request)

(1) Transition of Requests

Transition of requests with the narrowing-down criteria are shown in Figure 2-1.

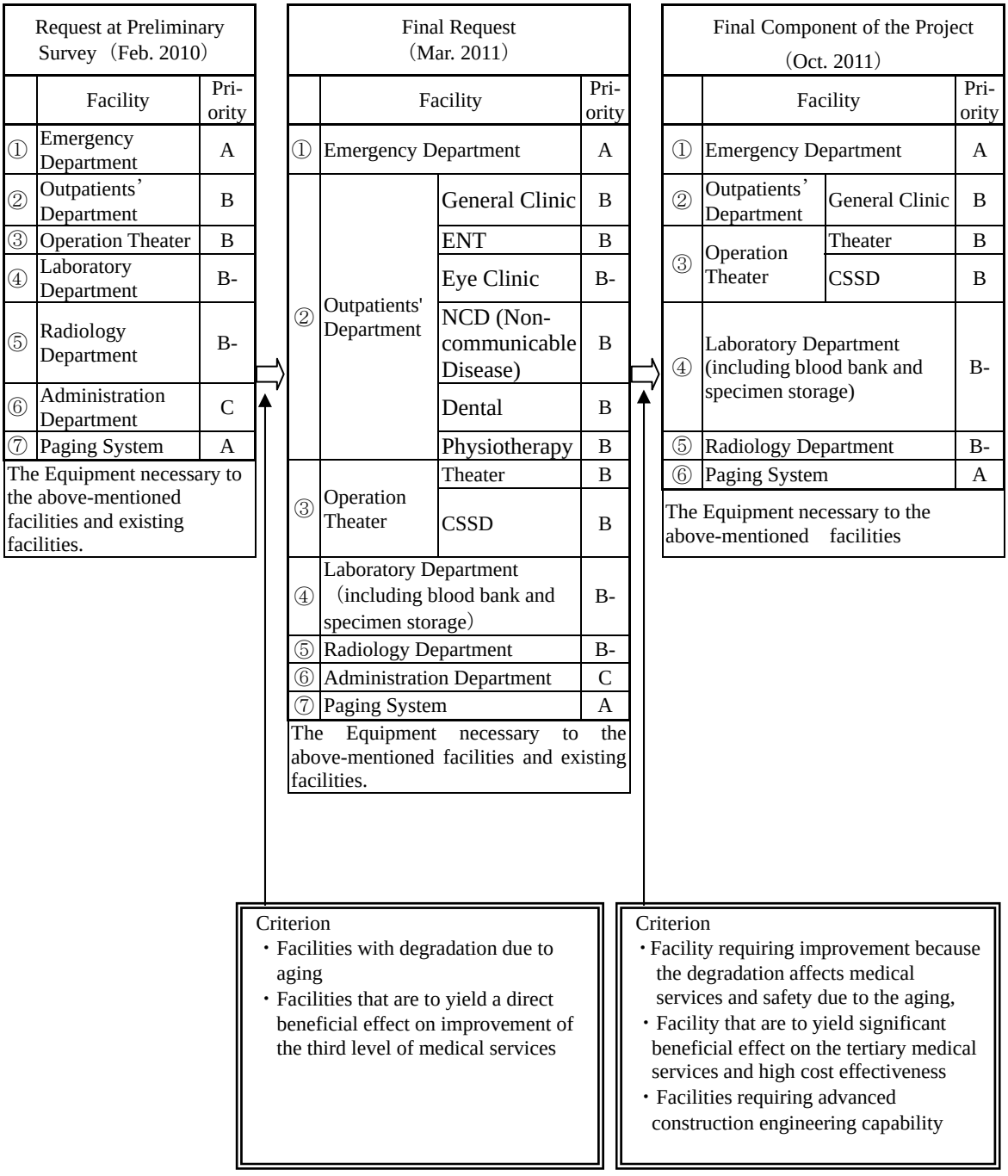


Figure 2-1 Request Transition

1) Facility Planning

① Initial Request

The details of the facilities mentioned in the initial request in October 2006 are as follows.

Facilities: Outpatients' Department, Emergency Department, Laboratory Department, Radiology Department, Maternity Department, Operation Theater, ICU, Administration Department

② Request at time of Preliminary Survey

The Japanese side, receiving the above request, carried out a Preliminary Survey in February 2010. However, about 4 years have passed since the initial request. Hence, it is understood that some changes have taken place regarding the items requested. The details of the request have therefore been modified and, as shown in Table 2-4 below, the details of the request have been confirmed with Vanuatu.

Among the items in the initial request, at the time of the Preliminary Survey the ICU and Maternity Department were deemed to be facilities that should be maintained by refurbishing the existing facilities. In the M/D (signed on February 25, 2010) it was agreed that they would not fall under the scope of cooperation.

The Administration Department was deemed to not contribute directly to medical care services and thus it was given the lowest priority among the facilities within the scope of cooperation.

In addition, Paging System for calling and contacting health care staff including doctors and nurses was newly regarded as necessary, and was included in the details of the request.

Table 2-4 Request at Preliminary Survey（for Facility）

	Facilities	Priority
①	Emergency Department	A
②	Outpatients' Department	B
③	Operation Theater	B
④	Laboratory Department	B-
⑤	Radiology Department	B-
⑥	Administration Department	C
⑦	Paging System	A

③ Content of final facility requests

a) Findings from field investigation

This preparatory survey was conducted between March 6, 2011 and April 4, 2011. Multidisciplinary discussions were made from the viewpoint of the situations and factors listed below and the determined final requests.

- Aging facilities requiring improvement
- Facilities that are likely to yield a direct beneficial effect on tertiary medical service
- Validity as a project site
- Facilities requiring advanced construction engineering capability
- Easiness of construction to be undertaken by the Vanuatu side
- Facilities that are not supported by other donors
- Effects on surrounding environment

b) Changes in requests detected by field investigation

Mutual discussions were made to further clarify and identify the details of the requests. It was confirmed that the Outpatients' Department consisted of the General Clinic, ENT, Eye Clinic, NCD, Dental and Physiotherapy, and the Operation Theater consisted of the Theater and CSSD and the Blood Bank and Specimen Storage belonged to the Laboratory Department. The Eye Clinic of the Outpatients' Department was ranked as "B-" priority because it was supported by supporting groups and organizations from different counties and would be serviceable without any bottlenecks.

c) Components of final facility requests

Final requests were agreed with Vanuatu side under the M/D (dated March 18, 2011) as tabulated below.

Table 2-5 Final Request (for Facility)

	Facilities		Priority
①	Emergency Department		A
②	Outpatients' Department	General Clinic	B
		ENT	B
		Eye Clinic	B-
		NCD(Non-communicable Disease)	B
		Dental	B
		Physiotherapy	B
	Operation Theater	Theater	B
		CSSD	B
④	Laboratory Department（including blood bank and specimen storage）		B-
⑤	Radiology Department		B-
⑥	Administration Department		C
⑦	Paging System		A

Subsequent technical discussions were made, and it was mutually agreed with Vanuatu that the scope of cooperation would not cover the Administration Department.

2) Contents of medical equipment requests

① Background of equipment plan

The discussion on the equipment plan was made in the Preparatory Survey for the selection for suitable device for procurement from the standard medical equipment lists requested by Vanuatu side with the equipment selection criteria (Table 2-5). As a result of discussions, the final requested equipment list was attached to M/D. The equipment plan was further refined based on the analysis in Japan.

② Basic policy of equipment plan

1. The equipment plan is limited to highly demanded and emergently needed departments of the Project.
2. The equipment which meets the following criteria is prioritized.

Table 2-6 Equipment Selection Criteria

Item	Standard
1. Correspondence with technical level	Plan ○：Existence of operators having enough skills and in number Not plan×：No existence of operators
2. Necessity of procurement	Plan○：Significantly obsolete, or need replacement due to break down Consideration △： Highly demanded even if it is new equipment Not plan×：Very low demanded and the current equipment has enough function
3. Relation with medical service	Plan○：Directly contribute to the current medical services Not plan×： Not medical equipment (furniture, and so on)
4. Correspondence with the current maintenance ability	Plan○：Can work under current maintenance capability Not plan×：Cannot work under current maintenance capability

(2) Review of Necessity and Validity of Requested Facilities

The results of the review on the final request of the Vanuatu side are reported below.

1) Background of cooperation

① Background of applicability of cooperation project to VCH

Vanuatu classifies health and medical care facilities and services into six levels. VCH is a referral hospital ranked Level 6, the highest level of this classification system. There are four major roles as a Level-6 hospital: 1) arranging medical specialists to provide tertiary medical care, 2) accepting referral patients in the country and determining referrals to be sent abroad, 3) serving as a certified training facility to train postgraduates (specialists), and 4) serving as a clinical educational facility aligned with the Vanuatu College of Nurse Education. While there are five hospitals in Vanuatu, VCH is the only hospital that can undertake these roles. VCH is preeminent over other hospitals as seen from the fact that it provides the largest scale of medical care service to approximately 60% of the total patients in the country. Furthermore, it is an ultimate medical institution for Vanuatuan citizens. From the point of view that VCH is an important medical institution for Vanuatu as described above, the need to improve the facilities is justifiable.

② Necessity of improving aging facilities and medical equipment and materials

a) Aging facilities

VCH has rarely been refurbished or renovated for approximately 37 years since its construction was completed in 1974 by the United Kingdom. Ageing, scattered facilities and other similar factors obstruct VCH from providing an appropriate medical service as the highest medical institution in Vanuatu.

It is necessary to make improvements as soon as possible to eliminate the many drawbacks listed below from the primary functions of the hospital facilities.

- Medical service downgraded by the layout of dispersed buildings for the Outpatients' Department and Central Clinical Service Department
- Risks of nosocomial infections and medical mishaps and of lower functional efficiency due to crossing traffic of patients, staff members and materials in the hospital
- Harmful effects of release of untreated slop and waste water on the ambient environment
- Lower safety and cleanliness of in-room environment due to aging of existing facilities

b) Aging medical equipment

The medical equipment procured by virtue of Japanese cooperation in 1994 has aged over 15 years and many of them are now barely serviceable. The medical equipment is updated by small-scale support provided by Australia, contributions made by an Australian itinerary surgery team and donations made by the local Rotary Club. Yet, many of them are secondhand equipment added with plan less. Eventually VCH came to confront difficulties in up keeping and repairing the medical equipment. It is time to improve the equipment in the whole hospital in a well-planned manner rather than just updating aging machines and equipment so that effective and efficient medical care and up keeping can be achieved, and the necessity is recognized.

2) Review of necessity and validity

① Improvement of aging facilities

In the course of a field investigation, it was requested to include the Emergency Department, Outpatients' Department (General Clinic), ENT, Eye Clinic, NCD, Dental, Physiotherapy, Operation Theater, Laboratory Department and Radiology Department in the scope of the cooperation. All of them, except for the Eye Clinic constructed in 2005, were approximately 37 years old and are severely aging. Furthermore, the Laboratory Department and Radiology Department do not have enough safety measures to satisfactorily handle bacteria, infectious specimens and radiation. These aging facilities apparently need early improvement.

② Increase of functional efficiency

To improve the aging facilities as well as the layout of dispersed facilities that degrades the medical service, it is necessary to merge the Central Clinical Service Department (Operation Theater, Laboratory Department and Radiology Department) with the Outpatients' Department. The General Clinic of the Outpatients' Department treats more than half of the outpatients and it is important to link up with the Central Clinical Service Department. In light of the severity of the emergency patients, the Emergency Department and Central Clinical Service Department need to be located close to each other. For better medical services, this project takes account of the importance of streamlining the layout of facilities of the Outpatients' Department, Emergency Department and Central Clinical Service Department.

③ Review of cost effectiveness

As mentioned above, the Laboratory Department and Radiology Department shall seek earlier implementation of safety measures in addition to actions required to improve the aging facilities. Streamlining of the layout and improvement of the facilities of the

Emergency Department, Outpatients' Department (General Clinic) and Central Clinical Service Department (Operation Theater, Laboratory Department and Radiology Department) can make a great contribution to better medical services of VCH and is justifiable to yield high cost effectiveness. In addition, these facilities require an advanced construction engineering capability. On the other hand, the Eye Clinic facilities are 6 years old and can remain serviceable. And, ENT, NCD, Dental and Physiotherapy are aging and may need some improvement, but their facilities can accommodate the current number of patients and appear to be serviceable for the time being. It is advisable to include improvement of these facilities in future agendas.

The requests made include equipment of the Paging System as the high priority list. The Paging System can lead to a better medical service because it is a tool to promptly page and communicate with medical staff. The costs required for the equipment of the Paging System accounts for a very small portion of the construction work costs and are justifiable to yield high cost effectiveness.

④ Review of validity in terms of manpower and budget

a) Review of manpower

This project does not cover any components that require an increase of manpower but does apply only to the certain scope under current situations of constant shortage of VCH's budget. The design was found valid from the aspect of manpower because this project was planned to arrange facilities, systems, machines and equipment to be operable with existing manpower and technical capability with regards to nurses, which is especially in short of the medical staff of VCH. The current manpower shortage is to be improved, because VCH will accept nurses from Solomon for three years from 2011 and subsequently recruit nurses from graduates from the co-located nursing school in order to make up for a shortage of nurses required. To cultivate resources of medical specialists and doctors required to provide satisfactory tertiary medical service, a study-abroad support program is available to medical students in Cuba and postgraduate education is provided in neighboring countries such as New Zealand and Fiji. It is likely that the issue of manpower shortage will be gradually solved in the future.

b) Review of budget

In light of the budget, the current balance of income and expenditure shows a severe shortage of operating expenses. VCH's business operation improvement activities are ongoing under the supervision of the Ministry of Finance. In 2011, SWAPs started providing its direct financial support to the MOH. This can alleviate the shortage of labor and operating expenses as well as monitor and supervise business management to improve VCH's revenue collection. As

mentioned above and in consideration of the changed status of VCH's operation, Japan's cooperation applies to the extent of hardly causing increase in operating expenses. Sustainability and validity can be assured by this project from the viewpoint of business operation.

3) Result of review of requests with regard to facilities

For the above-mentioned reasons, the Radiology Department and Laboratory Department are included in the scope of application in addition to the Outpatients' Department (General Clinic), Emergency Department and Operation Theater as shown in Table 2-7, based on the considerations of facility requiring improvement because the degradation affects medical services and safety due to the aging, facility that are to yield significant beneficial effect on the tertiary medical services and high cost effectiveness and facilities requiring advanced construction engineering capability.

The equipment of the Paging System is also included in the scope of application as it is deemed useful and serviceable.

Existing Special Clinics' facilities (ENT, Eye Clinic, NCD, Dental and Physiotherapy) need some improvement but are arranged in the relatively streamlined layout. It is not perfect but would not severely degrade the medical care service provided by the Special Clinics. Construction work for these facilities seems to be relatively simple compared to other facilities applicable to this project. It is reasonable enough to continue to use these facilities for the time being and include them in future agendas.

Under this project, Dental located in the construction site will be transferred to another location outside the hospital by Vanuatu side prior to start of construction and will be located back in an existing empty space of the hospital after completion of construction. The required minimum medical equipment contributory to medical care activities of the facilities of the Project will be procured to the facilities.

Thus, as shown in Table 2-7 below, as items within the scope of final cooperation in the M/D in explaining the Draft (signed on October 27, 2011) agreement was obtained with MOH.

Table 2-7 Final Cooperation Project

	Section
Facility	Emergency Department
	Outpatients' Department
	Operation Theater (Theater, CSSD)
	Laboratory Department (including blood bank and specimen storage)
	Radiology Department
	Paging System
Medical equipment	The Equipment necessary to the Project facilities; Emergency Department, Outpatients' Department, Operation theater, Radiology Department and Laboratory Department.

(3) Review of Necessity and Validity of Requested Medical Equipment

1) Analysis of the requested equipment

The additional request was made which reflects the opinion from AusAID volunteers by the end of the field investigation.

The request of the additional items were considered as the takeout matter to Japan, arranged by the situation of the use of the existing equipment and the purpose of taken as the data for verifying the validity of the additional requests. (Table 2-8).

In addition to the request equipment shown in M/D, in domestic analysis, the additional item also carried out domestic analysis as objects of examination.

Table 2-8 Additionally Requested Equipment List

Equipment		QTY	Current situation
(1)ENT			
1)	Diagnostic set	1set	The diagnostic instrument set for otolaryngology. Obsoletion is remarkable although diagnosed with one set of existing equipment
2)	Laryngoscope	1set	It uses for diagnosis and medical treatment of a throat. Although there is no existing equipment, a diagnostic team visits on visit medical examination from Australia one to twice for a year, and it uses it in that case.
3)	Suction unit	1unit	It uses for the malignant substance removal in the case of medical examination. One existing equipment has remarkably obsolete
4)	Audiometer and sound proof box	1set	Although screening inspection of hearing ability is conducted by one obsolete audiometer, the sound isolation function of a prefab type soundproof chamber is not perfect, and trouble has occurred in the inspection.
5)	ENT treatment unit	1unit	Although diagnosed by use, an instrument, etc. putting the usual chair on the stand for furniture now, there is also no medical examination light and it has interfered with medical examination.
(2)Ophthalmology			
1)	Sterilizer	1unit	It uses for urgent sterilization of a disposal instrument. Its superannuation is remarkable although the one present table type sterilization machine is working. Moreover, one boiling sterilizer is out of order.
(3)Dental clinic			
1)	Sterilizer	1unit	It uses for urgent sterilization of a disposal instrument. As for existing equipment, while two of three breaks down, capacity is small and one set has also interfered with urgent sterilization of the instrument.
(4)Physiotherapy			
1)	Parallel bar for paediatrics	1unit	The gait training instrument for children. Although one parallel bars for adults own now, since size is large as an object for children, it is a thing with one-set necessity also as an object for children.
2)	Freezer for ice gel	1unit	It is used for the purpose of cooling the affected part and softening inflammation. There is no existing equipment.
3)	Hot pack heater	1unit	By using it for a joint part etc., blood circulation is improved and it is used for the purpose of softening inflammation and a pain. One set of existing equipment is out of order, and has interfered with medical treatment.
(5)Operating theatre			
1)	Resect scope	1unit	It is used for prostate surgery. They are those with a schedule to which the surgeon chief has training in Australia this year although there is no existing equipment and the doctor who can use it is not.

Equipment		QTY	Current situation
2)	Tourniquet (electric type)	3unit	It is used for the arrest of hemorrhage in the case of abundant bleeding at the time of a nervous suture and fracture. The equipment which exists two sets now is not functioning effectively.
(6)CSSD			
1)	Pack sealer	1unit	The packing instrument for packing, before sterilizing the instrument etc. which sterilize. One existing equipment has remarkable obsolete.
2)	Sterilizer	1unit	It uses for urgent sterilization of a disposal instrument. Failure is often occured although the one present table type sterilization machine is working.
3)	Cabinet	Suitable amount	The cabinet for keeping the instrument after sterilization.
(7)Biological room			
1)	Safety cabinet	1unit	It is used in order to perform processing and dyeing of a tubercular sample. Existing equipment is in the situation where it is in a state that the use is impossible (finishing of withdrawal already now) and cannot process a sample under desirable environment on a human body by failure.
(8)Biochemistry			
1)	Biochemical analyzer	1unit	It is used for the inspection of enzyme, an electrolyte, etc. Existing equipment has already passed after supply for about 15 years, and has interfered with an inspection -- superannuation will be remarkable and a machine will stop in the middle of an inspection. Although there is every year 30,000 or more inspection demand, if it becomes impossible for this equipment to use it by failure, it must stop having to entrust an inspection to the private sector inspection company of Australia, and will be obliged to a large amount of expenses.
(9) Cytology/Hystology			
1)	Microtome	1set	It is used in order to create the sample for questioning the organization of a patient with doubt of a uterine cancer, a prostatic cancer, head cancer, etc. Although there is no existing equipment, about 48 inspections are entrusted to the private sector inspection company of Australia every month for the present above-mentioned purpose. One doctor engaged in the above-mentioned inspection in the hospital of Fiji, Australia, and New Zealand is on the register now.
(10)Pharmacy			
1)	Working table	1unit	The work table which the shelf for tablets attached to the table. Although one set is owned now, size is small and has interfered with work.
(11)Outpatients' room			
1)	Examination table	1unit/RM	It is used as a bed at the time of lay down and examining a patient.
2)	Film illuminator	1unit/RM	The instrument with an electric light which sticks an X ray film.
3)	Diagnostic set	1unit/RM	it is indispensable to a common patient's diagnoses (eyes, a nose, a throat, etc.).
(12)Emergency room			
1)	Treatment table	Suitable amount	It is used as a bed at the time of putting to sleep and examining a patient.
2)	Bed	Suitable amount	Bed for patients

2) Equipment analysis in Japan

The examination result is shown as follows.

Table 2-9 Equipment Analysis and Results

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
Radiology department										
1	General X-ray machine	A	2	Replacement of existing obsolete unit installed in 2005, and the X-ray fluoroscopy with photography which is condemned.	○	○	○	○	○	○
2	Mobile X-ray machine	A	1	Replacement of the obsolete unit installed in 2005 currently used in the emergency and the ward.	○	○	○	○	○	○
3	Automatic film processor	A	0	This item is not needed by use of CR system.	×	○	○	×	○	○
4	C-arm X-ray machine	B	1	Replacement of existing obsolete one procured in 2005, in the present operating room.	○	○	○	○	○	○
5	Ultrasound machine	B	1	Replacement of the used unit procured in 2005. The picture has been interfered with diagnosis, such as becoming indistinct. Abdominal diagnosis, cardiac disease diagnosis of the pregnant women and nursing mothers by Doppler, an embryonic morphological diagnosis, and so on. are performed. The Doppler inspections are done about 1,000 cases a year by two doctors.	○	○	○	○	○	○
6＊	CR system	B	1	This unit enables VCH free from chemicals supply management and waste liquid treatment by being X-ray filmless and non-use of automatic film processor.	○	○	○	△	○	○
Outpatients' department Gynecological department										
1	Gynecological examination table	A	1	Replacement of obsolete one	○	○	○	○	○	○
2	Gynecological examination unit	A	1	Replacement of obsolete one	○	○	○	○	○	○
3	Doppler fetal detector	A	1	Replacement of failure item procured in 1994.	○	○	○	○	○	○
4	Colposcope	A	1	Existing one unit is used by two obstetrician and gynecologist for diagnosis of cervical cancer and so on. Planned for replacement of obsolete existing unit procured in 1994.	○	○	○	○	○	○
5	Film illuminator	A	1	Replacement of obsolete one	○	○	○	○	○	○
6	Sterilizer	A	1	Replacement of existing equipment with much failure.	○	○	○	○	○	○
7	Medical refrigerator	A	0	Since relation with medical practice is little, it carries out the outside of the object of this plan equipment.	×	○	○	×	○	○

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
8	Diagnostic set	B	0	Diagnostic instrument sets, such as manual phonocardiograph, have existing ones, and since it is judged that it can be sufficiently used, they are excluded out of the object of this plan.	×	○	○	×	○	○
9	Examination instrument set	A	1	Since some disposable forceps are missing, it needs updating.	○	○	○	○	○	○
Pediatric department										
1	Examination table	A	1	Replacement of obsolete one	○	○	○	○	○	○
2	Scale (Height and Weight)	A	1	A height scale is remarkably obsolete and rust comes out. Moreover, since an error comes out of the scale, this item should be updated.	○	○	○	○	○	○
3	Ultrasonic nebulizer	A	1	Replacement of unfixable existing equipment.	○	○	○	○	○	○
4	Suction unit	A	1	Replacement of unfixable existing equipment.	○	○	○	○	○	○
5	Suction unit	A	0	It deletes by the above-mentioned duplication.	×	○	○	×	○	○
6	ECG	A	0	An ECG is borrowed from other sections and it corresponds now. It is as few as the demand of about 2-5 persons per week, and since it can work continuously, and thus it is excluded out of this plan.	×	○	○	×	○	○
7	Film illuminator	A	1	Replacement of obsolete one	○	○	○	○	○	○
8	Sterilizer	B	0	In the section concerned, since it is not essentially required, and thus it is excluded out of this plan.	×	○	○	×	○	○
9	Diagnostic set	A	1	Replacement of obsolete one	○	○	○	○	○	○
10	Examination instrument set	B	1	Updating by partial lack of disposable forceps.	○	○	○	○	○	○
Endoscopic department										
1	Gastrointestinal Fiberscope set	A	1	Replacement of the existing unit supplied in 2003. It is an inspection conducted now with frequency of 7 to 10 cases per week by two surgeons.	○	○	○	○	○	○
2	Broncho-fiberscope set	B	1	Replacement of the existing item procured in 2003. Inspection is done by two surgeons now.	○	○	○	○	○	○
3＊	Colono-fiberscope set	B	1	Without existing item, there exists service demand of 7 to 10 cases a week. One surgeon has experiences of around 2,000 clinical cases in hospitals of New Zealand.	○	○	○	△	○	○
4	Camera control set	B	1	This unit is planned for replacement as the existing unit is condemned, obsolete (procured in 2003). Doctors are making direct observing with existing endoscope now. Justified by the current insufficient inspection and existence of two doctors experienced.	○	○	○	○	○	○
5	Endoscopic table	B	0	As an operating table is planned, it is deleted.	×	○	○	×	○	○

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
6	Endoscope disinfection trolley	B	0	Since the existing container can wash well, it is deleted from this plan.	×	○	○	×	○	○
7＊	Ultrasonic cleaner	B	1	There is no existing item. It is essential to wash instruments with blood and so on adhered, and thus one set is included.	○	○	○	△	○	○
8	Endoscope cabinet	B	1	Replacement of item procured in yr. 2003.	○	○	○	○	○	○
Surgery department										
1	Examination lamp	A	1	Replacement of obsolete one	○	○	○	○	○	○
2	Examining instrument set	B	1	Since some disposal forceps is insufficient, it is replaced.	○	○	○	○	○	○
3	Film illuminator	A	1	Replacement of obsolete one	○	○	○	○	○	○
4	Electrosurgical unit	A	0	Since the cases necessary for treatment to use this unit are directly carried to operating rooms, this unit is used in neither surgery nor emergency and thus, it is deleted.	×	○	○	×	×	○
5	Manual dermatome	A	0	Since existing item is working sufficiently, it is deleted.	×	○	○	×	○	○
6	Gypsum cutter	C	0	As it should be not used in operating rooms, it is deleted.	×	○	○	×	×	○
7	Gypsum utensil set	C	0	Same as above	×	○	○	×	×	○
(Internal medicine)										
1	Film illumination	A	1	Replacement of obsolete one	○	○	○	○	○	○
2	Sterilizer	B	0	As it should be not used in operating rooms, it is deleted from this plan.	×	○	○	×	×	○
3	Diagnostic set	A	1	Replacement of obsolete one	○	○	○	○	○	○
4	Examination instrument set	B	1	Replacement of obsolete one	○	○	○	○	○	○
(Outpatient 3 rooms)										
1	Examination table	Add	3	Replacement of obsolete one	○	○	○	○	○	○
2	Film illuminator	Add	3	Replacement of obsolete one	○	○	○	○	○	○
3	Diagnostic set	Add	3	Replacement of obsolete one	○	○	○	○	○	○
Emergency										
1	Film illumination	A	1	Replacement of obsolete one	○	○	○	○	○	○
2	Diagnostic set	A	1	Replacement of obsolete one	○	○	○	○	○	○
3	Sterilizer	B	1	Replacement of existing unit with frequent failures.	○	○	○	○	○	○
4	Diagnostic set	A	0	It deletes by the above-mentioned duplication.	×	○	○	×	○	○
5	Examination instrument set	B	1	Since some disposal forceps is insufficient, it updates.	○	○	○	○	○	○
6	Medical refrigerator	B	1	Since capacity does not fulfill the present demand, one refrigerator updates.	○	○	○	○	○	○
7	Stretcher	B	1	Replacement of obsolete one	○	○	○	○	○	○
8	Wheel chair	B	2	Replacement of obsolete one	○	○	○	○	○	○
9	Suction unit	A	1	Replacement of the existing equipment supplied in 1990. it is remarkably obsolete	○	○	○	○	○	○
10	Defibrillator	A	1	Replacement of the existing unit supplied in 1994. it is remarkably obsolete	○	○	○	○	○	○
11	Resuscitator（manual）	A	1	Replacement of the existing one	○	○	○	○	○	○
12	ECG	A	1	It is condemning and thus this plan replaces with a new one.	○	○	○	○	○	○

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
13	Patient monitor	A	1	Replacement of the existing unit which was procured in yr. 1990 and is remarkably obsolete.	○	○	○	○	○	○
14	Treatment table	Add	1	Replacement of obsolete one	○	○	○	○	○	○
15	Bed	Add	4	Replacement of obsolete one	○	○	○	○	○	○
Clinical laboratory (Clinical laboratory)										
1	Centrifuge	B	1	Replacement of obsolete existing unit. Around 10 years have passed and still is working now.	○	○	○	○	○	○
2	Binocular microscope	B	0	Existing item that can use well enough, and it is deleted.	×	○	○	×	○	○
3	Leukocyte counter	B	0	Same as above.	×	○	○	×	○	○
4	Medical refrigerator	B	0	Same as above.	×	○	○	×	○	○
5	Electric balance	B	1	Replacement of obsolete one	○	○	○	○	○	○
6	Blood cell counters	B	0	Existing unit is working well enough, and it is deleted.	×	○	○	×	○	○
(Blood bank)										
1	Blood centrifuge	B	1	Around 15 years have passed and existing one is obsolete remarkably. The equipment is planned for replacement.	○	○	○	○	○	○
2	Blood bank refrigerator	B	1	One set of a temperature display is out of condition among six existing equipment. This unit is planned for replacement.	○	○	○	○	○	○
3	Sealer for blood	C	0	As it is not necessarily required, it is deleted.	×	○	○	×	○	○
4	Water bath	B	1	Around 16 years have passed and obsolete remarkably. This item is replaced.	○	○	○	○	○	○
5	Measurement device for blood bags	B	0	Since it is not necessarily required, it is deleted.	×	○	○	×	○	○
(Hematology)										
1	Blood cell counter	B	1	10,000 cases or more a month are inspected one set of the existing item. Since the further service demand will be expected from now on, and, thus one number is added.	○	○	○	○	○	○
2	Blood staining machine	B	0	As it will not be used, it is deleted.	×	○	○	×	○	○
(Biochemistry)										
1	Thyroid function analyzer	B	0	Since there is no existing item now, annually around 50 samples are entrusted to the private company of Australia, and it cots VCH around VUV 1.4 million as testing expense. It is judged that outsourcing is more sustainable in the light of operation and maintenance and thus it is deleted.	×	○	○	×	○	○
2	Troponin analyzer	B	0	Since there is no existing item, annually around 65 samples are entrusted to the private sector of Australia. It cost VCH VUV 1.87 for inspection cost. It is judged that outsourcing is more sustainable in the light of operation and maintenance and thus, it is deleted.	×	○	○	×	○	○

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
3	Hemoglobin electro analyzer machine	B	0	Since it is not essentially needed, it is deleted.	×	○	○	×	○	○
4	Centrifuge	B	0	It can be continuously used and thus it is deleted.	×	○	○	×	○	○
5	Biochemical analyzer	Add	1	Around 15 years have passed, this item has fell in n/ w order frequently, and it is obsolete and difficult to fix. Since there exist annually 30,000 tests or more in demand, and thus it is replaced.	○	○	○	○	○	○
(Microbiology)										
1	Incubator	B	1	Around 15 years have passed and existing one is obsolete remarkably. The item is replaced.	○	○	○	○	○	○
2	Sterilizer	B	1	Same as above unit.	○	○	○	○	○	○
3	Microscope（with teaching lens）	B	1	Same as above unit.	○	○	○	○	○	○
4	O2,CO2 Gas back container	B	0	Existing item is working well, and thus it is deleted.	×	○	○	×	○	○
5	Safety cabinet	Add	1	Around 18 years have passed and existing one is obsolete remarkably. This item is planned for replacement.	○	○	○	○	○	○
(Cytology / Histology)										
1	Microtome	Add	0	Since there is no existing unit, around 48 tests are entrusted to the private sector of Australia every month. Since outsourcing is possible and more sustainable, and thus it is deleted.	×	○	○	×	○	○
Physiology										
1	ECG with analyzer	B	0	Out of scope for current VCH	×	×	—	—	—	—
2	Tread mill	B	0	Out of scope for current VCH	×	×	—	—	—	—
Pharmacy										
1	Medical refrigerator	B	1	Since capacity of one refrigerator is not enough and thus it is added.	○	○	○	○	○	○
2	Top-pan balance	B	0	Existing unit can be continuously used and thus it is deleted.	×	○	○	×	○	○
3	Water Distiller	A	1	Replacement of existing condemned one	○	○	○	○	○	○
4	Working table	Add	0	Since furniture is not considered directly to medical services directly, and thus it is deleted.	×	○	○	○	×	○
Special department (Ophthalmology)										
1	Laser machine	B	0	Out of scope of the plan	×	×	—	—	—	—
2	A-scan machine	B	0	Out of scope of the plan	×	×	—	—	—	—
3	Vitrector machine	B	0	Out of scope of the plan	×	×	—	—	—	—
4	Sterilizer	Add	0	Out of scope of the plan	×	×	—	—	—	—
(Dental clinic)										
1	Dental treatment unit	A	0	Out of scope of the plan	×	×	—	—	—	—
2	Dental instrument set	B	0	Out of scope of the plan	×	×	—	—	—	—
3	Sterilizer	Add	0	Out of scope of the plan	×	×	—	—	—	—

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
(Physiotherapy)										
1	Stationery bicycle exercise machine	B	0	Out of scope of the plan	×	×	—	—	—	—
2	Ultrasound therapy machine	B	0	Out of scope of the plan	×	×	—	—	—	—
3	Transcutaneous nerve stimulator	B	0	Out of scope of the plan	×	×	—	—	—	—
4	Paraffin wax bath	B	0	Out of scope of the plan	×	×	—	—	—	—
5	Massage table	B	0	Out of scope of the plan	×	×	—	—	—	—
6	Massage machine	B	0	Out of scope of the plan	×	×	—	—	—	—
7	Electric oscillating saw	B	0	Out of scope of the plan	×	×	—	—	—	—
8	Parallel bar for pediatrics	Add	0	Out of scope of the plan	×	×	—	—	—	—
9	Freezer for ice gel	Add	0	Out of scope of the plan	×	×	—	—	—	—
10	Hot pack heater	Add	0	Out of scope of the plan	×	×	—	—	—	—
(ENT)										
1	Diagnostic set	Add	0	Out of scope of the plan	×	×	—	—	—	—
2	Laryngoscope	Add	0	Out of scope of the plan	×	×	—	—	—	—
3	Suction unit	Add	0	Out of scope of the plan	×	×	—	—	—	—
4	Audiometer and sound proof box	Add	0	Out of scope of the plan	×	×	—	—	—	—
5	ENT treatment unit	Add	0	Out of scope of the plan	×	×	—	—	—	—
Obstetrics (Delivery room)										
1	Delivery table	B	0	Out of scope of the plan	×	×	—	—	—	—
2	Vacuum extractor	B	0	Out of scope of the plan	×	×	—	—	—	—
3	Automatic resuscitator	B	0	Out of scope of the plan	×	×	—	—	—	—
4	Infant warmer	A	0	Out of scope of the plan	×	×	—	—	—	—
5	Cardiotocograph	B	0	Out of scope of the plan	×	×	—	—	—	—
6	Doppler Fetal detector	B	0	Out of scope of the plan	×	×	—	—	—	—
7	Infusion pump	A	0	Out of scope of the plan	×	×	—	—	—	—
8	Operating light	A	0	Out of scope of the plan	×	×	—	—	—	—
9	Delivery instrument set	A	0	Out of scope of the plan	×	×	—	—	—	—
10	Oxygen analyzer	B	0	Out of scope of the plan	×	×	—	—	—	—
11	Pulse oximeter	B	0	Out of scope of the plan	×	×	—	—	—	—
(Labor room)										
1	Labor bed	B	0	Out of scope of the plan	×	×	—	—	—	—
2	Fetal monitor	B	0	Out of scope of the plan	×	×	—	—	—	—
(New born room)										
1	Baby bassinet with mobile stand	B	0	Out of scope of the plan	×	×	—	—	—	—
2	Infant scale (Height and weight)	A	0	Out of scope of the plan	×	×	—	—	—	—
3	Ultrasonic nebulizer	A	0	Out of scope of the plan	×	×	—	—	—	—
4	Suction unit	A	0	Out of scope of the plan	×	×	—	—	—	—

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
5	Nursing bottle sterilizer	A	0	Out of scope of the plan	×	×	—	—	—	—
6	Infusion pump	A	0	Out of scope of the plan	×	×	—	—	—	—
7	Film illuminator	A	0	Out of scope of the plan	×	×	—	—	—	—
8	Phototherapy unit	A	0	Out of scope of the plan	×	×	—	—	—	—
9	Infant incubator	A	0	Out of scope of the plan	×	×	—	—	—	—
10	Intensive care incubator	B	0	Out of scope of the plan	×	×	—	—	—	—
11	Neonatal monitor	A	0	Out of scope of the plan	×	×	—	—	—	—
12	Oxygen analyzer	A	0	Out of scope of the plan	×	×	—	—	—	—
13	Infant resuscitator	A	0	Out of scope of the plan	×	×	—	—	—	—
14	Syringe pump	B	0	Out of scope of the plan	×	×	—	—	—	—
15	Infant ventilator	C	0	Out of scope of the plan	×	×	—	—	—	—
16	Bilirubin analyzer	A	0	Out of scope of the plan	×	×	—	—	—	—
17	Ultrasonic nebulizer	A	0	Out of scope of the plan	×	×	—	—	—	—
18	Infant warmer	A	0	Out of scope of the plan	×	×	—	—	—	—
Operation theater (Operating room)										
1	Operating table	A	2	Two sets of existing items are not working well, with height adjustment impossible. Replacement of one set and one set is added.	○	○	○	○	○	○
2	Suction unit	A	0	Since central vacuum is planned, it is deleted.	×	○	○	×	○	○
3	Infusion pump	B	2	One set of replacement is planned and one more additionally.	○	○	○	○	○	○
4	Operating light	A	2	Existing two units have been used for 15 years or more. One is planned for replacement and one more for addition.	○	○	○	○	○	○
5	Automatic resuscitator	B	0	Since the respirator is attached to the anesthesia machine, it is deleted.	×	○	○	×	○	○
6	Defibrillator	A	1	As existing one unit is obsolete, and it is replaced.	○	○	○	○	○	○
7	Film illuminator	A	2	Existing two units have been used for 15 years or more, and are n/w properly. One is planned for replacement and one set is filled up.	○	○	○	○	○	○
8	Patient monitor	A	2	One of two existing units is n/w, and another one is used one. One is planned for replacement and one more for fulfilling of service demand.	○	○	○	○	○	○
9	Operating instrument set	A	2	Planned for replacement of obsolete existing item.	○	○	○	○	○	○
10	Laparoscope set	B	1	One existing item is used by the obstetrics and surgery, disposal instruments run short and TV monitor is n/w. This item is replaced.	○	○	○	○	○	○
11	Hand washing sink unit	A	1	Planned for replacement of obsolete existing item.	○	○	○	○	○	○

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
12	Pulse oximeter	A	0	Due to function over-lapping with the above-mentioned patient monitor, it is deleted.	×	○	○	×	○	○
13	Electrosurgical unit	A	2	One unit is n/w and another unit fails often with use of ten years or more. These two units are planned for replacement and one for addition.	○	○	○	○	○	○
14	Anesthesia machine	A	2	Two sets of existing units are working but one is almost deteriorating. One is planned for replacement and one for addition to meet service demand.	○	○	○	○	○	○
15	Blood bank refrigerator	A	1	Replacement of one existing equipment	○	○	○	○	○	○
16	Patient heater	A	0	Since it is not essential under A/C for surgical operation, it is deleted.	×	○	○	×	○	○
17	Infant warmer	A	1	One existing unit has been used for 15 years or more, and thus it is superannuated remarkably. One existing unit is planned.	○	○	○	○	○	○
18	Solar power supply system	A	0	Deleted as the item does not contribute to medical service directly.	×	○	○	×	○	○
19	Resect scope	Add	0	As present doctors have no experience to use this item, and thus it is deleted.	×	○	○	×	×	○
20	Tourniquet (electric type)	Add	0	As this unit is not essential for present operating procedures, it is deleted.	×	○	○	×	○	○
I.C.U.(Recovery room)										
1	Patient monitor	B	3	Two existing units are working now and have been used for 5 years. Replacement is planned for these two and one for addition.	○	○	○	○	○	○
2	Infusion pump	B	3	One unit of replacement is planned for existing ones and two for addition.	○	○	○	○	○	○
3	Defibrillator	A	1	One unit is used in the present operating room, one is planned for addition.	○	○	○	○	○	○
4	Pulse oximeter	A	0	Since the function is overlapping with the said patient monitor, it is deleted.	×	○	○	×	○	○
5	Oxygen hood	B	0	As this item is covered by another unit, it is deleted.	×	○	○	×	×	○
6	Gadget bed	A	3	Replacement is planned for existing two obsolete ones and one for addition.	○	○	○	○	○	○
7	Suction unit	B	0	As the vacuum is planned for central piping, it is deleted.	×	○	○	×	○	○
8	Oxygen analyzer	B	0	As this item is not essential, it is deleted.	×	○	○	×	×	○

No.	Equipment	Priority	QTY	Reason of procurement	Judgment	(1)	①	②	③	④
(CSSD)										
1	Autoclave	A	3	Existing 3 units have already been used for 15 years or more, as for all, they are obsolete remarkably and two have failures frequently. These three units are planned for replacement. Since city water contains much hardness, a water softener is attached to them for replacement of existing one.	○	○	○	○	○	○
2	Carrying cart	A	3	Replacement of three units for existing obsolete ones.	○	○	○	○	○	○
3	Pack sealer	Add	0	As an existing unit is working well and thus it is excluded out of this plan.	×	○	○	×	○	○
4	Sterilizer	Add	1	Planned for replacement of existing items n/w.	○	○	○	○	○	○
5	Cabinet	Add	3	Planned for replacement of existing obsolete item.	○	○	○	○	○	○
Others										
1	Hemoglobin meter	B	0	Since it does not meet the contents of the medical services VCH provides, it is deleted.	×	○	○	×	×	○
2	Ultrasound machine in maternity complex	B	0	Since the new ultrasound machine for Radiology dept. can cover services for maternity, it is deleted.	×	○	○	×	○	○
3	Oxygen generators	A	0	It is considered where the existing oxygen generator is used, and deleted.	×	○	○	×	○	○
4	Water softener	A	0	It is attached to autoclaves.	-	-	-	-	-	-
5	Automatic voltage stabilizers for precision items	A	0	It is attached to precision equipment which need voltage fluctuation control.	-	-	-	-	-	-

A Fundamental
B Necessary
C Low priority
Add ＝Additionally requested equipment
＊ ＝New equipment with the validity of supply
n/w =not working

(1)：Location of equipment
Planned ○：Equipment planned for new building
Not planned ×：Equipment planned for existing building

① Correspondence with technical level
Planned ○：Existence of operators having enough skills and in number
Not planned ×：No existence of operators

② Necessity of procurement
Planned ○：Significantly obsolete, or need replacement due to break down
Consideration △：Highly demanded even if it is new equipment
Not planned ×：Very low demanded and the current equipment has enough function

③ Relation with medical service
Planned ○：Directly contribute to the current medical services
Not planned ×：Not medical equipment (furniture, and so on)

④ Correspondence with the current maintenance ability
Planned ○：Can work under current maintenance capability
Not planned ×：Cannot work under current maintenance capability

2-2-2-2 Site/facility Layout Planning

(1) Location of the Site and Conditions of the Site

The hospital site is located in Vanuatu's capital city of Port Vila on Efate Island and at a position about 100 m from the lagoon's shoreline and about 40 m above sea level. The site is surrounded by roads on all four sides and has an area of slightly over 7 ha. The site is sloped to the south with 30 m difference in height. Existing hospital facilities are laid out along the contour lines of the site. (Figure 2-2)

The area around the site is a residential area and the southwest part is occupied by illegal dwellers.

The project site is located on the sloped land near the shoreline and the geology consists of silt in the surface layer and reef limestone in the lower layer.

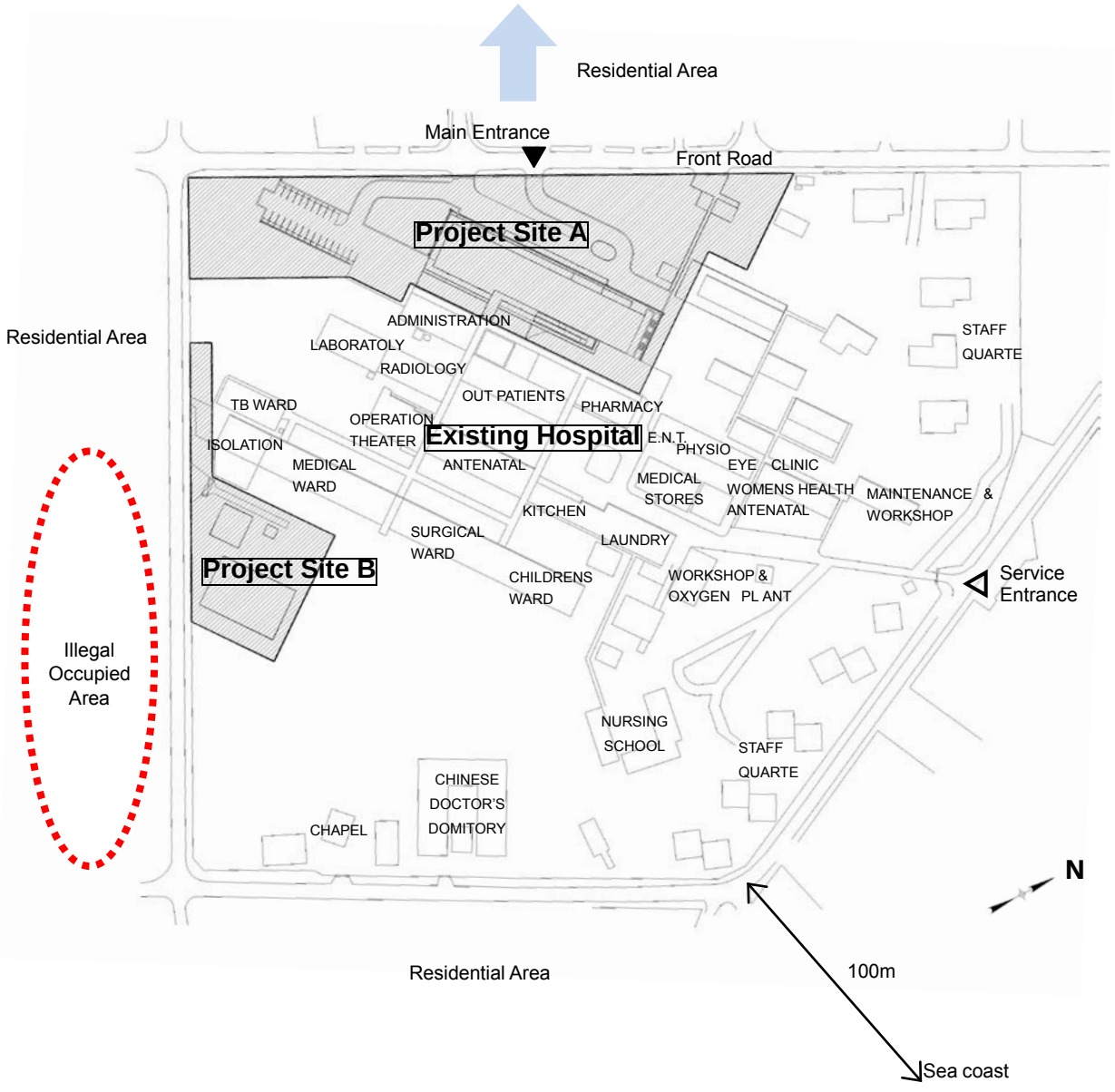


Figure 2-2 Surrounding Environment of Construction Site

(2) Land Use Planning and Future Extension Planning

The facility master plan for the redevelopment of VCH will be prepared jointly with the MOH on the basis of the present state of existing facilities and the request by Vanuatu side for new facilities, and then agreed upon by both parties. The layout of new facilities will be determined based on this master plan. The following are the main points to be noted in relation to the planning. (Figure 2-3)

① Ensuring a continuity of functional zones

→A functional continuity must be secured between the new Outpatient and Central Clinical Service Zone and the Existing Ward Zone, Women's Health Zone and Service Zone. An efficient layout is required for the new Outpatient and Central Clinical Service Zone because its land area is limited.

② Providing for future extension

→The new and existing facilities will be provided with a space for future extension. Those facilities must be adaptable to such extension.

③ Staged refurbishment of existing facilities

→Some buildings will become vacant after the Outpatient and Central Clinical Service Departments are transferred to the new facilities. Those buildings will be refurbished to accommodate a Gynecology, Dental Clinic, and such like that are not included in the new facilities.

④ Placing a bus stop in the road in front of the hospital

→When explaining the Draft, the MOH decided to place a bus stop in the road in front of the facilities described in Figure2-3. The aim was to avoid traffic congestion on the hospital premises with regards to the shared bus.

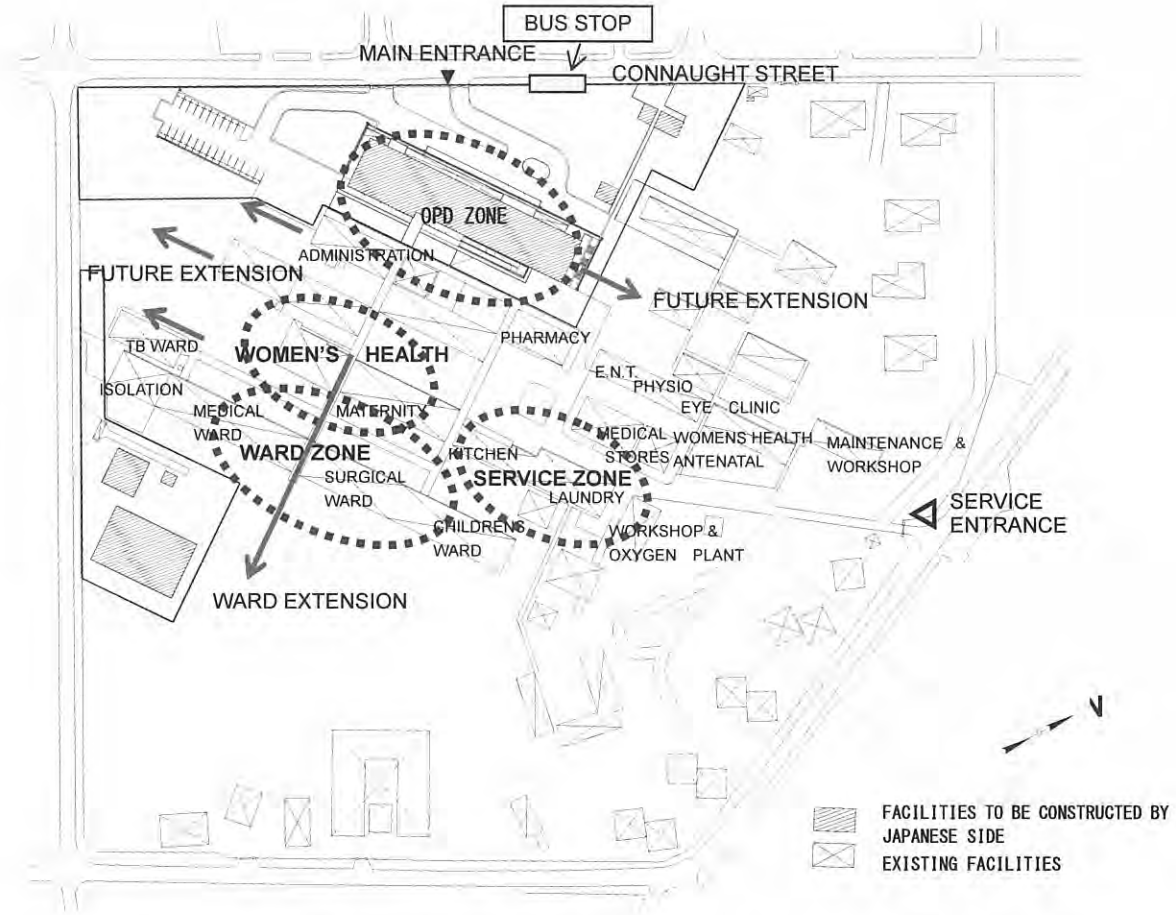


Figure 2-3 Facility Master Plan

(3) Facility Layout Planning

The departments covered by this Project are the Outpatients' Department (General Clinic, Emergency) and the Central Clinical Service Department (Operation Theater, Laboratory, and Radiology). The new facilities (new OPD Building) to accommodate these departments will be constructed as a full two-story building in the space between the front road in the northwest and the existing facilities. Frontality and visibility will be maintained because those new facilities will face the main gate of the existing hospital. They will be laid out rationally by following the contour lines of the ground.

For ease of access, the Outpatients' Department (General Clinic) and the Emergency Department will be placed on the second floor and the Central Clinical Service Department on the first floor. This will secure continuity from the departments on the second floor to existing wards at the back of the site.

The transformer room, receiving tank, and elevated tank for the Project will be placed on the front road side so that infrastructures outside of the site are pulled into the site smoothly. The sewage treatment plant will be placed on the lower ground at the south side of the site. (Figure 2-4)

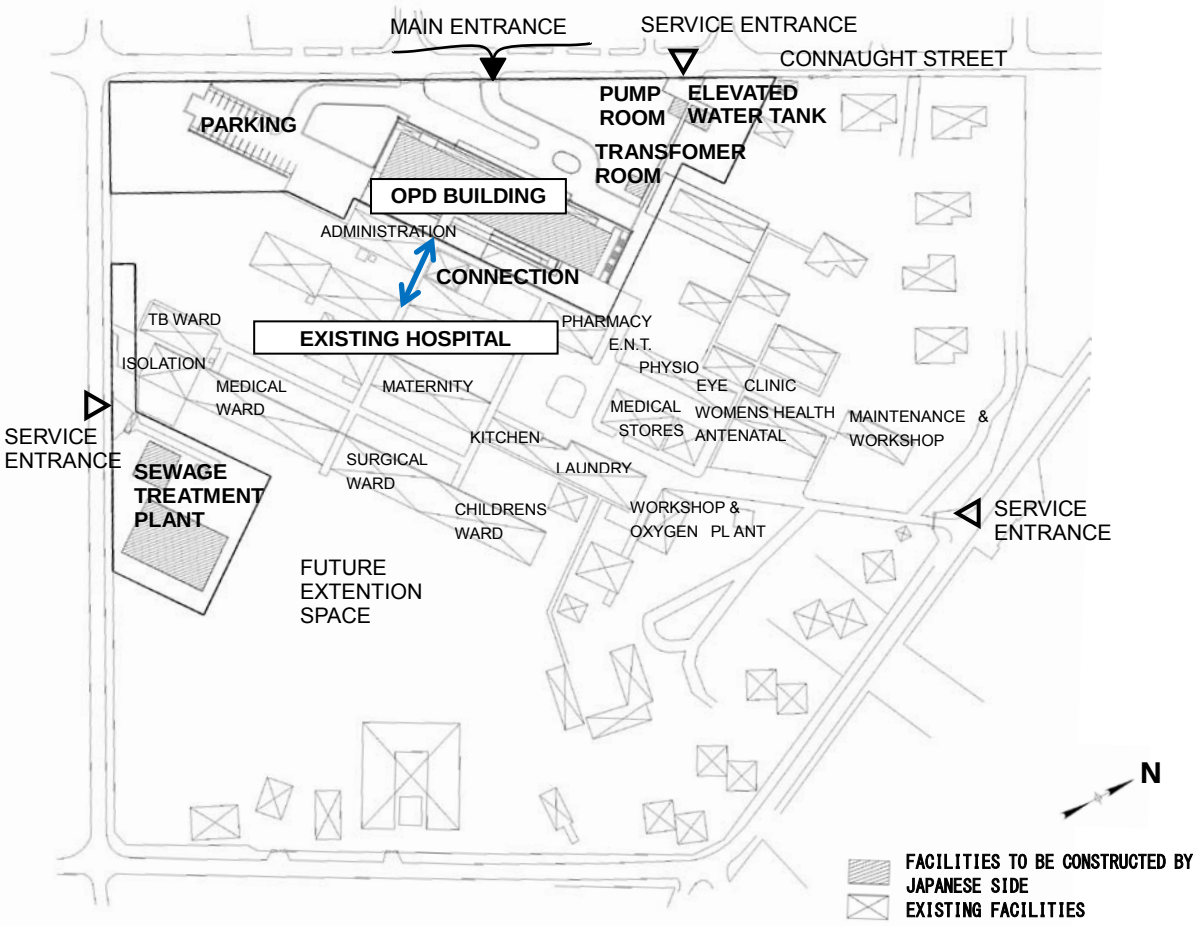


Figure 2-4 Layout Plan of the Project Facilities

2-2-2-3 Architectural Plan

(1) Conditions for setting the Scale of the Facility

Currently, VCH has a serious shortage of human resources (HR), but its personnel costs account for a huge percentage of the hospital budget. Because of this situation, a facility scale that may impose more HR and financial burdens should be avoided. Therefore, the facility scale will be determined to be operated by the existing manpower effectively, and not by the future increased manpower.

Table 2-10 shows the number of existing rooms and proposed rooms. For the Emergency Department, there must be three rooms in terms of its original functions, but there are only two shared rooms at present. Therefore, three rooms will be provided in the new plan as resuscitation (consultation), treatment and observation rooms to recover the department's original functions.

Table 2-10 Required Scale of the Facility

	Existing Number of Rooms	Number of Rooms (Based on last 3 years average)
Emergency Department	2	3
Outpatients' Department (General Clinic)	7	7
Operation Theater	2	2

1) Preconditions for medical services at VCH

① Number of annual service days

Medical services of the Outpatients' Department (General Clinic), Radiology Department (scheduled) and Laboratory Department (scheduled), excluding the Emergency department, Radiology Department (emergency) and Laboratory Department (emergency), will be provided on weekdays only.

The number of annual service days of each department will be as follows.

Emergency Department	365 days
Outpatients' Department (General Clinic)	260 days
Radiology Department (scheduled)	260 days
Radiology Department (emergency)	365 days
Laboratory Department (scheduled)	260 days
Laboratory Department (emergency)	365 days
Operation Theater (scheduled)	260 days
Operation Theater (emergency)	365 days

② Service hours of non-emergency departments

The Outpatients' Department (General Clinic), Radiology Department (scheduled) and Laboratory Department (scheduled), excluding the Emergency Department, Radiology Department (emergency) and Laboratory Department (emergency), will provide medical services 8 hours a day on weekdays, from 7:30 to noon and from 13:00 to 16:30.

(2) Facility Planning for VCH

1) Planning by department

① Number of patients

Because the number of patients decreased in FY 2010 due to the shortage of medical supplies (medicine, oxygen gas) with an insufficient budget, the average value of three years from 2007 through 2009 will be used as the patient data for setting the scale.

② Estimation of the scale

The necessary number of rooms for the departments covered by the VCH project will be estimated based on the following design conditions. As mentioned earlier, estimates will be made based on the condition that existing functions and scale are maintained without taking into account the population growth in the future.

・Outpatients' Department (General Clinic)

Average number of patients per day (persons/day) = number of patients per year (persons/year) ÷ number of service days per year (day/year)

Number of patients for consultation/treatment per room (persons/room/day) = service hours (min/day) ÷ average consultation/treatment time per patient per room (min. room /persons)

Necessary number of rooms (room) = average number of patients per day (persons/day) ÷ number of patients for consultation/treatment per room (persons/room/day)

Table 2-11 Required Number of Rooms for the General Clinic

	Annual No. of Out-Patients (p/year)	Annual working day (day/year)	Opnning hour (min/day)	Average No. of daily patients (p/day)	Consultation room			
					Average of consultation time(min/p)	Maximum No. of daily patients per room (p/day*room)	Required No. of consultation rooms	No. of rooms
	A	B	C	D=A/B	G	H=C/G	I=D/H	
General consultation	81,980	260	480	315.31	10	48	6.57	7

*1: Average consultation/treatment time per patient per room (obtained via an interview)

・Emergency Department

Average number of patients per day (persons/day) = number of patients per year (persons/year) ÷ number of service days per year (days/year)

Number of patients for consultation/treatment per room (persons/room/day) = service hours (min/day) ÷ average consultation/treatment time per patient per room (min. room /persons)

Necessary number of rooms (room) = average number of patients per day (persons/day) ÷ number of patients for consultation/treatment per room (persons/room/day)

Table 2-12 Required Number of Various Rooms for Emergency Department

Emergency	Annual No. of Emergency patients (p/year)	Annual working day (day/year)	Opening hour (min/day)	Average No. of daily patients (p/day)	Resuscitation room				Treatment room				Observation room			
					Average of Consultation time(min/p)	Maxmum No. of daily patients per room	Required No. of consultation rooms	No. of rooms	Average of observation time(min/p)	Maximum No. of daily patients per room	Required No. of treatment rooms	No. of rooms	Average of Observation time (min/p)	Maxmum No. of daily patients per room	Required No. of observation rooms	No. of rooms
	A	B	C	D=A/B	G	H=C/G	I=D/H		J	K=C/J	L=D/K		M	N=C/M	O=D/N	
Traffic accident	128	365	1,440	0.35	60	24	0.01		180	8	0.04	1	480	3	0.12	1
Asthmatic patient	18,667	365	1,440	51.14	10	144	0.36	1	20	72	0.71		-	-	-	

・Operation Theater

Average number of operations per day (persons/day) = number of operations per year (persons/year) ÷ number of service days per year (day/year)

Necessary number of operation rooms (room) = average number of operations per day (persons/day) ÷ average number of operations per room (persons/room/day)

Necessary number of beds (bed) = average number of operations per day (persons/day) ÷ average recovery time (day/bed/persons)

Table 2-13 Required Number of Rooms and Beds for Operation Theater

	Annual No. of Operations/Patients (p/year)	Annual working day (day/year)	Average No. of daily Operations/Patients (p/day)	Major operation			Minor operation			Recovery		
				Maximum No. of daily operations (n/day*room)	Required No. of operation room	No. of operation room	Maximum No. of daily operations (n/day*room)	Required No. of operation room	No. of operation room	Average of recovery time (day／p)	Required No. of Recovery beds (p/day)	No. of beds
	A	B	C=A/B	F	G=C/F		F	G=C/F		H	I=C*H	
Major Operation	879	260	3.38	3	1.13					0.25	0.85	
Minor Operation	1,465	365	4.01				5	0.80		0.1	0.40	
total	2,344		7.39		1.13	1		0.80	1		1.25	2

2) Necessary Floor Area

The total floor area which is required in terms of an architectural plan will be calculated from the necessary number of rooms and such like estimated above. The floor area of each room in the new facilities will be determined by Japanese standard on the floor area of medical facilities (design materials compiled by the Architectural Institute of Japan), in addition to the floor area of the existing facilities.

In addition, comprehensive consideration was given to assumed factors such as the layout of medical devices in each room, and the number of patients and healthcare staff. Thus, the required floor area of each room was set as shown in Table 2-14 below.

Table 2-14 Floor Area of Each Room of the Subject Facility

Floor	Dept.		Room	Floor Area (㎡)	Dimension
1	OPERATION THEATER /RADIOLOGY /LABORATORY DEPARTMENT	OPERATION THEATER	Theatre-1	39.68	6.40 m × 6.20 m
			Theatre-2	39.68	6.40 m × 6.20 m
			Dirty Corridor	25.60	2.10 m × 12.19 m
			Operation Hall	33.54	2.60 m × 12.90 m
				27.03	5.30 m × 5.10 m
			Equipment RM	20.48	6.40 m × 3.20 m
			Recovery RM	41.73	6.40 m × 6.52 m
				4.99	2.20 m × 2.27 m
				1.39	1.30 m × 1.07 m
			Scrub	6.72	4.20 m × 1.60 m
				2.57	2.40 m × 1.07 m
			Changing RM-1	7.04	2.20 m × 3.20 m
				1.95	1.00 m × 1.95 m
			Changing RM-2	7.04	2.20 m × 3.20 m
				1.95	1.00 m × 1.95 m
			Shower-3	2.88	2.20 m × 1.31 m
			Shower-4	2.86	2.20 m × 1.30 m
			Anti Hall	6.10	2.00 m × 3.05 m
			WC-8	3.08	2.20 m × 1.40 m
			SK-2	2.42	2.20 m × 1.10 m
			Staff RM-2	40.96	6.40 m × 6.40 m
			Holding Bay	23.68	3.70 m × 6.40 m
			Wash RM-2	32.48	5.80 m × 5.60 m
				2.10	1.00 m × 2.10 m
			Preparation RM	26.95	4.90 m × 5.50 m
				2.57	2.85 m × 0.90 m
			Autoclave RM	15.75	2.50 m × 6.30 m
			Sub Total	423.22	㎡
		RADIOLOGY DEPARTMENT	X-Ray-1	29.94	6.37 m × 4.70 m
			X-Ray-2	29.75	6.37 m × 4.67 m
			WC-9	5.72	2.20 m × 2.60 m
			Contrall RM	10.84	4.17 m × 2.60 m
			Ultrasound Scanning	10.05	6.40 m × 1.57 m
				7.61	4.70 m × 1.62 m
			WC-10	2.74	1.69 m × 1.62 m
			Reception-4/Office-1	16.80	3.20 m × 5.25 m
				1.58	2.10 m × 0.75 m
			CRT	17.92	6.40 m × 2.80 m
			Sub Total	132.94	㎡
		LABORATORY DEPARTMENT	Waiting-3	31.50	3.58 m × 8.80 m
				16.80	3.20 m × 5.25 m
				2.23	1.18 m × 1.89 m
				4.78	2.83 m × 1.69 m
			Tea RM	8.40	3.00 m × 2.80 m
			WC-11	2.62	2.00 m × 1.31 m
			WC-12	2.62	2.00 m × 1.31 m
			Blood Sampling	13.76	6.40 m × 2.15 m
				3.61	5.55 m × 0.65 m

Floor	Dept.		Room	Floor Area (㎡)	Dimension
1	LABORATORY DEPARTMENT		Counseling RM-2	10.56	3.30 m × 3.20 m
			Mararia Checking	20.61	6.40 m × 3.22 m
			Bleeding RM/Blood Donation	14.08	4.40 m × 3.20 m
			Blood Bank	38.40	6.40 m × 6.00 m
			Serology	19.20	6.40 m × 3.00 m
			Hematology	24.96	6.40 m × 3.90 m
			Biochemistry	24.96	6.40 m × 3.90 m
			Virology	9.60	3.20 m × 3.00 m
			TB	9.60	3.20 m × 3.00 m
			Wash RM.	7.35	2.45 m × 3.00 m
				1.39	0.75 m × 1.85 m
			Media RM.	9.60	3.20 m × 3.00 m
			Cytology/Histology	16.35	5.45 m × 3.00 m
				1.10	0.55 m × 2.00 m
				0.64	0.40 m × 1.60 m
			Microbiology	13.44	3.20 m × 4.20 m
			STI	13.44	3.20 m × 4.20 m
			Locker RM-3	6.99	2.33 m × 3.00 m
				2.56	1.15 m × 2.23 m
				1.98	1.15 m × 1.72 m
			Locker RM-4	10.44	3.48 m × 3.00 m
				1.98	1.15 m × 1.72 m
			WC-13	3.06	1.78 m × 1.72 m
			WC-14	3.06	1.78 m × 1.72 m
			Shower-5	3.75	2.93 m × 1.28 m
			Shower-6	3.75	2.93 m × 1.28 m
			Store-3(DRY)	14.70	4.20 m × 3.50 m
			Store-4(COOL)	9.66	4.20 m × 2.30 m
			Office-2	20.48	6.40 m × 3.20 m
			Conference RM-2	20.48	6.40 m × 3.20 m
			Reception-5	11.84	3.70 m × 3.20 m
			Sub Total	436.33	㎡
	OTHERS		Corridor-5	25.20	9.00 m × 2.80 m
			Corridor-6	54.08	2.60 m × 20.80 m
				9.52	3.40 m × 2.80 m
			Corridor-7	39.00	2.60 m × 15.00 m
			Corridor-8	31.72	2.60 m × 12.20 m
			Stairs	25.38	2.82 m × 9.00 m
			Generator RM	39.68	6.40 m × 6.20 m
			Compresser RM	6.20	2.00 m × 3.10 m
			Vacuum RM	7.20	2.00 m × 3.60 m
			Manifold RM	10.40	2.00 m × 5.20 m
			Neutralization/ Disinfection Equipment RM	23.68	2.00 m × 11.84 m
			Rainwater Filtration RM	17.92	6.40 m × 2.80 m
			PS/EPS	12.04	
			Sub Total	302.02	㎡
			1st Floor Total	1294.52	㎡

Floor	Dept.		Room	Floor Area (㎡)	Dimension
2	EMERGENCY /OUTPATIENT' DEPARTMENT	EMERGENCY DEPARTMENT	Treatment RM-1	38.40	6.40 m × 6.00 m
			Resuscitation RM	40.96	6.40 m × 6.40 m
			Observation RM	52.48	6.40 m × 8.20 m
				3.72	4.65 m × 0.80 m
			Reception・Staff RM-1	13.12	6.40 m × 2.05 m
				6.61	5.75 m × 1.15 m
			Waiting-1	35.84	6.40 m × 5.60 m
			Store-1	34.24	5.35 m × 6.40 m
				1.44	0.45 m × 3.20 m
				0.18	0.45 m × 0.40 m
			Dirty RM	11.36	3.55 m × 3.20 m
			Sterilization RM	9.12	2.85 m × 3.20 m
			WC-1(Patient)	6.38	2.20 m × 2.90 m
				1.14	0.65 m × 1.75 m
			WC-2(Staff)	3.31	2.15 m × 1.54 m
			WC-3(Staff)	3.31	2.15 m × 1.54 m
			Sub Total	261.61	㎡
		OUTPATIENT' DEPARTMENT	General Consultation RM-1(Infection)	19.20	6.40 m × 3.00 m
			General Consultation RM-2	19.20	6.40 m × 3.00 m
			General Consultation RM-3	19.20	6.40 m × 3.00 m
			General Consultation RM-4	19.20	6.40 m × 3.00 m
			General Consultation RM-5	19.20	6.40 m × 3.00 m
			General Consultation RM-6	19.20	6.40 m × 3.00 m
			General Consultation RM-7	19.20	6.40 m × 3.00 m
			Store-2	9.66	3.55 m × 2.72 m
				4.28	2.85 m × 1.50 m
			Plaster RM	19.20	6.40 m × 3.00 m
			Treatment RM-2	38.40	6.40 m × 6.00 m
			Nurse Station-1	13.44	4.20 m × 3.20 m
			Nurse Station-2	11.94	3.73 m × 3.20 m
				6.70	2.68 m × 2.50 m
			Medical Record	45.76	6.40 m × 7.15 m
				9.32	5.65 m × 1.65 m
			Reception-2	7.04	2.20 m × 3.20 m
			Reception-3	20.80	6.50 m × 3.20 m
			Waiting-2	178.64	15.40 m × 11.60 m
				8.00	2.50 m × 3.20 m
			Sub Total	507.57	㎡
		PHARMACY	VCH Pharmacy	30.91	6.40 m × 4.83 m
				24.69	5.65 m × 4.37 m
			Repack RM	10.24	3.20 m × 3.20 m
			Counseling RM-1	10.24	3.20 m × 3.20 m
			Sub Total	76.08	㎡

Floor	Dept.	Room	Floor Area (㎡)	Dimension
2	OTHERS	WC-4	13.33	4.30 m × 3.10 m
			5.04	2.10 m × 2.40 m
		WC-5	6.36	2.05 m × 3.10 m
			3.66	3.05 m × 1.20 m
			4.56	2.40 m × 1.90 m
			1.69	1.30 m × 1.30 m
		Locker RM-1	10.44	3.48 m × 3.00 m
			1.98	1.15 m × 1.72 m
		Locker RM-2	11.14	3.48 m × 3.20 m
			2.22	1.15 m × 1.93 m
		WC6	3.06	1.78 m × 1.72 m
		WC7	3.44	1.78 m × 1.93 m
		Shower-1	3.75	2.93 m × 1.28 m
		Shower-2	3.75	2.93 m × 1.28 m
		SK-1	2.34	1.30 m × 1.80 m
		Conference RM.	38.40	6.40 m × 6.00 m
		Corridor-1	25.20	9.00 m × 2.80 m
			31.20	2.60 m × 12.00 m
		Corridor-2	62.40	2.60 m × 24.00 m
		Corridor-3	47.84	2.60 m × 18.40 m
		Corridor-4	4.31	1.40 m × 3.08 m
			3.99	2.85 m × 1.40 m
		Electrical RM	38.40	6.40 m × 6.00 m
		MR	20.48	3.20 m × 6.40 m
		PS/EPS	13.13	
		Sub Total	362.10	㎡
		2nd Floor Total	1207.36	㎡
	EXTERIOR COMMON	Outside Corridor	30.00	3.00 m × 10.00 m
		Sloop 1	92.40	42.00 m × 2.20 m
		Sloop 2	72.00	36.00 m × 2.00 m
		Sloop 3	145.20	66.00 m × 2.20 m
		Loading	11.66	2.20 m × 5.30 m
		Emargency Entrance	58.00	10.00 m × 5.80 m
		Entrance	124.80	16.00 m × 7.80 m
		Sub Total	534.06	㎡
		Elevated water tank	44.55	
		Transformer RM.	35.24	
		Pump RM.	25.85	
		Blower RM.	15.98	
		Sub Total	121.62	㎡
		Total Floor Area	3157.56	㎡

3) Composition of facilities (function)

The composition of the facilities of the project is shown in the table 2-15.

Table 2-15 Facility Configurations of the Department within the Scope of the Project

Major project breakdown	Facility
OPD Building	First floor: Operation Theater: Operation rooms (2), Recovery, Operation Hall, Central Sterilization and Supply, Equipment room, Changing Room Radiology Department: X-ray(2), Control room, Ultrasound Scanning, CRT room, Reception, Office Laboratory Department: Hematology/ Serology/ Blood bank/Biochemistry /Cytology/ Histology/ Microbiology/ STI/ Virology/TB/Wash room/ Media room/ Malaria/Blood Sampling/ Blood Donation/Tea room/ WC/ Reception/ Office/ Locker room Second floor: Emergency Department: Waiting, Reception/Staff room, Resuscitation room, Treatment room, Observation room, Dirty room, Sterilization room Outpatients' Department (General Clinic): Waiting, General Consultation room (7), Nurse Station, Treatment room, Plaster room, Medical Record, Reception, Pharmacy, Locker room, Conference room Specialized Equipment: Rainwater Utilization System
Ancillary facilities	Elevated Water Tank Pump room Transformer room Blower room Sewage Treatment Plant, Soak Pit

4) Floor planning

As shown in Figure 2-5, to aggregate facilities for medical services in one place and to use the limited area effectively, the two-story building is formed for the OPD building. The building was given a slope and stairs for persons to move up and down, and an elevator, which would require maintenance, was not provided.

To ensure easy access for patients, the main entrance and emergency entrance were set at almost the same level as the road in front. They are on the second floor because of the height difference on the site.
In addition, the Emergency Department, which needs to handle patients rapidly, and the Outpatients' Department (General Clinic) and Pharmacy, where many patients come to undergo consultations and treatment and receive medication, are located on the second floor.

The Central Clinical Service Department will be placed on the first floor and outpatients who need an examination will go down to this floor via the slope or stairs. The slope will be designed to enable smooth movement of wheelchairs and stretchers. Access to the Central Clinical Service Department on the first floor from existing wards will become easy because they are roughly on the same ground level. External stairs leading to the existing Special Clinics will also be provided to secure continuity between the departments.

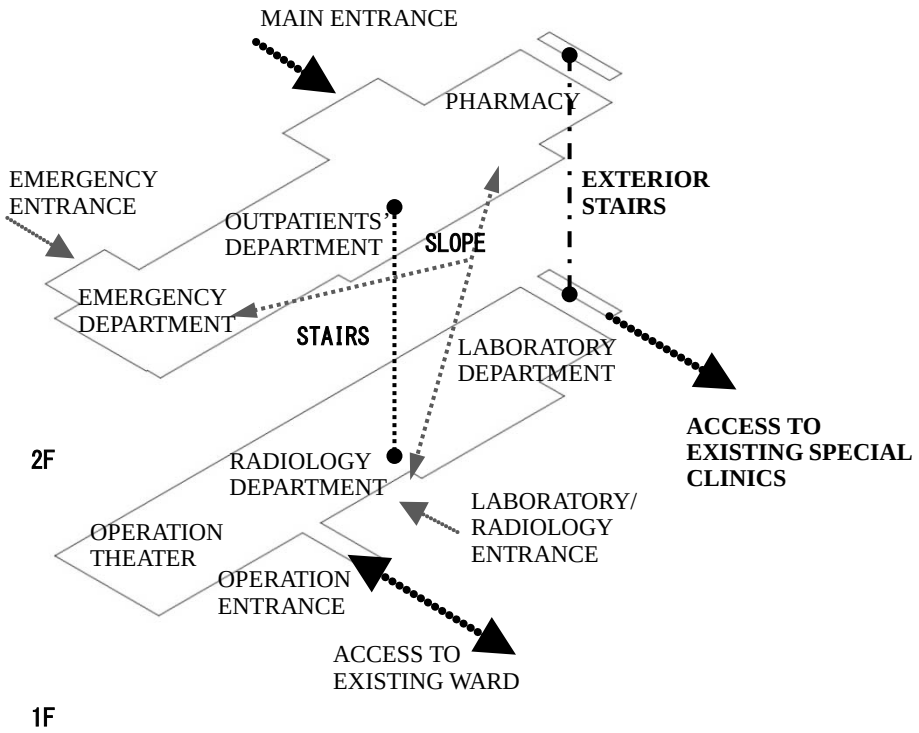


Figure 2-5 Diagram of Spatial Relation of Functions

① Concept of the Outpatients' Department

The Outpatients' Department will consist of the reception, Emergency Department, Outpatients' Department (General Clinic) and VCH pharmacy. The waiting area for outpatients will be placed just inside of outpatients' entrance while accompanying persons will be allowed to wait outside to reduce overcrowding of the inside. The entrance to the Emergency Department will be placed on the west side of the second floor of the OPD Building, which is the closest position from the front road, for easy access of emergency vehicles.

The Emergency Department will consist of a resuscitation room, observation room and treatment room, and have continuity with the general clinic department to enable medical services with a limited number of staff. The Emergency Department leads to a roofed slope that can allow patients to get to the Operation, Laboratory, and Radiology Departments swiftly without getting wet on rainy days. (Figure 2-6)

The General Clinic will have 7 consultation rooms, as with the existing department. One of the rooms will be used for infected outpatients to prevent nosocomial infection. Access to consultation rooms, treatment rooms, and a plaster room by patients is from the center corridor, and the window side of those rooms will become the area of traffic lines for doctors and nurses. This layout, separating their trafic lines from that of patients, enables efficient medical services to eliminate the crossing of the lines. (Figure 2-7)

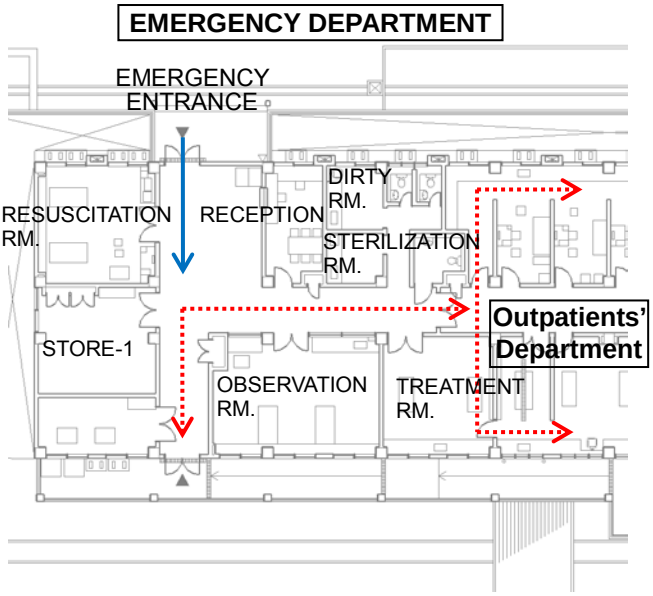


Figure 2-6 Second Floor: Emergency Department

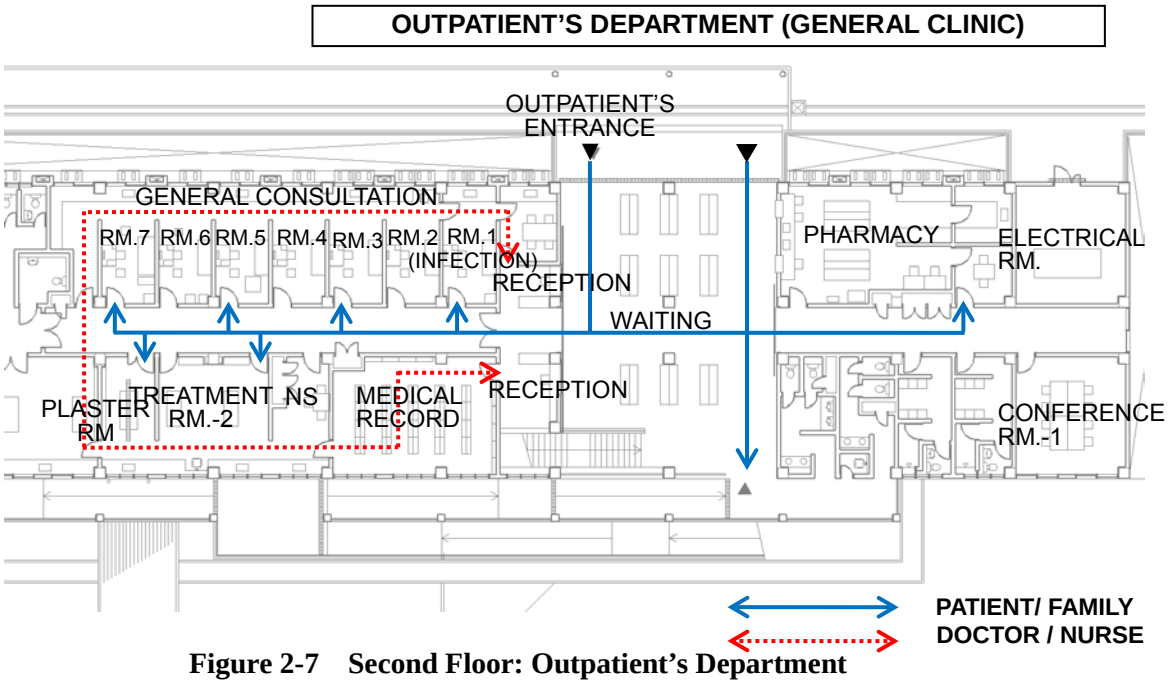


Figure 2-7 Second Floor: Outpatient's Department

② Concept of Laboratory and Radiology Departments

The Laboratory Department will consist of rooms for blood sampling, bleeding, blood donation, malaria testing, blood bank, serology, hematology, biochemistry, virology, TB, cytology and histology, microbiology, and STI (Sexually Transmitted Infection). The Radiology Department will consist of rooms for X-rays and ultrasound scanning, etc. The rooms for blood sampling, bleeding, blood donation and urine collection, and the malaria test room staffed by outside personnel will be placed near the entrance and the waiting area to allow patient's access. Other rooms of the Laboratory Department will be placed in the staff-only zone where entry is managed by reception staff. To secure easy traffic lines, a blood bank and serology, hematology and biochemistry areas will be placed in an open wide room. To prevent nosocomial infection, individual rooms will be provided for the tests of virology, TB, cytology and histology, microbiology, and STI. In the meantime, the X-ray and ultrasound scanning rooms requiring patients to directly enter the room will be placed near the waiting area for ease of access. In particular, the entrance to X-ray rooms where emergency patients are often checked for the conditions will be placed near the slope for ease of access from the Emergency Department on the upper floor. The X-ray rooms will be constructed of concrete and the openings covered with lead or special glass to shut off radiation for safety. (Figure 2-8)

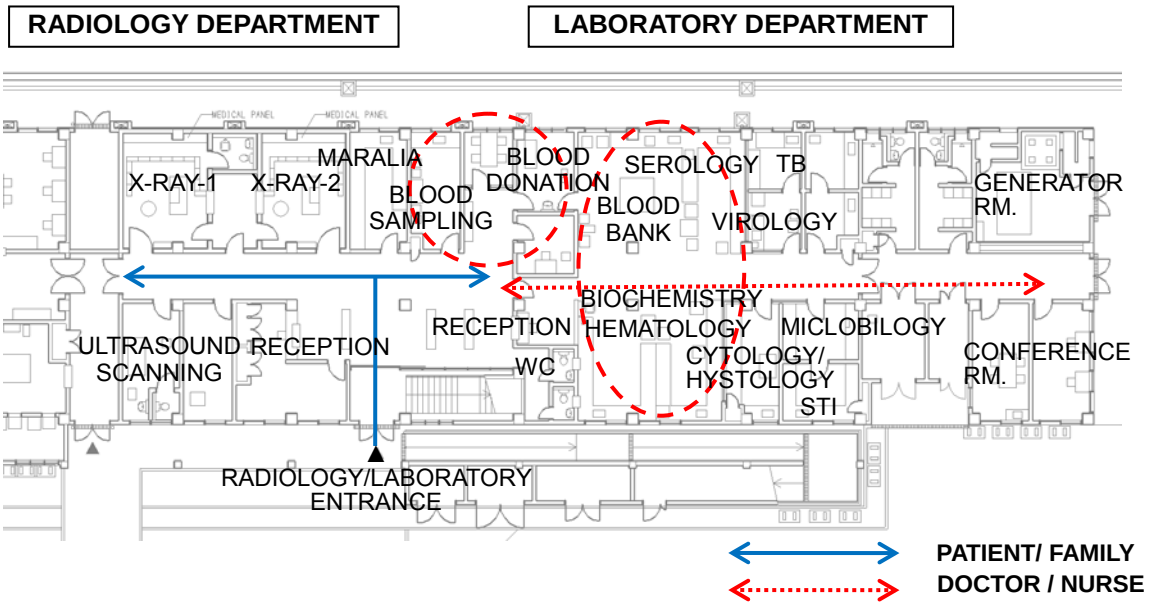


Figure 2-8 First Floor: Laboratory and Radiology Departments

③ Concept of the Operation Theater

The Operation Theater will consist of two theaters, a recovery room and CSSD, and it will have a staff room and an equipment room as ancillary rooms. To prevent infection completely, all the patients, staff and equipment are required to undergo cleansing before entering the clean area. Dirty equipment and supplies after operations will be carried to CSSD by separating them from medial staff and patients. The patients after undergoing an operation will be placed in the recovery room visible from the nurse station, and then carried to the patients' ward. CSSD will be designed to enable delivery and receipt of equipment and supplies from both the operation hall and corridor sides so that it can handle sterilization of equipment from the Outpatients' Department and wards as well. (Figure 2-9)

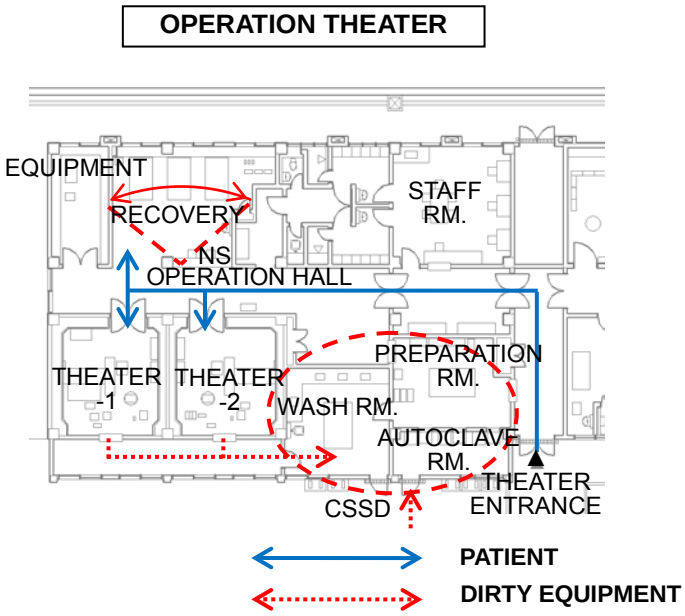


Figure 2-9 First Floor: Operation Theater

5) Cross-sectional plan

To secure appropriate continuity of service functions by making use of the gradient of the hospital site, the second floor of the new OPD Building accommodating Outpatients' Department (General Clinic) and Emergency Department will be placed roughly on the same level as the front road, and the first floor accommodating the Central Clinical Service Department roughly on the same level as the existing facilities. (Figure 2-10)

The floor height of the 1F will be set at 4.5 m because operation theaters require a high floor height for the installation of AC ducting. The floor height of the second floor will be 3.85 m to secure an average ceiling height of 2.8 m.

Jalousie-type windows will be adopted for the rooms with no air conditioning to bring in a draught. The waiting area for outpatients will be designed as a half-exterior type with a configuration to ensure good draught and little temperature rise by placing a skylight at the top. Insulation materials will be laid on the roof to improve insulation efficiency, prevent the inward flow of heat, and reduce the use of electricity for air conditioning.

The roof will be constructed of a concrete slab that can withstand cyclones and covered with folded metal which are commonly used for waterproofing in Vanuatu. The concrete slab also contributes to insulation in combination with the insulation materials laid on the roof and prevents serious damage to rooms in case of water leakage.

As a water supply for medical use, a rainwater tank will be installed in the underground pit to recycle rainwater with a view to reducing energy costs.

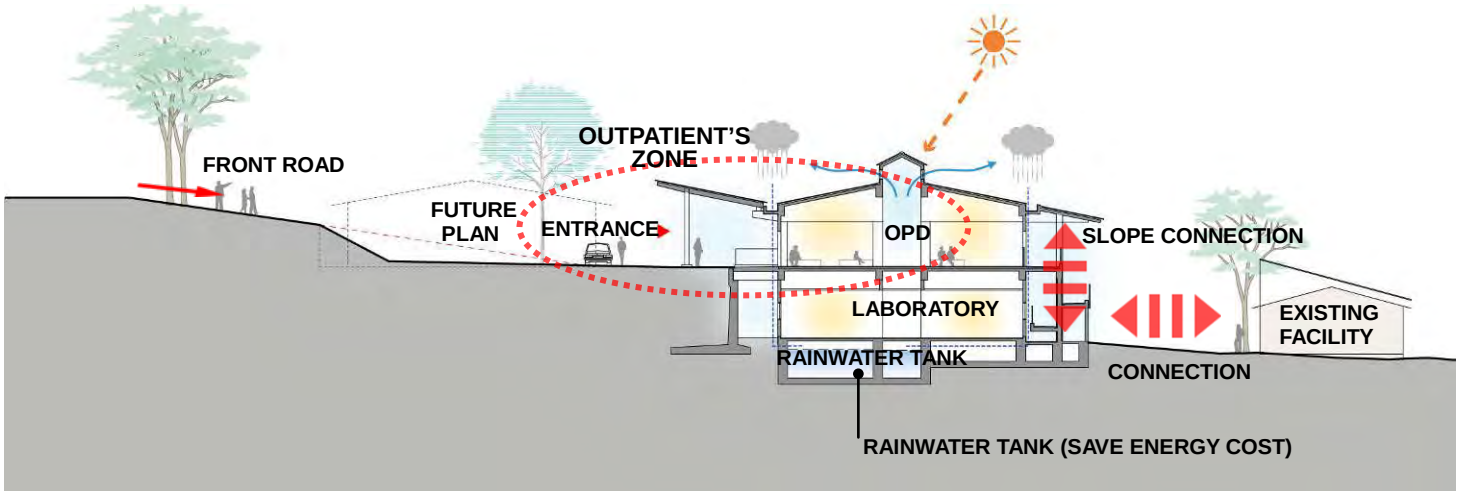


Figure 2-10 Cross Sectional View of the New OPD Building

6) Elevation plan

The elevation of the new building must have an open, clear, and clean image. Eaves with a carriage porch and a skylight will provide a distinctive elevation when looked at from the front road side and a roofed slope will give a unique elevation when looked at from the existing building side.

For the exterior walls, strong and durable materials that need little maintenance will be adopted. The exterior walls will be finished by painting as is common in the local area. Pipe shafts will be installed on the exterior walls to accommodate rainwater, water supply and drainage pipes. This will reduce damage due to water leakage compared with the case where pipes are installed inside the building.

2-2-2-4 Structural Plan

(1) Geotechnical Conditions of the Project Site

About half of Vanuatu's islands are volcanic and Efate Island where the project site is located is also a volcanic island created by the uplift of a submarine volcano. The geology of Efate Island consists of volcanic areas in the central area at high altitude and sediments in the area near the seashore.

The project site is located on sloped ground near the seashore and its geology is made up of reef limestone which came from deposited corals on the seabed.

According to the ground survey (Figure 2-11), a silt layer exists at a depth of between GL-0.3 and -1.5 m and there is a reef limestone layer below that. The upper part of the reef limestone layer is rather fragile due to weathering and not appropriate as load-bearing ground. The thickness of this fragile reef limestone layer varies from 0 m up to 7 m depending on the test point (Figure 2-11). The lower part of the reef limestone layer is hard ground with a capacity sufficient for a load bearing layer.

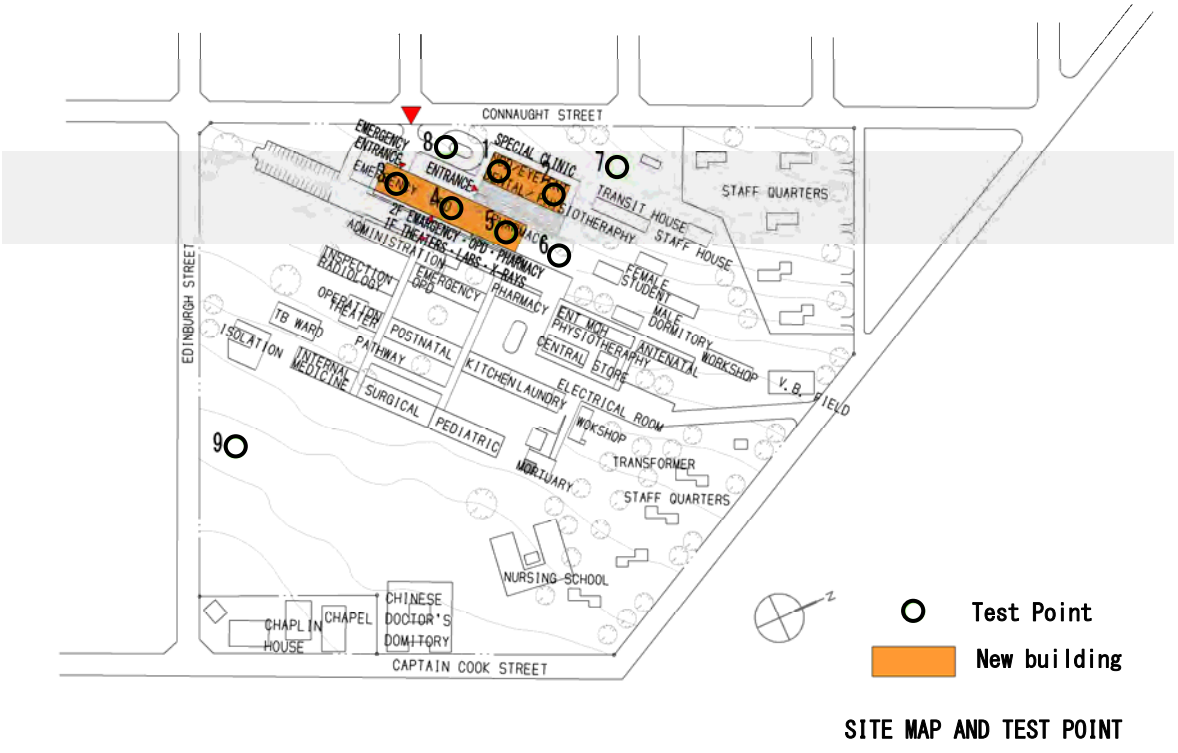


Figure 2-11 Location of Test Point

(2) Foundation Plan

1) Bearing ground and allowable bearing capacity

The lower part of the reef limestone layer is chosen as the bearing ground for the project based on the ground survey report.

According to the report, the net allowable bearing capacity of that part is 30 t/m^2 (300 kN/m^2) which was estimated from the bearing capacity when the settlement reached 25 mm. Therefore, the long-term allowable bearing capacity and the short-term allowable bearing capacity for the present design will be set at 15 t/m^2 (150 kN/m^2) and 30 t/m^2 (300 kN/m^2), respectively.

In Efate Island, reef limestone layers do not appear at the same altitude because the deposited layers at the sea bottom have been lifted up to various heights as a result of volcanic actions. The reef limestone layer at the project site appears to be roughly parallel with the gradient of the ground. In addition, because the fragile reef limestone layer does not have the same thickness due to weathering, the depth of the bearing layer is varied, ranging between 1FL+4 and -6 m, as shown in the figure 2-12.

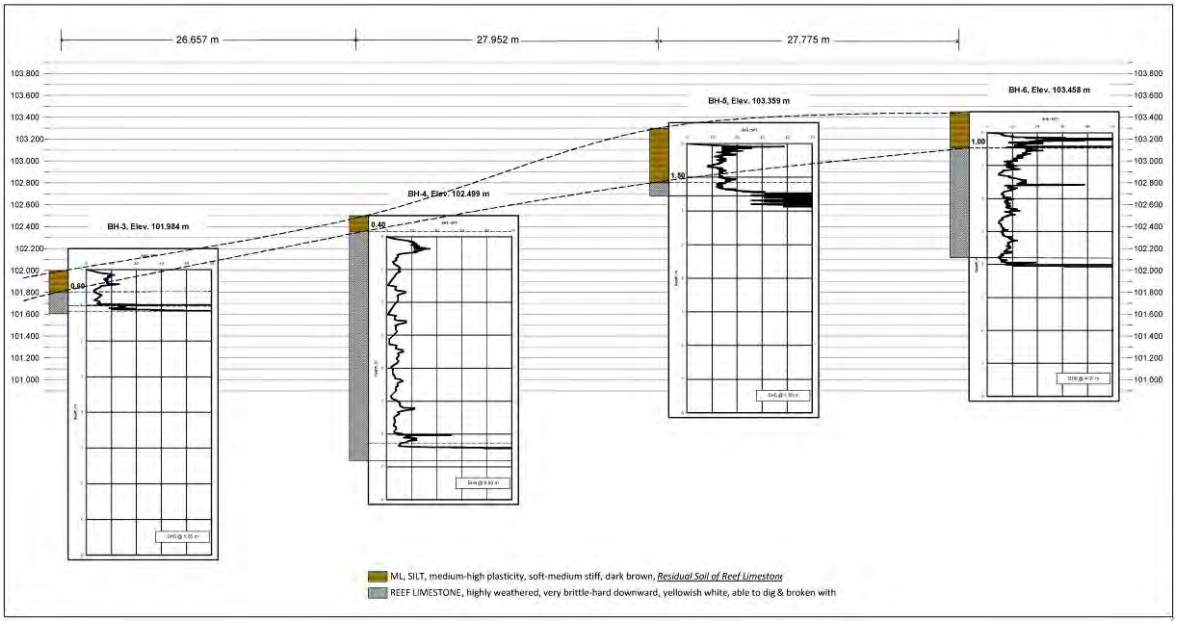


Figure 2-12 Assumed Geological Section (East - West)

2) Foundation type

The thickness of floor beams on first floor (foundation beams) will be made to between 1,800 and 2,500 mm because a tank pit and a pipe pit will occupy a wide area below first floor. The foundation slab will be placed between -2 and -3 m of the first floor level and the foundation slab will reach the bearing layer in the area roughly half of the building area. The depth from the foundation slab to the bearing layer will be roughly between 0 and 4 m in other areas.

In view of the above conditions, a spread foundation is chosen as the foundation type. In the area where the foundation slab does not reach the bearing layer, replacement concrete will be

deposited. A raft foundation with a slab will be constructed in the area where pits are placed, and a continuous footing will be installed in other areas.

(3) Structural Plan

Geographically, Vanuatu is located near the boundary of the Pacific plate and the Australian plate, one of the most earthquake-prone regions in the world. As the region is frequented by M 7 or higher earthquakes, an earthquake resistant structure will be adopted for the new building.

The new OPD Building will become a two-story building with a basic span of 6 m × 6 m. Its structural type will be a reinforced concrete construction with high earthquake resistance and durability and it will be constructed with locally available materials. Reinforced concrete frame structure is selected for the building.

The construction site is sloped down toward the south. The existing ground lies at the first floor level on the south side of the new building and at the second floor floor level on the north side of the building. Because three sides of the building excluding the south will be used as a dry area, retaining walls are necessary on those sides. If those retaining walls are integrated with the building, the earthquake resistance of the building could be decreased for two reasons: rigidity balance of the entire building will be lost (a reduction in rigidity and eccentricity) and eccentric earth pressure will be imposed from the north side. Therefore, retaining walls will be constructed as independent structures separated from the building.

The roof will be a concrete slab type because part of the roof is independent and severe blow-up load due to cyclones is expected. The roof will be covered with metal roof.

The exterior and interior walls will be constructed using concrete blocks as is common in local areas. Reinforced concrete will be used only for the portion which is required the building performance.

The eaves and the outside corridor will be constructed of structural steel. Because the project site is close to the sea and therefore in need of rust preventive measures are needed. Structural steel will be finished with hot-dip galvanizing for rust prevention and other structural steel and metal hardware will be coated with rust-resisting paint to improve durability.

The structural type of auxiliary facilities will be reinforced concrete construction. The water tank and the sewage treatment plant will be constructed as wall structures and other facilities will adopt reinforced concrete frame structure in principle.

(4) Policy on Structural Design

The structural design will be performed in accordance with National Building Code-2000 of Vanuatu (hereafter “Vanuatu Standard”). The Vanuatu Standard is complemented by the Australian Standard (AS) and New Zealand Standard (NZS). It is stipulated that the wind load should be determined based on AS 1170 and the fixed load, live load and seismic load based on NZS 4203. The factors to be employed when applying those standards to the structures in Vanuatu are specified in the Vanuatu Standard.

However, AS 1170 and NZS 4203 were integrated into AS/NZS 1170 in 2002 and the estimation method of those loads has been changed. Therefore, those loads are to be determined based on the new AS/NZS 1170. But, the new factors to be employed when applying those loads to the structures in Vanuatu are not specified in Vanuatu Standard, and we will determine them by referring to the former factors that were determined based the former AS 1170 and NZS 4203.
Regarding the use of Japanese software for structural calculations, we obtained approval from the Ministry of Infrastructure and Public Works Utilities based on the fact that verification is possible by inputting Vanuatu Standard-based values into the software.

(5) Design Load

1) Determination of annual exceedance probability of each load

The annual exceedance probability of each load will be determined from the importance level and design working life of the building based on AS/NZS 1170.0-2002.
Considering the type of building, which is a hospital facility, and the quality of locally manufactured concrete, the importance level and design working life of the proposed building are determined as follows.

Importance level [1 to 5]:	4 (high)
Design working life:	50 years

There will be two design levels: the serviceability limit state [SLS] and the ultimate limit state [ULS]. However, for buildings with an importance level of 4 their serviceability limit state must be checked under seismic loading at two sub-levels, SLS 1 and SLS 2.
The following are annual exceedance probabilities at each design level that are determined from the importance level and design working life.

Serviceability limit state	SLS1:	1/25 (return period: 25 years)
	SLS2:	1/500 (return period: 500 years)
Ultimate limit state	ULS:	1/2500 (return period: 2,500 years)

2) Fixed load

Fixed load will be determined based on AS/NZS 1170.1-2002 by taking into account the finishing materials and structural materials used for the building.

3) Live load

Live load will be determined based on AS/NZS 1170.1-2002 and other conditions expected during the service life.

4) Wind load

Wind load will be determined based on AS/NZS 1170.2-2002.
Wind velocity, 70 m/s, will be applied to the ultimate limit state (ULS) and 57 m/s to SLS 1 of the serviceability limit state based on the Vanuatu Standard.

5) Seismic load

Seismic load will be determined based on NZS 1170.5-2004.

The estimation method of seismic load based on NZS 1170.5-2004 is shown below.

Fi (Equivalent Static Horizontal force at level i)

$$Fi = Ft + 0.92V \frac{Wi \cdot hi}{\sum_{i=1}^{n} (Wi \cdot hi)}$$

Where,

Ft : 0.08V at the top level and 0 elsewhere

Wi : seismic weight at level i

hi : height of level i above the base of the structure

V (Horizontal seismic base shear)

$$V = C_d(T_1) \cdot Wt$$

Where,

Wt : seismic weight of the structure

$C_d(T_1)$ (Horizontal design action coefficient)

$$C_d(T_1) = \frac{C(T_1) \cdot Sp}{k\mu}$$

Where,

Sp : structural performance factor

$k\mu$: inelastic spectrum scaling factor

$C(T)$ (Elastic site hazard spectrum for horizontal loading)

$$C(T) = C_h(T) \cdot Z \cdot R \cdot N(T, D)$$

Where,

$C_h(T)$: spectral shape factor

Z : hazard factor

R : return period factor Rs or Ru

$N(T, D)$: near-fault factor

In NZS 1170.5-2004, 0.13 to 0.60 is specified as the hazard factor (Z) for various zones in New Zealand, but the Z value of Vanuatu is not specified. In the Vanuatu Standard, the Z value of the project site is specified as 0.7 based on the former NZS 4203. From the fact that Z of New Zealand specified by the former NZS 4203 was 0.6 to 1.2, the new hazard factor (Z) of Vanuatu can be calculated as follows.

$$Z = 0.13 + (0.7 - 0.6) \times \frac{(0.6 - 0.13)}{(1.2 - 0.6)} = 0.2083$$

$N(T, D)$ is an overdesign factor for areas within 20 km of major faults in New Zealand. Therefore, we decided to employ 1.0 for the project site.

The calculation results of $C_d(T_1)$ (Horizontal design action coefficient) are shown below.

■The Elastic Site Hazard Spectrum

C(T)=Ch(T)･Z･R･N(T,D)

Importance Level	4	(High)	
Design Working Life	50	(yaers)	
T1	0.35	(sec)	
Site Subsoil Class	B	(Rock)	
Ch(T1)	1.89		:The Spectral Shape Factor
Z	0.21		:The Hazard Factor
Rs(SLS1)	0.25	(1/25)	:The Return Period Factor
Rs(SLS2)	1.00	(1/500)	
Ru	1.80	(1/2500)	
N(T,D)	1.00		:The Near-Fault Factor

■The Horizontal Design Action Coefficient

Cd(T1)=C(T1)･Sp/kμ :The Horizontal Design Action Coefficient

State	C(T1)	μ	Sp	kμ	Cd(T1)
SLS1	0.098	1.00	0.70	1.00	0.069
SLS2	0.394	2.00	0.70	1.57	0.175
ULS	0.709	4.00	0.70	2.71	0.183

μ :Structural Ductilty Factor
for SLS1: 1.00≦μ≦1.25
for SLS2: 1.00≦μ≦2.00
for ULS: 1.00≦μ≦6.00
Sp :The Structural Performance Factor
kμ :The Inelastic Spectrum Scaling Factor

For reference, the calculation results based on the former NZS 4203 are shown below.

■Reference : NZS4203
■The Lateral Force Coefficient
for SLS C=Ch(T1,1)· Sp· R· Z· Ls
for ULS C=Ch(T1,μ)· Sp· R· Z· Lu

	Sp	0.67	:Structural Performance Factor
	R	1.30	:Risk factor for Structure(0.6-1.3)
	Z	0.70	:Zone Factor(0.6-1.2)
	Ls	0.17	:Serviceability Limit State Factor
	Lu	1.00	:Ultimate Limit State Factor
for SLS	Ch(T1,1)	0.68	:Basic Seismic Hazard Acceleration Coefficient
for ULS	Ch(T1,4)	0.23	
for SLS	C	0.069	:The Lateral Force Coefficient
for ULS	C	0.140	

The seismic loads calculated from each standard are roughly equal in the serviceability limit state. But, the seismic load calculated from NZS 1170.5-2004 is about 30% larger than that calculated from the former NZS 4203 in the ultimate limit state.

(6) Materials Used

Specifications of the materials used for the project are set out in the Vanuatu Standard. The Vanuatu Standard is complemented by the New Zealand Standard (NZS).

1) Concrete

Conform to NZS 3101 and 3109 based on the Vanuatu Standard.
According to the field investigation, types of concrete with a specified design strength of 20, 25, and 30 N/mm^2 are being manufactured in Vanuatu. To secure seismic resistance and durability of the proposed building, 25 N/mm^2 will be adopted for the major structural area and 20 N/mm^2 for other areas as the specified design strength of concrete

2) Reinforcing bar

Conform to NZS 3402 based on the Vanuatu Standard.
Reinforcing bars manufactured to JIS are acceptable as they fall within the range allowed by NZS 3402.

3) Structural steel

Conform to NZS 3404 based on the Vanuatu Standard.
Structural steel manufactured to JIS is acceptable as it falls within the range allowed by NZS 3404.

4) Concrete block

Conform to NZS 4210 based on the Vanuatu Standard.

2-2-2-5 Mechanical and Electrical (M/E) Systems

(1) Electrical Systems

The key points of an electrical system plan under the project are listed below.

1. Prioritize stabilization of power supply when making a plan, in consideration of usage of hospital buildings.
2. Give due consideration to less availability of local materials and simplify maintenance.
3. Select energy-savable equipment, machines and instruments so as to reduce running costs.

1) Power Supply System

Electric power is currently supplied to VCH by a local electric power company, Union Electrique du Vanuatu (hereafter "UNELCO"). Power rated at 5.5 kV is led in to a stand-alone transformer room located around the boundary in the north of the premises. After the voltage is stepped down by the transformer (owned and managed by UNELCO) in the room, power is supplied to individual facilities via a distribution board in the Electrical room in the hospital.

The existing high-voltage transformer has a capacity of 250 kVA. The power required under the project is estimated to be approximately 300 kVA including power required for new facilities. This means we forecast a shortage of power. UNELCO's policy offers one line each to every consumer. The capacity of the transformer to be newly established is intended to be used for all VCH, and shall be 400 kVA to meet the power needs. The consultant recommended Vanuatu to replace the 250 kVA transformer with a new transformer and connect the existing load to the new transformer. Vanuatu agreed to this recommendation.

The UNELCO's high voltage 5.5 kV, three-phase, 3 W, 50 Hz x 1 line will be led into a new transformer room on the project site from Connaught Street on the front side in the west through an underground route. The power required for the facilities under the project will be supplied by UNELCO at 400 V/230 V, three-phase, 4 wires. The power will also be supplied to the existing buildings.

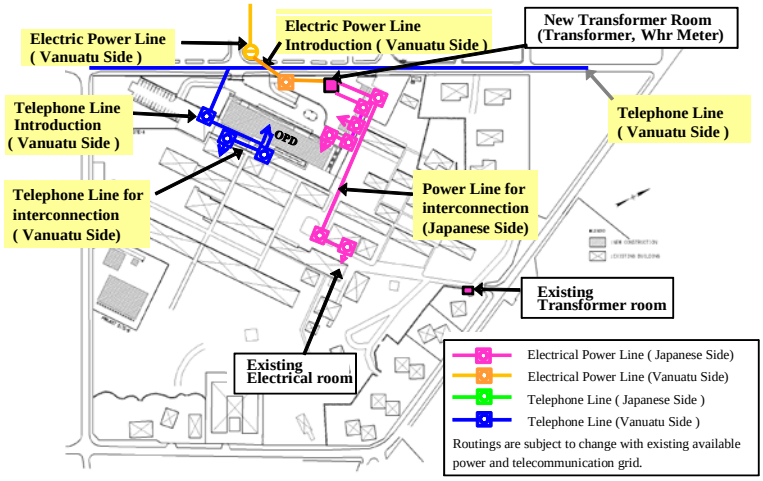


Figure 2-13 Power & Telecommunication Introduction Route

A diagram of construction work is to be carried out by the Japanese side and to be done by the Vanuatu side is shown in Figure 2-14. Vanuatu side will undertake primary high voltage lead-in to the transformer room and Japan side will undertake underground conduit installation required for lead-in.

Japan side shall be responsible for works including installation of a switch board as a scope limit between the hospital and the electric power company; installation of a new transformer room, a transformer, mains and distribution boards, wiring work, a branch breaker for connection to the existing board; conduit works and wirings on the project site. Vanuatu side shall be responsible for installation of a watt-hour meter for metering.

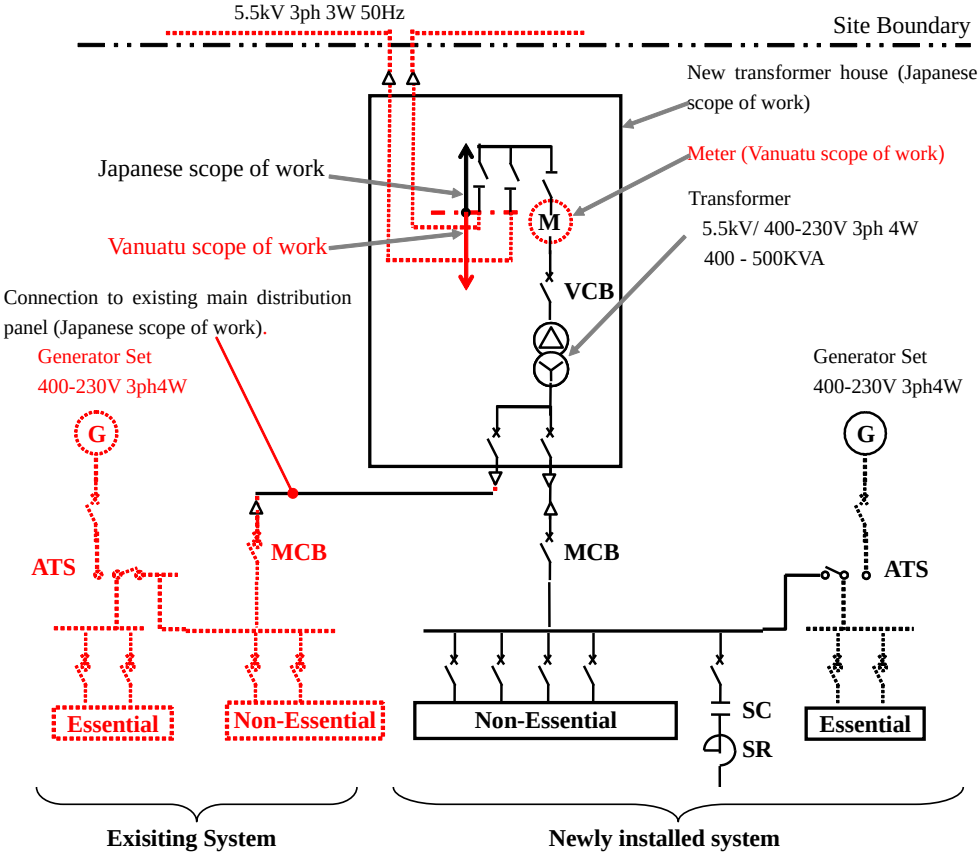


Figure 2-14 Electrical System Plan

In Vanuatu, the quality of its commercial power source is exceptionally high as seen in a voltage fluctuation of no more than +/- 7% and frequency fluctuation of +/- 0.2%. Installation of automatic voltage regulators (AVR) will be taken into account for the purpose of protecting equipment from voltage fluctuations by the procurement of medical equipment but will be limited to medical equipment susceptible to voltage fluctuations.

During occasional power outages, a blackout may last a couple of hours, and thus, a diesel power generator will be installed as an emergency power supply system.

Emergency power supply will apply to equipment that must not be inactive during a blackout such as refrigerators of medical equipment, air conditioners, ventilation fans, lighting and power sockets in the Emergency Department. A power generator of a radiator cooling diesel package type will be installed and have the required minimum capacity. A

service tank (daily use tank) will be used to supply diesel fuel. The capacity is assumed to be about 100 kVA so as to serve as emergency power for the facilities within the scope of the project. The power generator will be installed in the Generator room to avoid exposure to weather and will employ appropriate sound insulation, sound-proof and vibration-proof systems in consideration of the surrounding environment. Figure 2-15 shows the power distribution system.

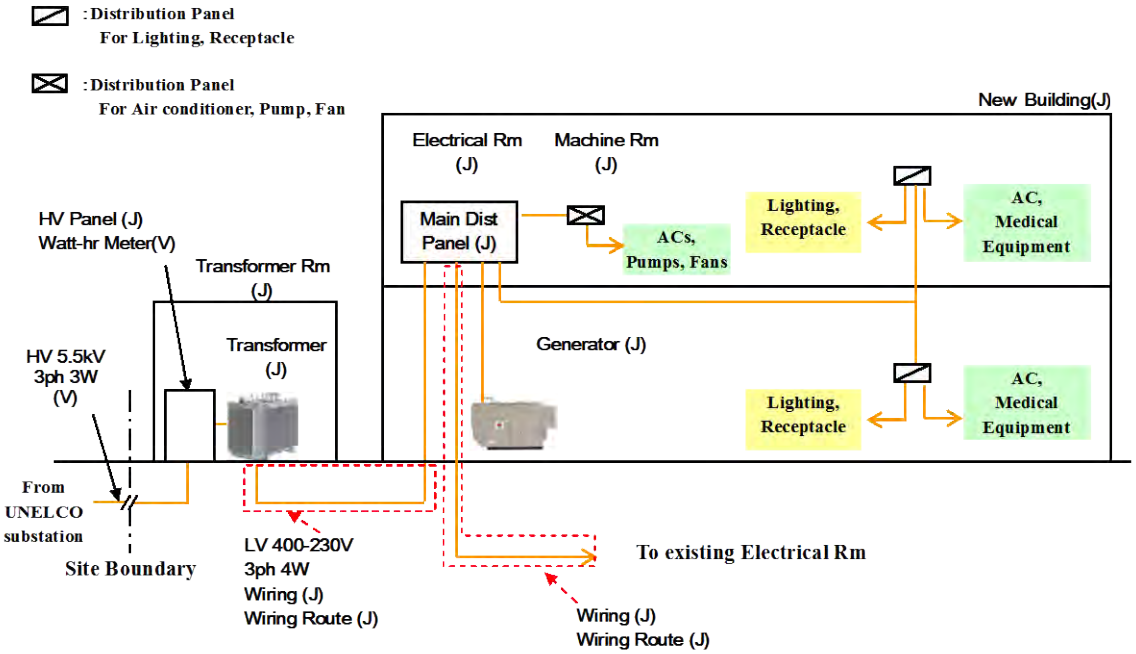


Figure 2-15 Power Distribution

2) Lighting and receptacles system

More than half of the lighting installed in public facilities including VCH in Vanuatu is usually kept off to reduce electricity costs.

On the other hand, installation must comply with AS/NZS 1680 standards. The project plans to set designed illuminance of general lighting as shown in the table 2-16 and control the lighting to effectively light up necessary areas.

Table 2-16 Lighting Plan of Major Rooms

Description	Design Illiminance [Lx]	Light Source
Consultation	300	Fluorescent Lamp
Lab, Treatment	500	Fluorescent Lamp
Store, Machine Room	100	Fluorescent Lamp
Office	400	Fluorescent Lamp
Corridor	50	Fluorescent Lamp
WC	100	Fluorescent Lamp

The light source will be energy-efficient fluorescent light tubes that are generally used in the local area and are characterized by high illumination efficiency. Switch zoning will be segmented like zigzag type and core side/perimeter side, in order to reduce the running costs. Switchable three-pin type (AS/NZS 3112) power sockets will be employed as they are generally used in Vanuatu. The installation location and quantity of the sockets will be determined after reviewing the type of power supply to equipment, power supply capacity and connection.

3) Lighting arrester and grounding device

To protect the facilities from lightning, lightning arresters will be installed. In addition, a grounding device will be installed for each piece of medical equipment, power equipment and communication equipment as per individual specifications.

The lightning arrester will not need to be installed to the power lead-in line because it is buried in the ground.

4) Telephone system

As for telephone equipment lead-ins, there are existing 100 underground wires that were installed and buried in the street on the front side of the premises by a local telecom company, Telecommunication Vanuatu Limited (hereafter TVL). It has been over three decades since their installation, and some of the wires are damaged. And, the existing lead-in route crosses the project site. The project will remove the existing wires once and then install the wires into a new main distribution frame (MDF) for the new building.

Approximately 10 to 20 regular telephone lines and 50 to 100 extension lines will be required for the line capacity required for the facilities.

Japan will install the MDF, a private automatic branch exchange (PABX), a terminal board, in-room wiring and telephone equipment. The MDF and PABX will have an enough capacity to cover the existing wards.

Vanuatu side will undertake all the work of telephone line lead-in wiring and piping to the new MDF; connection of the new MDB to the existing MDF; and adjustment of the existing PABX.

Prior to removal of existing telephone lines for this construction work, it is necessary to take into account the need for a temporary telephone line plan during construction.

The telecommunication system is shown in the figure 2-16.

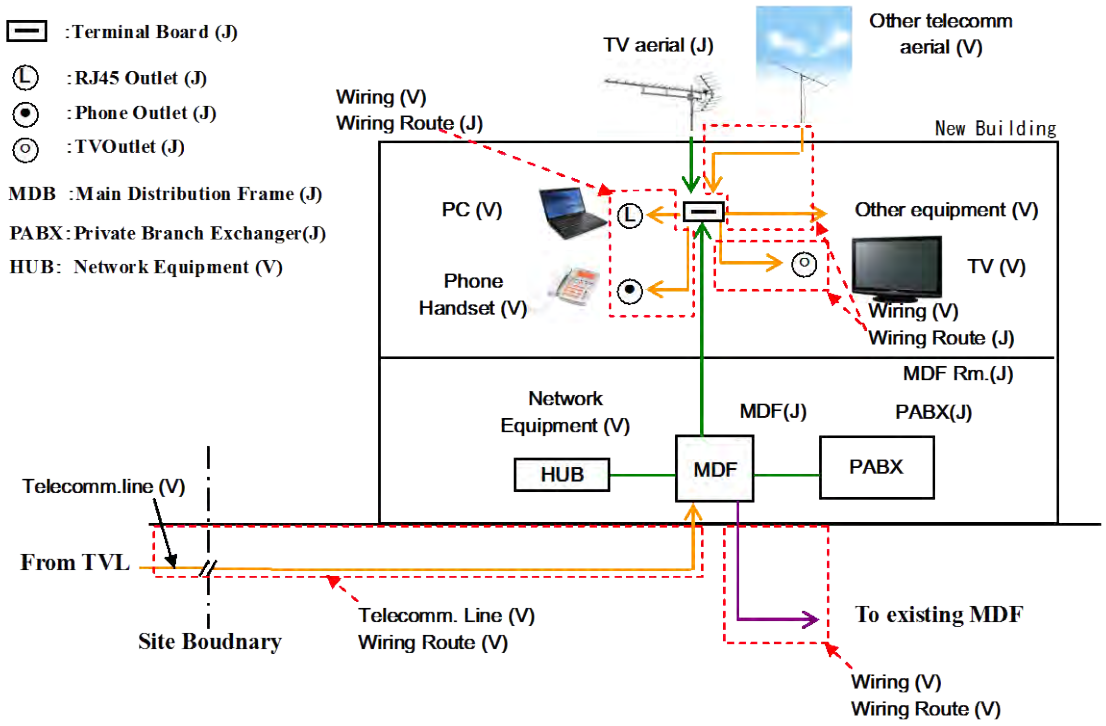


Figure 2-16 Telecommunication System

5) Paging system

① Public address system

We assume that two types of address systems will be installed — a public address system and a reception address system for each department. Therefore, a main unit (amplifier) will be installed for the public address system in the reception desk on the first floor of a new building to page medical doctors and staff in every floor of the new facility. Amplifiers will be installed in reception desks of individual departments as required to allow a receptionist to page patients waiting in the waiting space.

The main unit for public address system will have an enough capacity to cover the existing wards.

To prioritize user-friendliness and easy handling, an interlock function will not be added between the address system and a disaster prevention system.

② Intercom system and Nurse Call system

Intercom systems will be installed for intercommunication between the Operation Theaters and the staff standby area of the department and for maintenance-oriented intercommunication between the administration office and the machine room & electrical room.

A simple push-button type nurse call system will be installed for intercommunication between the Theater and the nurse station.

6) Fire alarms and exit signs

There are no fire or disaster management acts or regulations in Vanuatu and thus installation of fire alarms is underpinned by no legal grounds. Nevertheless, autonomous installation would cause no hassle. By referring to similar systems installed in local facilities, the project will use manually switchable emergency alarms. Evacuation exit signs will be installed in all intricate spots that may obstruct evacuation activities.

Installation of the fire alarms will apply only to the facilities applicable to the project.

7) TV system

TV systems will be installed by the hospital. Japan will install an antenna, dividers and wiring and outlets as required for a common antenna TV system. Basically, outlets will be installed in every waiting room and staff room.

TVs and support racks will be installed by Vanuatu side.

8) Piping for LAN

To construct a computer network in the new facilities, Japan will install outlet boxes with RJ45 modular jacks and piping to the EPS. For connection to the existing network, connection pipes, handholes will be installed on the project site.

Vanuatu side will undertake installation, adjustment and wiring of network equipment. Use of Cat5 cables was determined in discussions with the local telecom company.

(2) Mechanical Building Systems

1) Water supply

Water will be supplied to VCH from a new water tank through an 80 mm lead-in pipe from UNELCO's 100 mm main water supply line in Connaught Street on the front side. The size of water tank assumes the possibility of a water supply cutoff and ensures approximately 110 m3 corresponding to one day's consumption of the facilities of VCH. In consideration of concerns about contamination and required costs, a ground-based concrete tank will be used. A gravity water supply technique will be used with an elevated water tank. The height of the water tank will ensure enough water pressure for the facility such as a shower room on the second floor. City water is generally used for non-medical service activities, because UNELCO's water quality research results show water hardness as high as 256 ppm. In the case of a shortage of rainwater usually used for the medical equipment, a water softener system will be used to supply water for medical service activities. The rainwater falling on the roof of the new facility shall be collected, undergo primary filtration and then mainly be used as tap water for medical equipment. Figure 2-17 shows a water supply and drainage piping plan while Figure 2-18 depicts a water supply and hot water supply system.

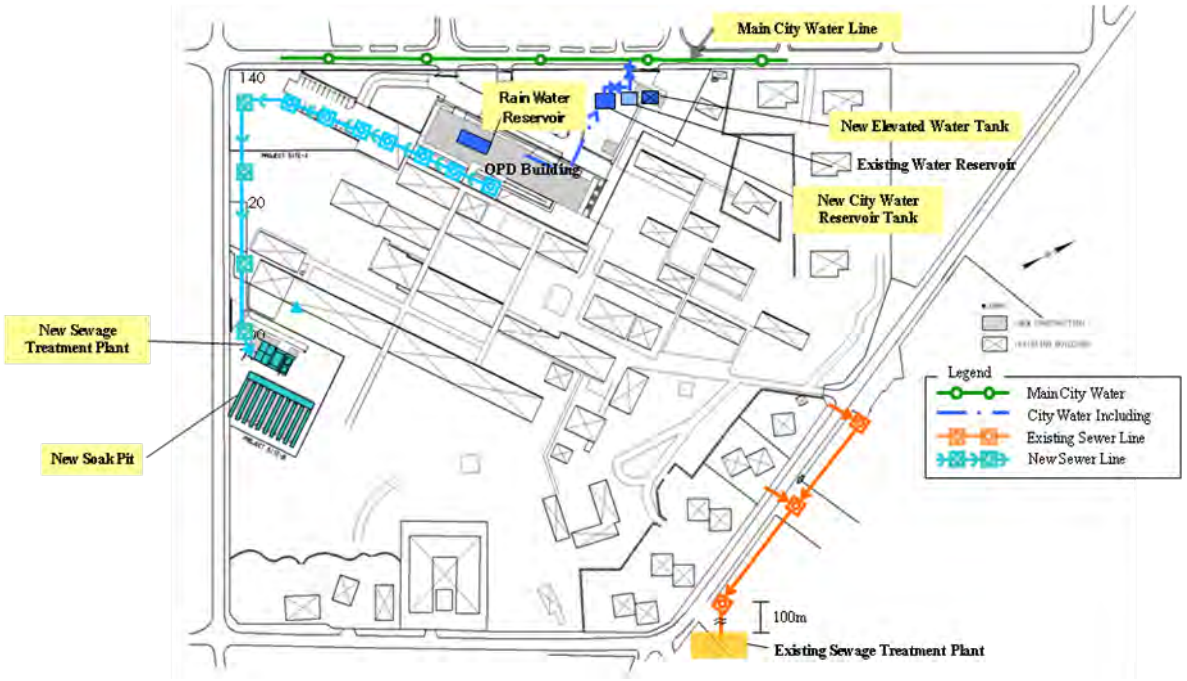


Figure 2-17 Water Supply and Drainage Piping Plan

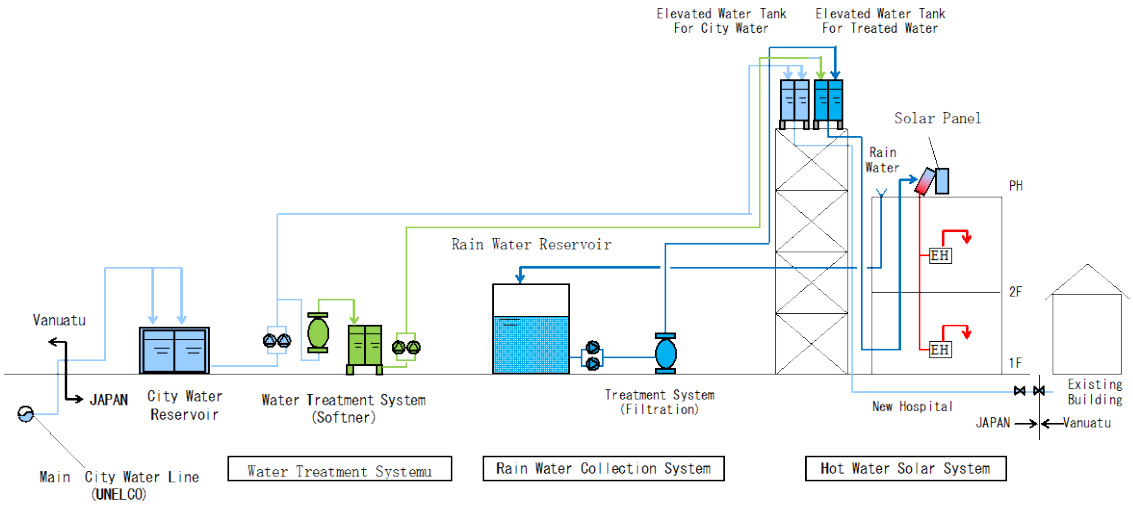


Figure 2-18 Water Supply and Hot Water Supply System

The city water is very hard in Vanuatu. Rainwater on the roof of the new Building will be collected in the rainwater tank as much as possible.

2) Drainage system

With regard to drainage from the project facilities, the existing wastewater treatment system is not functioning at this moment and does not have enough capacity. A wastewater treatment system complying with legal requirements implemented in Vanuatu will be installed for new facilities in the south of the premises. Sewage and gray water will be treated by the wastewater treatment system and then released to a soak pit. Infectious wastewater and laboratory wastewater will be treated in the disinfection tank and neutralization tank prior to release. The drainage system is shown in the figure 2-19.

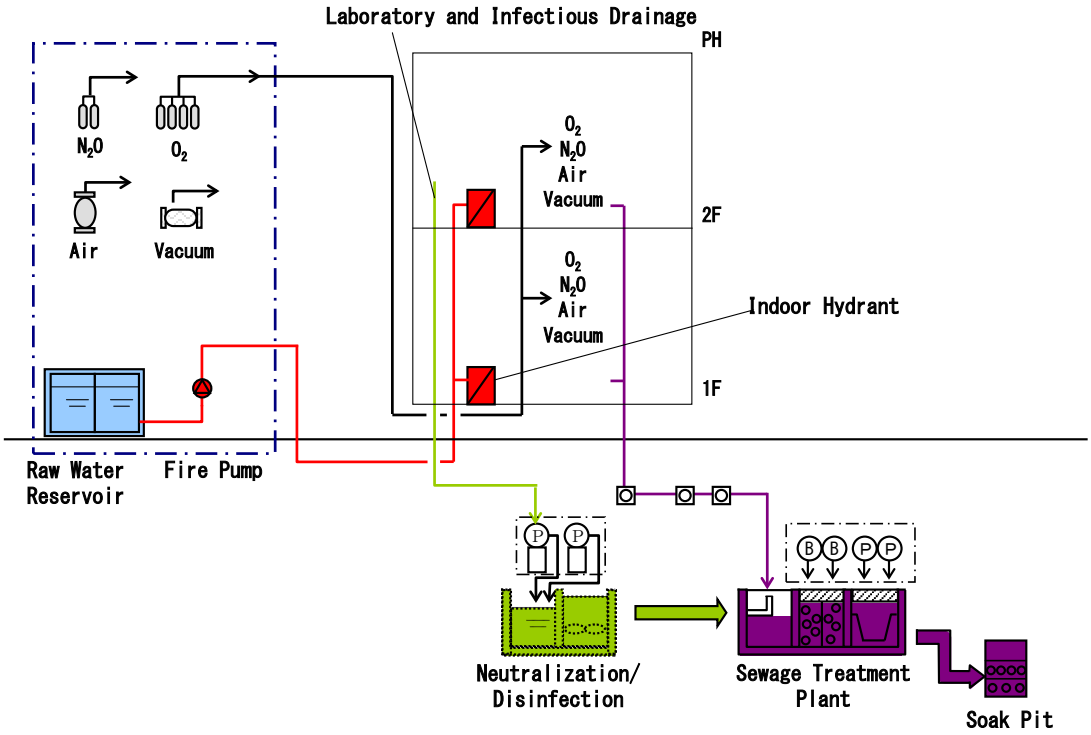


Figure 2-19 Drainage System, Fire Protection System, Medical Gas Supply System Flow

3) Hot water supply system

A hot water supply system is planned to offer a limited supply to the Operation Theater, Emergency and shower rooms. In a similar fashion to the existing system installed in the hospital, a solar-powered hot water supply system and a local electric water heater will be installed. The project will be reviewed so that the hot water supply pressure remains sufficient.

4) Sanitary fixtures

Western-style toilet bowls will be installed. Low tanks generally available in the local area will be used for flushing. Urinals will be of a floor-mounted stall type and use the flush valve type for flushing. Washrooms for the disabled will be installed in the Outpatients' Department and will be subject to in-washroom layout, fixtures and supplies oriented to the disabled.

5) Fire extinguishing system

Installation of a fire extinguishing system will be planned in accordance with building standard implemented in Vanuatu. All details not prescribed by any standards implemented in Vanuatu will be covered by standards and criteria implemented in New Zealand, Australia or Japan. As fire extinguishing systems under the project, indoor fire hydrants (hose reels) and fire extinguishers will be installed.

6) Medical gas system

Oxygen, dinitrogen monoxide, air, vacuums and excessive gas exhaust systems will be used as medical gas under the project. From the aspects of safety, user-friendliness and maintainability, a central type will be used. BS-type medical gas outlets will be introduced. The number of oxygen humidifiers and suction pumps to be installed to the outlets will be determined based on a utilization rate of outlets. Medical gas will be supplied to the minimum required rooms. The oxygen manifold shall be connected with the new oxygen generator to be procured by AusAID, which shall be adjusted with AusAID.

7) Air conditioning and ventilation system

As shown in Figure 2-20, the consultation room, staff room, waiting room and other similar rooms will use natural ventilation through windows. Doors will have transoms in the upper area. Ceiling fans will be installed in the room.

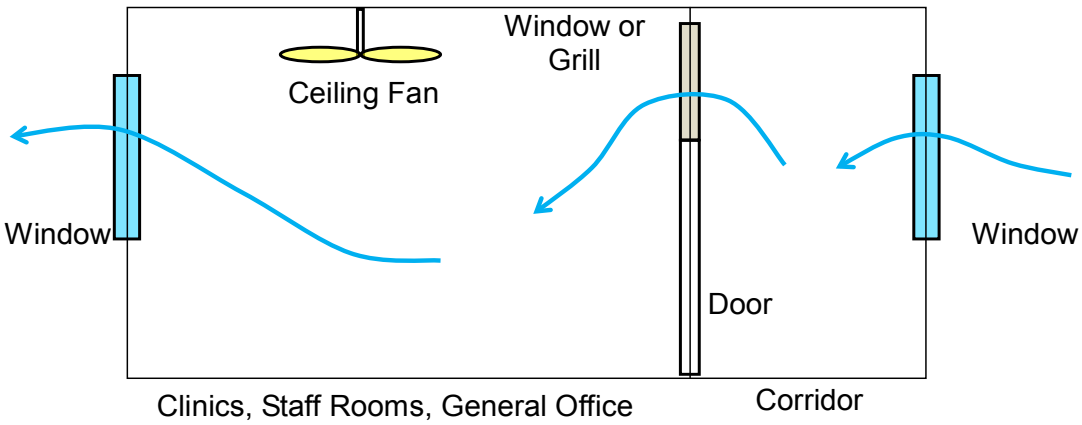


Figure 2-20 Ventilation System for Clinics, Staff Rooms

All rooms essential to medical service will have air conditioning systems. Separate air conditioning of either a wall-hung or ceiling type will be employed. Standard recyclable filters will be installed (Figure 2-21). The Operation Theater will use a semi-central duct type in the similar fashion to the existing facilities. For the project, there will be a machine room to accommodate air conditioners, because air conditioners for existing facilities are located outdoors and are severely deteriorated and degraded. With regard to types of filter, middle-performance or high-performance filters will be installed depending on the application or usage (Figure 2-22).

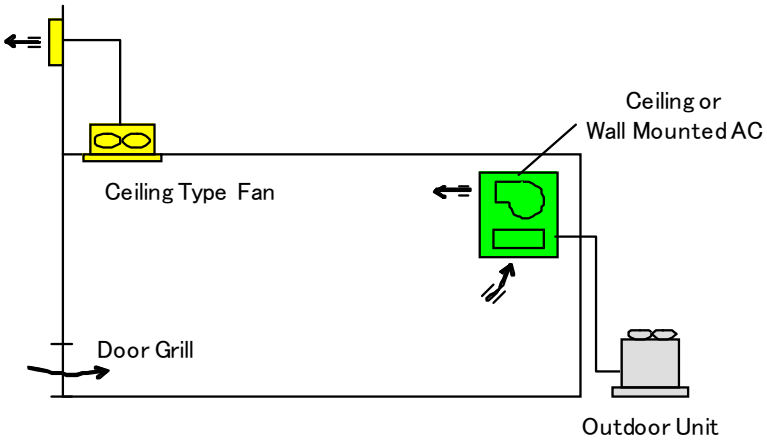


Figure 2-21 Individual Air-Conditioning System

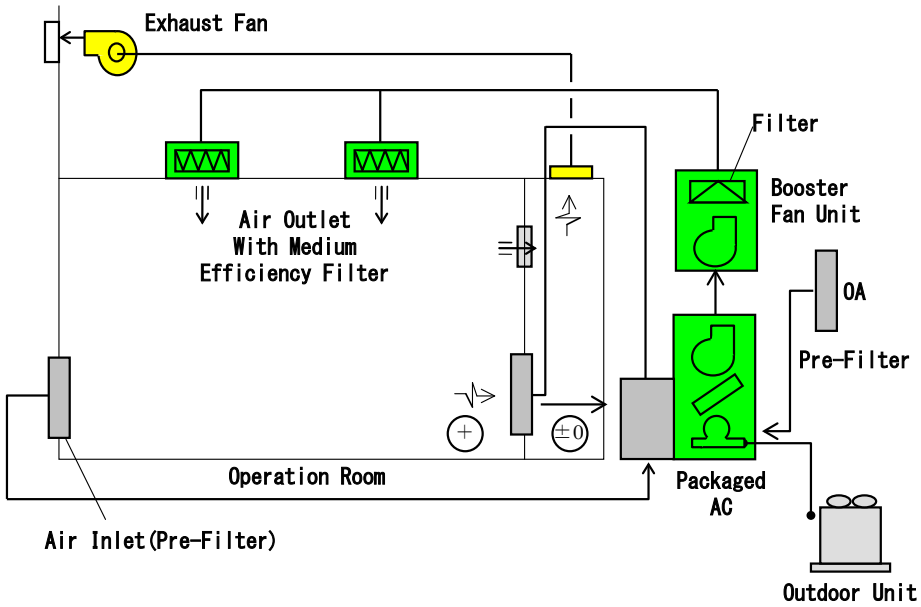


Figure 2-22 Individual Air-Conditioning System for Operation Theater

2-2-2-6 Construction Materials Plan

With regard to construction materials, simple and sturdy building materials will be selected, which require only some upkeep and are procurable for use in construction such as supplies and replacement parts, in order to prevent any difficulties in continuous upkeep. Key building materials and guidelines are described below. (Table 2-17, 18)

(1) Exterior Finishing Materials

1) Roof

Folded metal roofing will be added to the top of a concrete slab slope roof to prevent water leaks that may accelerate the aging of buildings in regions of high rainfall. Thermal insulation material will be sandwiched in between the layers above to insulate buildings from external heat and reducing temperature rises in the interior space to further reduce the load of air conditioning.

2) Exterior walls

To ensure practical maintenance in the local region where materials are less available and less procurable, general paint, locally available will be used for the exterior walls of the buildings. In consideration of other environmental factors, external openings of rooms not using an air conditioning system will be louvered to achieve natural ventilation and draught in the indoor environment.

3) Walkways and driveways

External walkways will be paved with highly durable interlock blocks. Driveways and parking lots will be asphalt-paved as per local specifications.

Table 2-17 Exterior Finishing Material and Construction Method

Building element		Adopted construction method	Rationale for adoption
Exterior	Roof	Sloped concrete slab roof with steel pre-formed roof sheets	Maintenance is relatively easy and relatively good performance against leakage.
	External wall	Concrete block +Mortar +Painting	Maintenance is rather easy.
	Fixture	Aluminum door and window	They are rigid and durable, and water resistant.
		Stainless steel door (main entrance and exit, entrance and emergency entrance, etc.)	They are rigid, durable, and good in water resistance.
	Exterior	Asphalt pavement	Rigid, durable, and easy to be maintain.
		Interlocking block	Rigid, durable, easy to be maintain and is adopted for entrance area.

(2) Interior Finishing Materials

1) Floors

The outpatients' waiting room open to the exterior and its access corridor will be finished with antislip ceramic tiles for higher safety in wet conditions. Other rooms isolated from ambient air will be finished with the materials cited below to meet the application or usage and required performance.

① Outpatients' Department, medical administration office and washrooms: These areas are accessible to patients and staff who have contact with patients and will be covered with highly durable ceramic tiles that are easy to clean up and keep clean.

② Clean areas in the Operation Theater, Laboratory Department and Radiology Department: All of the areas that are likely to have a chance of being exposed to contamination or require high cleanliness will be covered with vinyl floor sheets for easier cleaning up and higher cleanliness to prevent nosocomial infection.

2) Interior walls

General interior walls will be mortared and paint-finished. To facilitate wiping, tiles will cover the walls of washrooms, sanitation facilities, shower rooms and other waterworks that may be exposed to contaminants.

Passageways, interior walls, pillars and corners that may come in contact with wheeled stretchers and carts will be covered with dedicated or hand-railed stretcher guards and/or corner guards.

The X-ray rooms will be enclosed by reinforced concrete walls or lead materials to prevent any radiation from leaking out of the room.

3) Ceilings

The outpatients' waiting room open to the exterior, its top lighting, corridors, emergency waiting room, stairs and laboratory waiting room will have concrete ceilings with a paint finish.

The Operation Theater requires high cleanliness and is likely to be exposed to contaminants, and thus, will have a ceiling made of inorganic-painted calcium silicate board material that can be easily cleaned up and kept clean.

General rooms will have a system ceiling made of an economical T-barred light gauge steel backing covered with a sound-absorbing rock wool board.

4) Doors and windows

Exterior fittings directly exposed to the weather will employ aluminum sashes to increase their weather resistance. An entrance to the Operation Theater and other areas likely to be

bumped into by wheeled stretchers will be equipped with stainless steel doors that are easy to clean up and have excellent durability.

General interior fittings made of highly durable aluminum material will be installed in the buildings. The utility room and machine rooms will be equipped with steel fittings having high durability and good sound insulation. The radiology room will use steel fittings backed by lead material to prevent any radiation from leaking out of the room.

Table 2-18 Interior Finishing Material and Construction Method

Building element		Adopted construction method	Rationale for adoption
Interior	Floor	Porcelain tile	They are durable and easy to clean.
		Polyvinyl chloride floor sheet	They facilitate cleaning and maintenance of the operation theaters and laboratory department which require high level of cleanliness.
	Interior wall	Painting (general rooms)	These are locally common and easy to maintain.
		Calcium silicate board	It excels in antibacterial property, and facilitates maintenance of high levels of cleanliness for the operation room, which require highest levels of cleanliness.
		Porcelain tiles (places where water is used)	These are locally common. They facilitate maintenance of the portions on which water droplets fall.
	Ceiling	Rock wool sound insulation board	It is locally common and facilitates maintenance.
		Calcium silicate board	It excels in antibacterial property, and facilitates maintenance of high levels of cleanliness for the operation rooms, which require high levels of cleanliness.
	Fixture	Aluminum door	Easy to maintain, and is adopted for general rooms.
		Steel door	It excels in sound proofing property, and is adopted for Machine Room, etc.

(3) Building systems equipment

The service life of building systems equipment is usually 7 to 13 years and is much shorter than that of building materials. Therefore, after completion of construction, to facilitate Vanuatu's upkeep of system equipment including updating, proven equipment made in a local third country will be procured as far as possible or Japanese equipment will be procured.

2-2-2-7 Equipment Plan

(1) Overall Plan

1) The scope of the plan

In the project, the medical equipment plan is limited to necessary items of the project facilities.

2) The surrounding conditions for the equipment installation

① Electricity: The electric power supply company of Vanuatu explains that the fluctuation ranges in ±7%. For electrically sensitive equipment such operating room items, AVR, automatic voltage regulator should be attached. In addition, UPS, uninterrupted power supply should be attached to ultrasound machine and CR system so that data may not be erased at the time of power failure which occurs occasionally.

② Water quality: Since the local water quality contains much hardness, water quality processing is required. In this plan, a water softener is to be attached for Autoclaves in CSSD as the items is susceptible to the water quality.

③ Agents: For the equipment which needs the periodical maintenance or need consumables constantly, it makes prerequisite to have a local agent in Vanuatu or neighboring countries to offer in the bidding.

3) The objective of the equipment procurement

The objective is to develop the third level medical services which will be provided in new facilities by procuring necessary items of medical equipment.

4) Places to be equipped

The procured equipment will be dispositioned to Operation theater, CSSD, Radiology, and Laboratory located on first floor, Emergency, General Clinic, and Pharmacy on second floor.

(2) Planned Equipment

The specifications and use of the major equipment which will be procured in the project are as follows.

Table 2-19 Planned Equipment List

＊	Equipment	QTY
(1)	Radiology department	
1	General X-ray machine	2
2	Mobile X-ray machine	1
3	C-arm X-ray machine	1
4	Ultrasound machine	1
5	CR system	1
(2)	Outpatients' department	
(2)-1	Gynecological department	
1	Gynecological examination table	1
2	Gynecological examination unit	1
3	Doppler fetal detector	1
4	Colposcope	1
5	Film illuminator	1
6	Sterilizer	1
7	Examination instrument set	1
(2)-2	Pediatric department	
1	Examination table	1
2	Scale (Height and Weight)	1
3	Ultrasonic nebulizer	1
4	Suction unit	1
5	Film illuminator	1
6	Diagnostic set	1
7	Examination instrument set	1
(2)-3	Endoscopic department	
1	Gastrointestinal Fiberscope set	1
2	Bronchofiberscope set	1
3	Colonofiberscope set	1
4	Camera control set	1
5	Ultrasonic cleaner	1
6	Endoscope cabinet	1
(2)-4	Surgery department	
1	Examination lamp	1
2	Examination instrument set	1
3	Film illuminator	1
(2)-5	Internal medicine department	
1	Film illuminator	1
2	Diagnostic set	1
3	Examination instrument set	1
(2)-6	Outpatient 3 rooms	
1	Examination table	3
2	Film illuminator	3
3	Diagnostic set	3
(3)	Emergency department	
1	Film illuminator	1
2	Diagnostic set	1
3	Sterilizer	1
4	Examination instrument set	1
5	Medical refrigerator	1
6	Stretcher	1
7	Wheel chair	2
8	Suction unit	1

＊	Equipment	QTY
9	Defibrillator	1
10	Resuscitator（manual）	1
11	ECG	1
12	Patient monitor	1
13	Treatment table	1
14	Bed	4
(4)	Clinical laboratory	
(4)-1	Laboratory department	
1	Centrifuge	1
2	Electric balance	1
(4)-2	Blood bank	
1	Blood centrifuge	1
2	Blood bank refrigerator	1
3	Water bath	1
(4)-3	Haematology	
1	Blood cell counter	1
(4)-4	Biochemistry	
1	Biochemical analyzer	1
(4)-5	Microbiology	
1	Incubator	1
2	Sterilizer	1
3	Microscope（with teaching lens）	1
4	Safety cabinet	1
(5)	Pharmacy	
1	Medical refrigerator	1
2	Water distiller	1
(6)	Operation theater	
(6)-1	Operating theater	
1	Operating table	2
2	Infusion pump	2
3	Operating light	2
4	Defibrillator	1
5	Film illuminator	2
6	Patient monitor	2
7	Operating instrument set	2
8	Laparoscope set	1
9	Hand washing sink unit	1
10	Electrosurgical unit	2
11	Anaesthesia machine	2
12	Blood bank refrigerator	1
13	Infant warmer	1
(6)-2	Recovery room	
1	Patient monitor	3
2	Infusion pump	3
3	Defibrillator	1
4	Gadget bed	3
(6)-3	CSSD	
1	Autoclave	3
2	Carrying cart	3
3	Sterilizer	1
4	Cabinet	3

Table 2-20 Specifications of Major Equipment

Item No.	Equipment	QTY	Specification	Use
(1)-1	General X-ray machine	2	Composition: High current generating equipment, X-ray tube, Bucky table, Bucky stand ・Tube current: appx.500mA ・Tube voltage: appx.150kV ・Tube holding:Ceiling type	Diagnostic imaging of chest and abdomen
(1)-2	Mobile X-ray machine	1	・Type：Inverter ・Tube voltage：appx.40-125kV ・mAs：appx.100mAs ・Tube current：appx.160mA	Taking X-ray photograph in ward and emergency area
(1)-3	C-arm X-ray machine	1	・S.I.D(focal-detection distance:appx: 90-100cm ・I.I.(image intensifier)：6,9inch ・Tube voltage：appx.110kV ・Monitor：2 units	Diagnostic imaging device to treat bone fractures, and so on during operations.
(1)-4	Ultrasound machine	1	・Scanner：linear,convex,sector ・Imaging mode：B,B/M,M,PWD,CWD ・Monitor：appx.15inch ・Probe：convex,linear,vaginal,sector ・With UPS,PC,color printer	Abdominal diagnosis, fetal diagnosis in the obstetrics, diagnosis of pregnant women and nursing mothers including cardiac disease
(1)-5	CR system	1	・CR unit：appx.70plate ・CR console：CD or DVD ・Dry imager：more than 90sheet ・With server、PC、network device	Digital processing of X-ray image, output, and diagnosis
(2)-3-3	Colonofiberscope set	1	・View：appx.120-140° ・View depth：appx.5-100mm ・Endoscope diameter：appx.13.8mm or less ・Control length：appx.1,680-1,700mm	Quality diagnosis of the large intestines, such as the colon and the rectum, biopsy, medical treatment
(2)-3-4	Camera control set	1	・Light source:xenon or halogen ・Monitor：appx.19inch ・DVD：for medical ・With color printer,Video conversion equipment,leak tester,trolley	Projection of picture of the said endoscopes on a monitor for diagnosis.
(3)-9 (6)-1-4 (6)-2-3	Defibrillator	3	・Heat rate range：appx.30-240bpm ・Monitor：appx.5.5inch ・ECG waveform display is possible. ・Battery ：more than 1hour ・with caster	Restoring of abnormal heart rhythm disorders, such as ventricular fibrillation and an atrial flutter, or cardiac arrest
(3)-12 (6)-1-6 (6)-2-1	Patient monitor	6	・Measurement ：ECG,respiratory,SPO2 or more ・Monitor：appx.8.0inch,color LCD ・Battery：more than 90minites ・With caster	Monitoring of vital signs of a patient
(4)-2-1	Blood centrifuge	1	・Rotation speed：more than 7,000rpm ・Capacity：more than 3,000ml ・Maximum RCF：appx.11,000G ・With cooling function ・With tube rack for blood bag	Creation of the blood for transfusion

Item No.	Equipment	QTY	Specification	Use
(4)-3-1	Blood cell counter	1	・Measurement：more than 18items,white cell 3kind possible ・Sample volume：less than 50micro ・Measurement time：more than 60sample /hours ・With printer	Counting numbers of the red blood cells and white blood cells and measurement of other hematology facotrs
(4)-4-1	Biochemical analyzer	1	・Measurement：GLU, Na, K, UREA, CREAT, T Bili, AST, ALT, ALP, Ca.CK, GGT, N Bili, AMYL, CHOL, TRIG, URIC, TP rot, CK-MB, MG, ALB ・Sample processing：more than 150test /hour ・With purerification device ・With printer,UPS	Automatic measurement of the factors of patients' blood samples
(4)-5-4	Safety cabinet	1	・Average air flow speed：Inflow；appx.0.45m/sec, Outflow；appx.0.30m/sec ・ULPAorHEPA filter efficiency：＞99.99% 0.1-0.3μm/hour ・Material：SS ・built-in gas burner, and Ultraviolet lamp	Inspection processing of tubercle bacillus and a dyeing process to processing of a harmful sample
(6)-1-1	Operating table	2	・Control:hydraulic pump or hydraulic pump with handle ・Lateral up and down, sideslip right-and-left inclination, tripod plate straddle and going down, and upper stand rotation are possible. ・With caster,brake	Fixation of the body of the patient at the time of conducting a general operation
(6)-1-3	Operating light	2	・Ceiling type、twin ・Main intensity：more than 125,000 Lux ・Sub intensity：more than 95,000 Lux ・Lamp：Halogen or LED	Graring at operating sights
(6)-1-8	Laparoscope set	1	・Telescope：appx.10mm,5.0-5.4mm ・With forceps for surgery and gynecology treatment ・Light source：xenon lamp ・Monitor：appx.19inch ・DVD：for medical ・With color printer、Video conversion device, trolley	Excision in general abdominal surgery, such as appendectomy and the gynecology field
(6)-1-9	Hand washing sink unit	1	・Sink：for two persons ・Material：Stainless steel ・Water flow：appx.4littrer/min ・Drainage ：Foot or leg or arm switch ・With brush,、Manual type	Supply of sterlilizaed water for washing hands before operations
(6)-1-11	Anaesthesia machine	2	・Conposition: Anaesthesia machine, Ventilator, Vaporizer ・Vaporizer:Halothane ・Amount of ventilation: 100 - 900 ml or more ・Number of times of breathing：6 – 40times/min or more	Performing general anesthesia during surigical operations
(6)-3-1	Autoclave	3	・Capacity:appx.320litter ・Tub material：Stainless steel ・Pressure：approx.1.4kg/cm^2 ・Water softener attached	Sterilization of the steel made instruments for mainly used for surgical operations

2-2-3 Outline Design Drawings

Table 2-21 List of Drawings

	Drawing	Scale	Page
1	Site Plan	1/1200	77
2	1st Floor/2nd Floor Plan	1/300	79
3	Pit/Roof Plan	1/300	81
4	Elevation/Section	1/400	83

VILA CENTRAL HOSPITAL

CONNAUGHT STREET

EDINBURGH STREET

PROJECT SITE-A

PROJECT SITE-B

PUMP ROOM

ELEVATED WATER TANK

TRANSFORMER ROOM

OPD

ADMINISTRATION

SLAB

BM.1
N 8036261.193
E 215926.705
Z 100.000

PHARMACY

TB WARD

ISOLATION

MEDICAL WARD

MATERNITY

SURGICAL WARD

CHILDRENS WARD

KITCHEN

LAUNDRY

E.N.T.

PHYSIO

EYE CLINIC

CENTRAL STORE

MEDICAL STORE

WOMENS HEALTH ANTENATAL

MAINTENANCE & WORKSHOP

WORKSHOP & OXYGEN PLANT

GARBAGE

MORTUARY

SEWAGE TREATMENT PLANT

BLOWER ROOM

SOAK PIT

FUTURE PROGRAM

TRANSIT HOUSE

FUTURE PROGRAM

STAFF HOUSE

FEMALE STUDENT

MALE DORMITORY

STAFF QUARTERS

DARK

DIRT ROAD

DIRT ROAD

DIRT ROAD

NURSING SCHOOL

CHINESE DOCTOR'S DORMITORY

CHAPEL

CHAPLIN HOUSE

SLAB

SLAB

CAPTAIN COOK STREET

TRUE NORTH

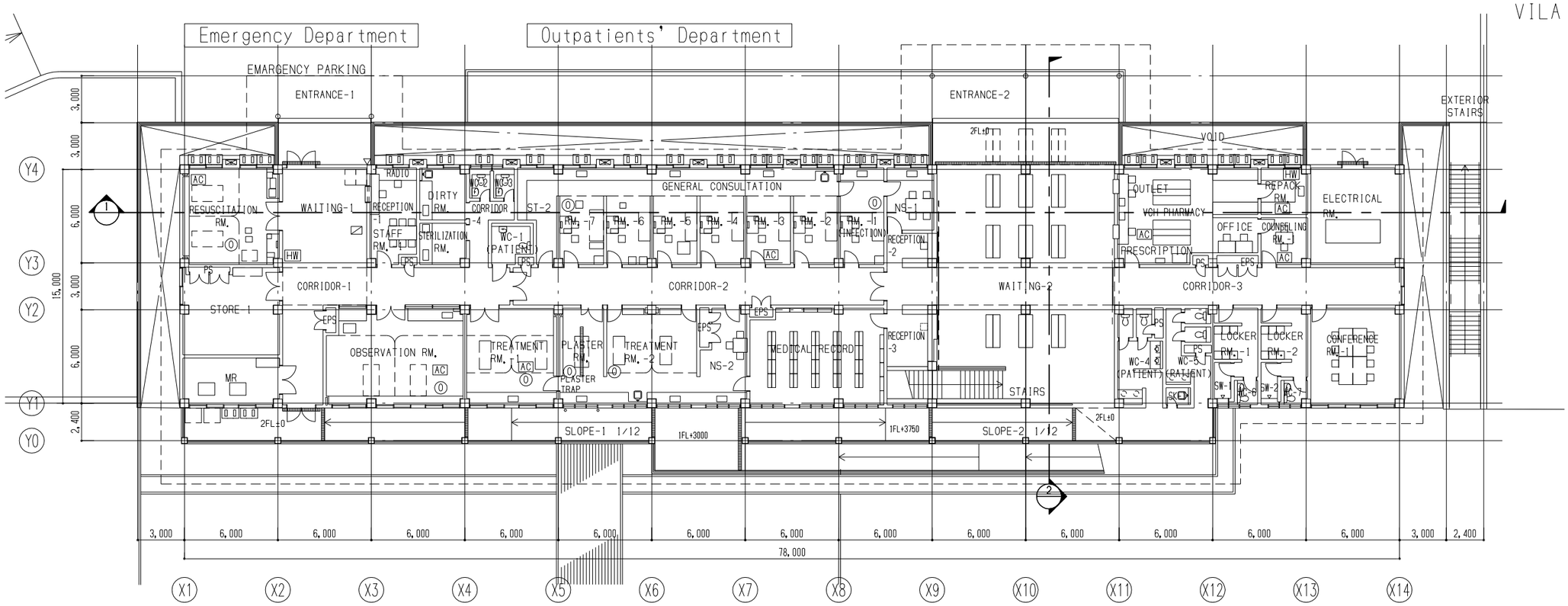
LEGEND

:FACILITIES CONSTRUCTED BY JAPANESE SIDE

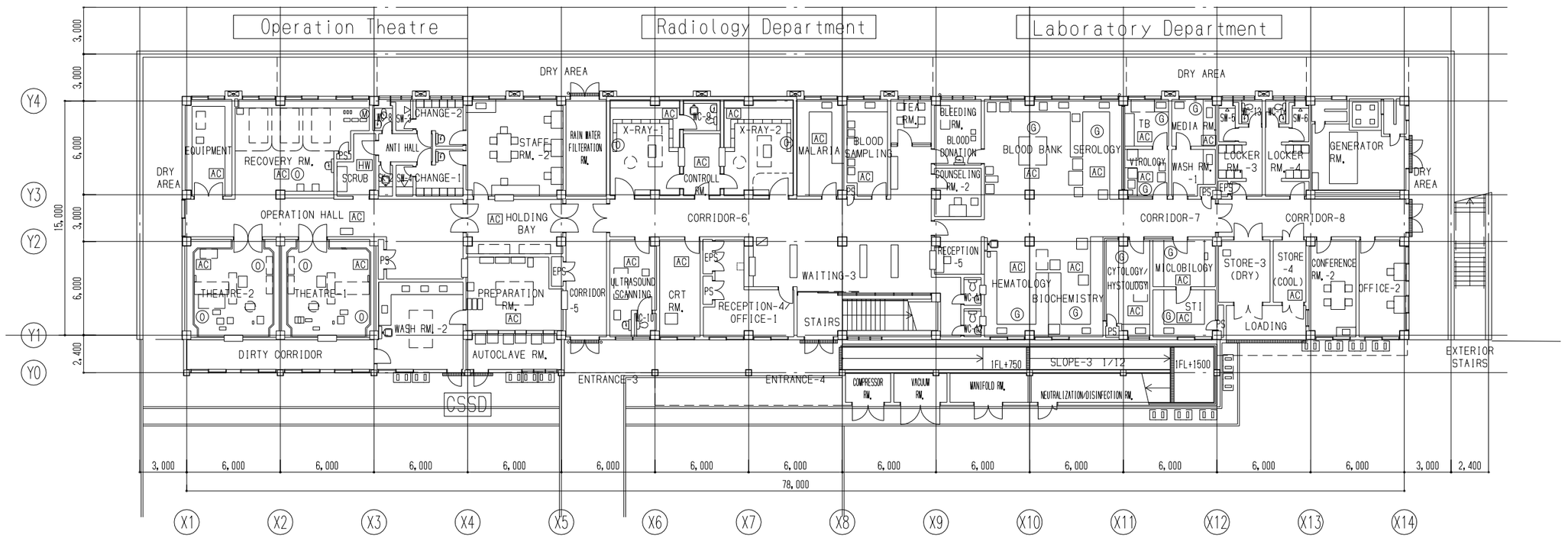
:EXISTING BUILDING

LEVEL BY ASSUME AT BM.1 =100.000 Meter

SITE PLAN 1/1200



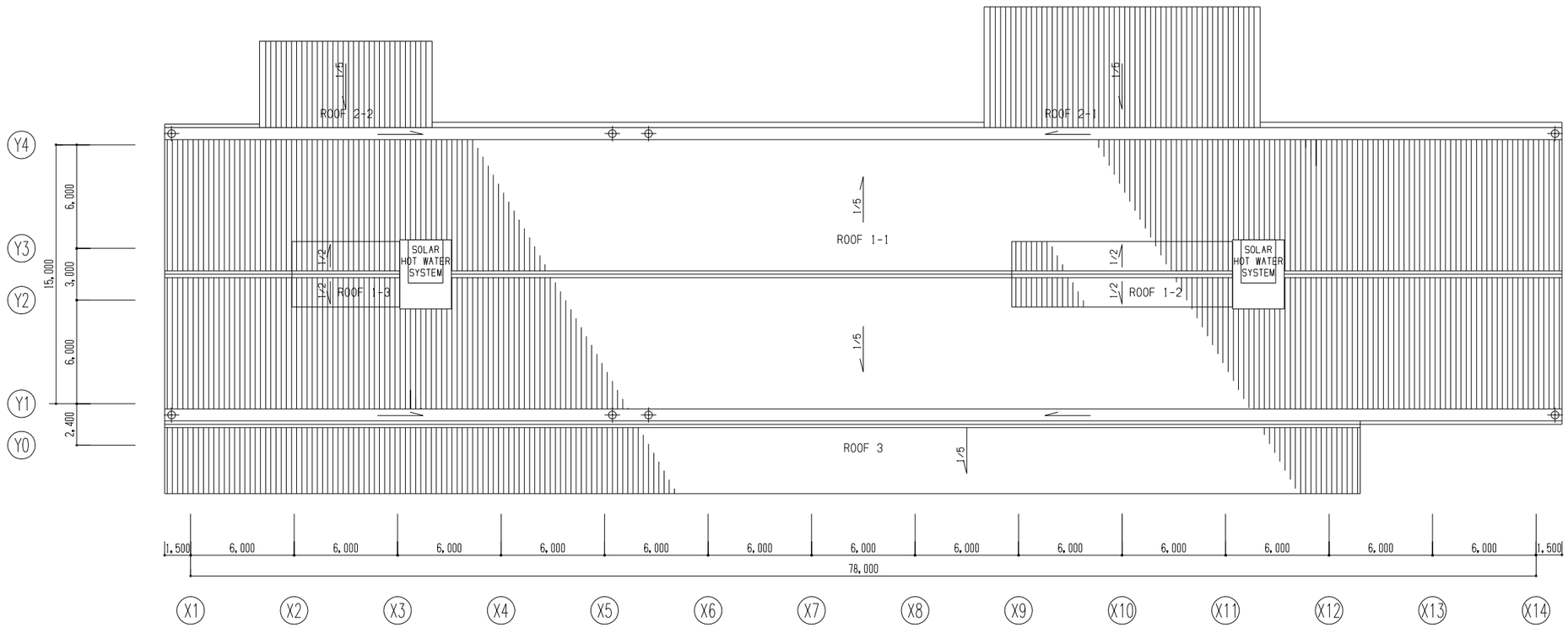
2F PLAN



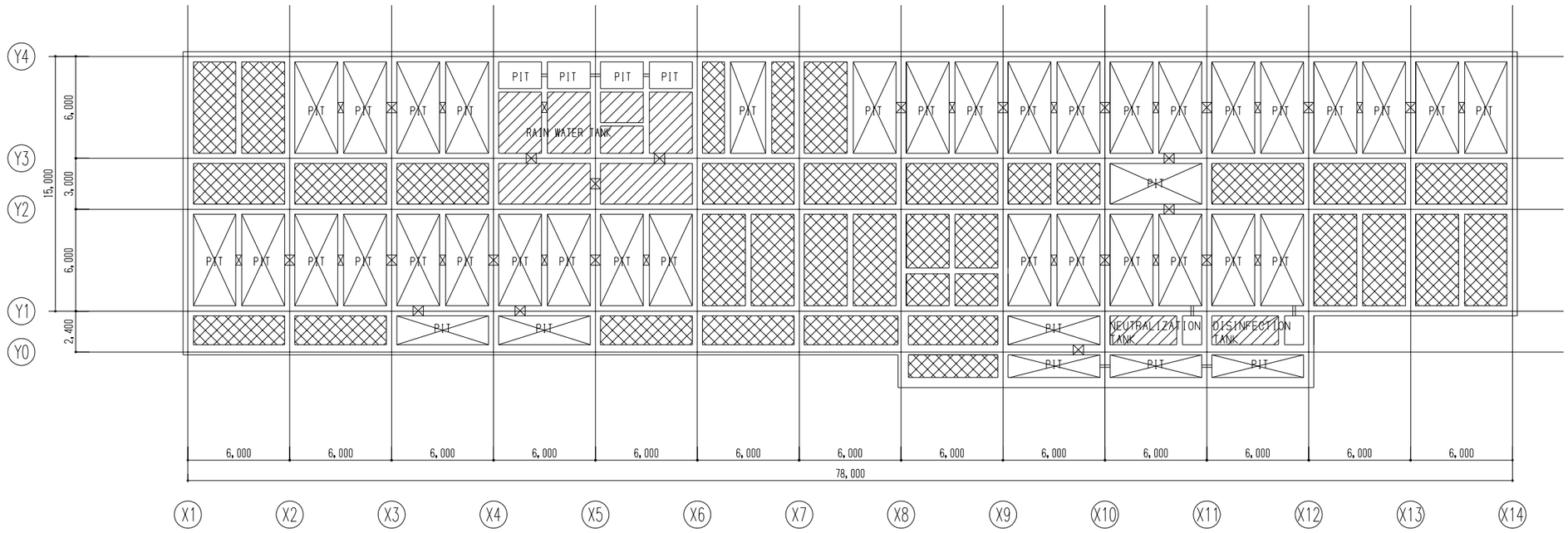
1F PLAN

LEGEND	
AC	AIR CONDITIONING
HW	HOT WATER
O	OXYGEN
G	GAS

1F/2F PLAN 1/300



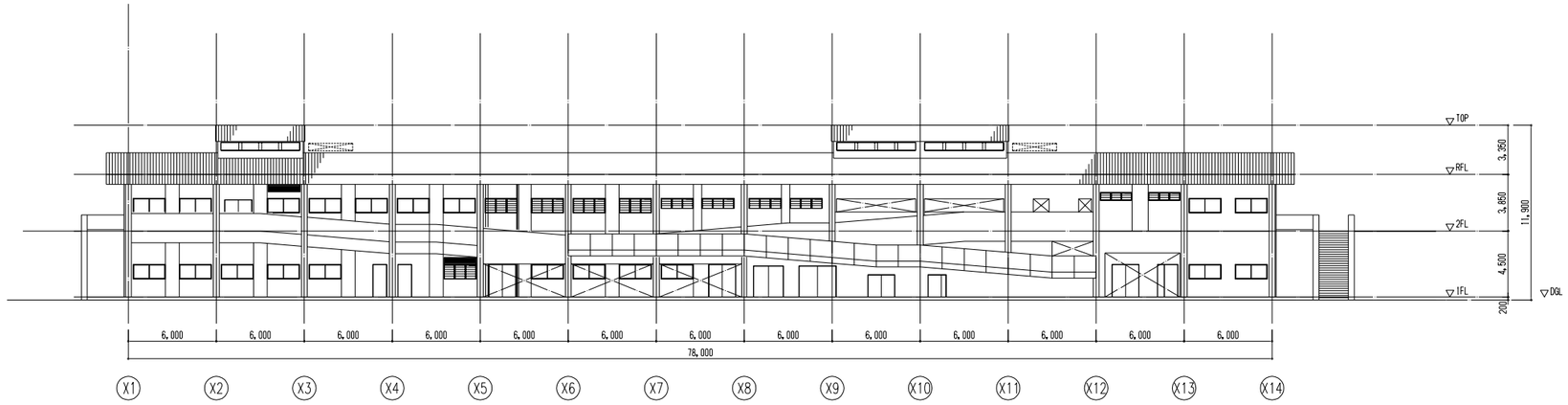
ROOF PLAN



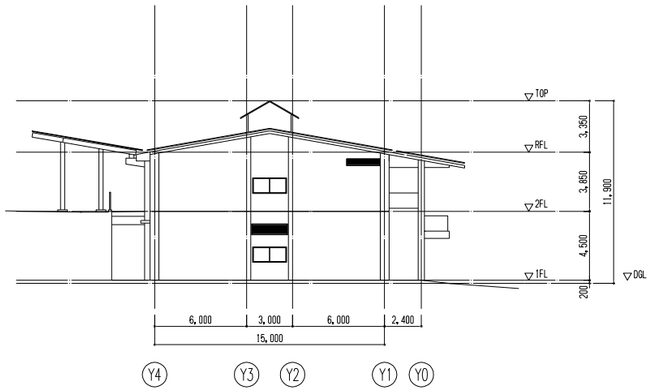
LEGEND	
	BACK FILLING
	PIT
	PIT (ARTESIAN SPRING TANK)
	TANK

PIT PLAN

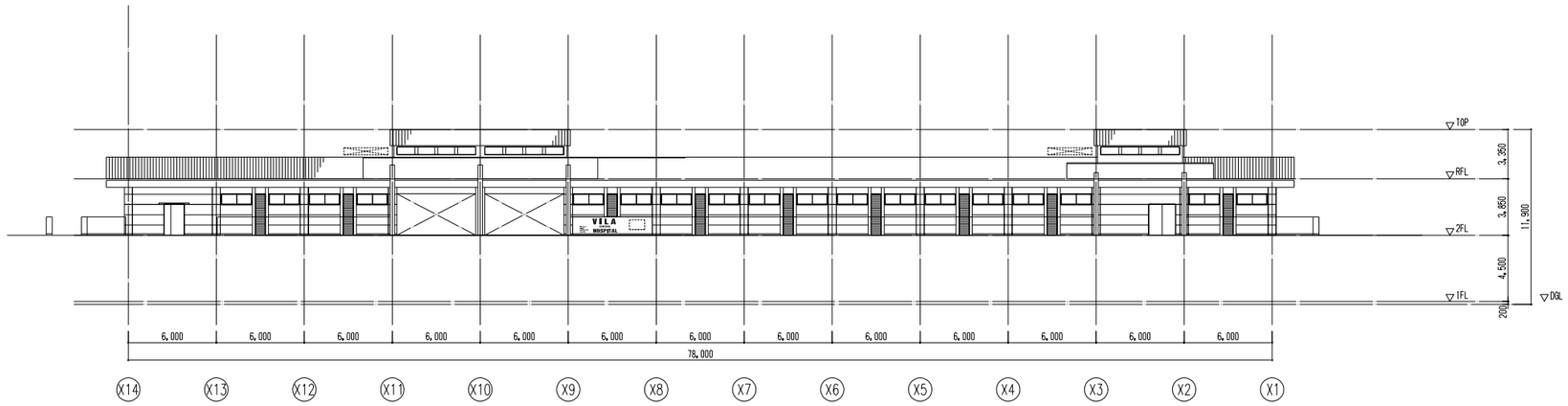
ROOF/PIT PLAN 1/300



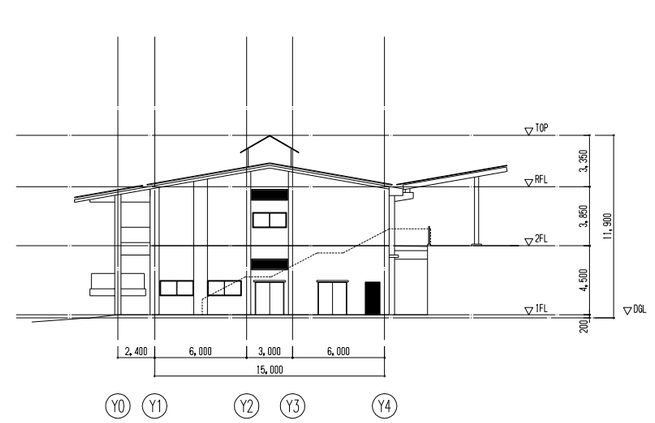
NORTH ELEVATION



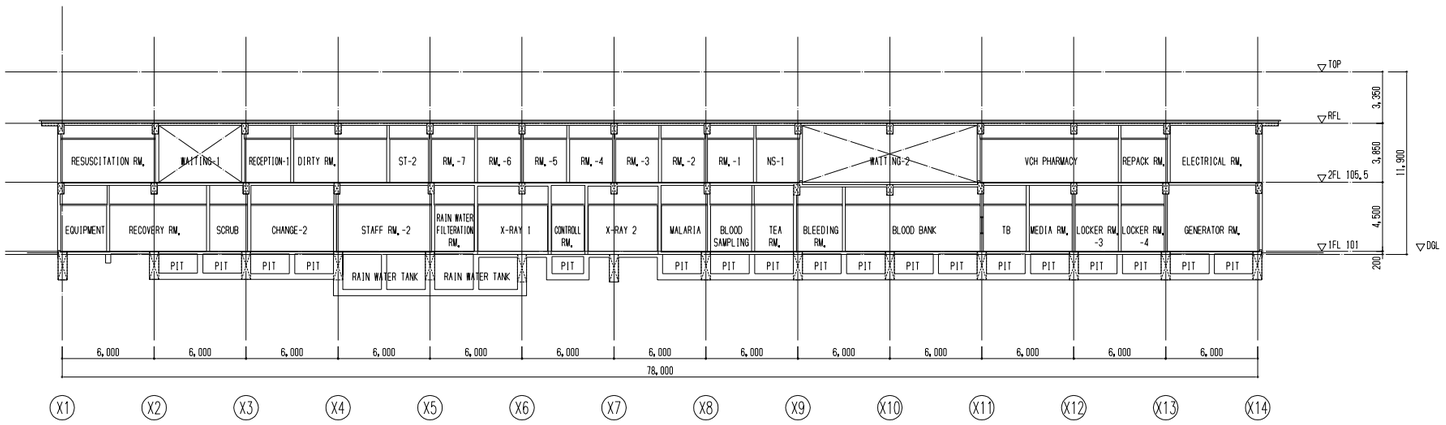
WEST ELEVATION



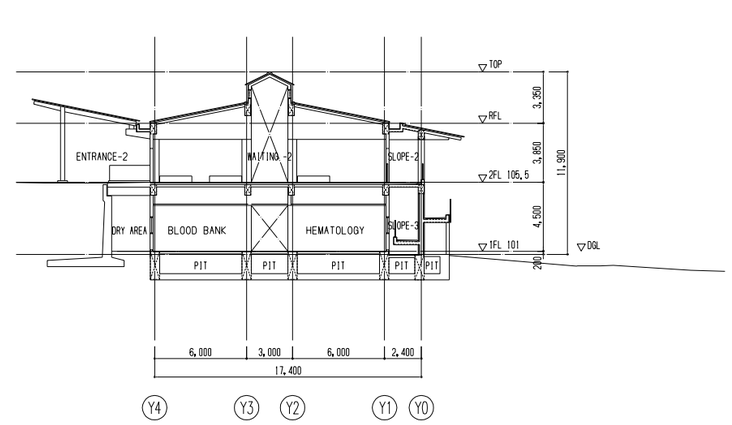
SOUTH ELEVATION



EAST ELEVATION



SECTION 1



SECTION 2

ELEVATION/SECTION 1/400

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Project Implementation System

The project will be implemented in accordance with the Grant Aid system of the Government of Japan after obtaining the approval of the Japanese Cabinet and after concluding the Exchange of Notes (E/N) and the signing of the Grant Agreement (G/A) on the project with the Government of Vanuatu.

The responsible agency of the project on the Vanuatu side is the MOH and the implementation agency is VCH. The contracting person is MOH and MOH executes the conclusion of a consultant agreement and a construction/equipment contract and implements the Vanuatu works related to the project.

The project implementation structure is indicated in the figure 2-23.

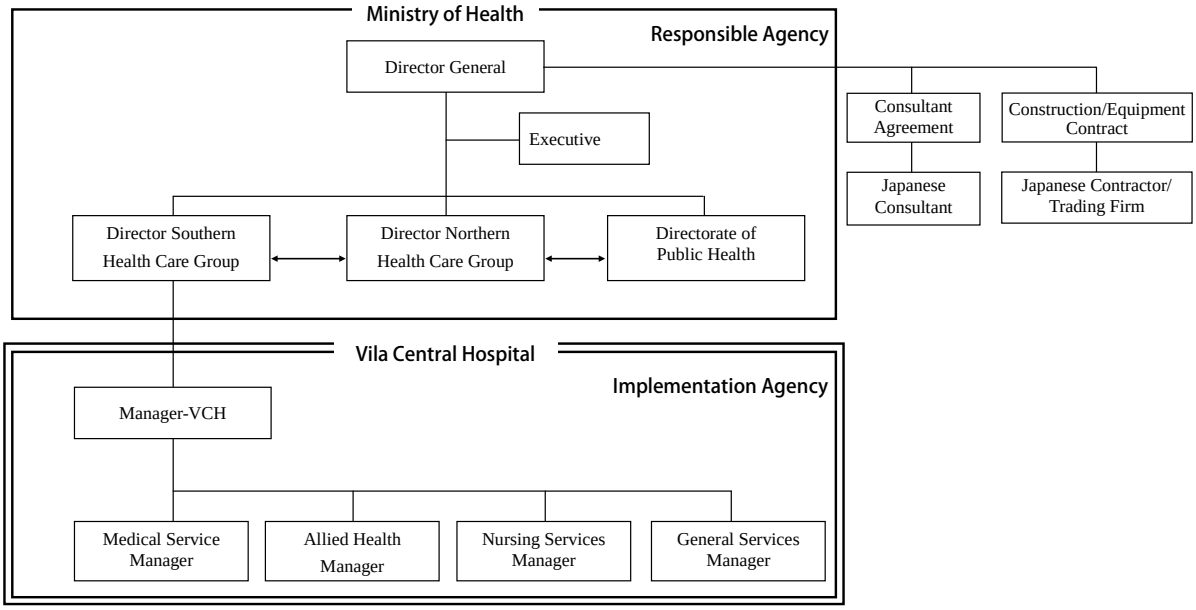


Figure 2-23 Project Implementation Structure

Arrangement of taskforce team

To promote the project smoothly, the Vanuatu side agreed that taskforce teams will be established, maintained and implemented until the end of the project. As mentioned in the table 2-22 and the figure 2-24, the taskforce team is comprised of two groups of the National Taskforce Committee and the Ministry of Health Task Force. The former will perform administration and coordination at the level of a responsible agency, while the latter will do so at the level of an implementation agency.

Table 2-22 List of Member of Task Force Team

List of member of the National Taskforce Committee

Position	Office
Director General of Health	Ministry of Health
Director of Finance	Ministry of Finance
Civil Engineer	Ministry of Infrastructure
Health Sector Analyst	Prime Minister's Office
Representative of Foreign Affairs Department	Ministry of Foreign Affairs

List of member of Ministry of Health Task Force

Position	Office
Director Southern Health Care	Ministry of Health
Planning incharge	Ministry of Health
Finance & Accounts Manager	Ministry of Health
General Services Manager	Vila Central Hospital
Medical Service manager	Vila Central Hospital
Chief of Surgery	Vila Central Hospital
Nursing services manager	Vila Central Hospital
Allied manager services - Radiology - Laboratory	Vila Central Hospital
Physician	Vila Central Hospital

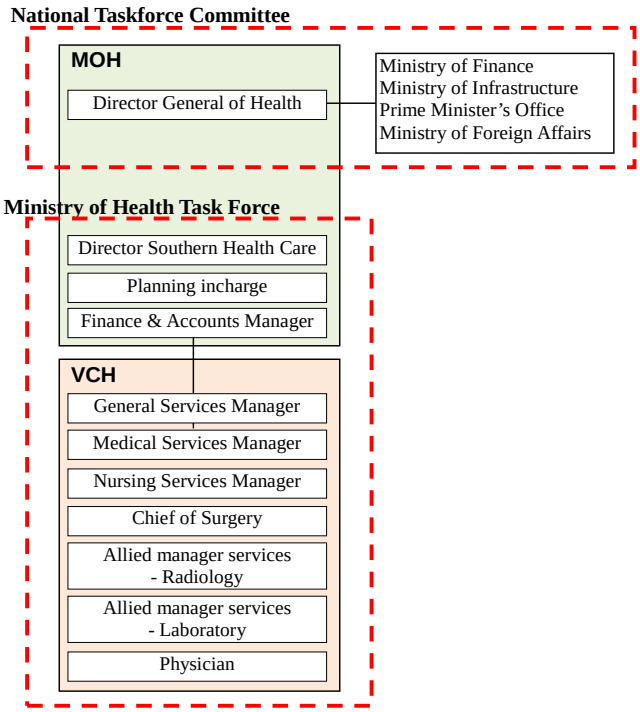


Figure 2-24 Organization of Task Force

(2) Tax Exemption

Tax exemption will be applied to this Japanese Grant Aid project in Vanuatu in accordance with the E/N to be concluded between the two countries.

Based on the designations in the E/N, the following will be the responsibilities of the Vanuatu.

1) To ensure prompt unloading and customs clearance at ports of disembarkation in the Vanuatu.
2) To ensure that customs duties, internal taxes and other fiscal levis which may be imposed in the Vanuatu with respect to the purchase of the products and the services be exempted..

Following the conclusion of a construction contract with Vanuatu, the contractor and the equipment supplier involved in the work will promptly prepare a master list of import items and apply for tax exemption through MOH.

Taxes such as a value-added tax (VAT) of 12.5% levied on the items procured in Vanuatu. Documents on items to purchase shall be filed in advance, and after the announcement has been issued the purchases shall be made in a duty-free manner.

An overview of the duty and tax exemption process is shown in Figure 2-25.

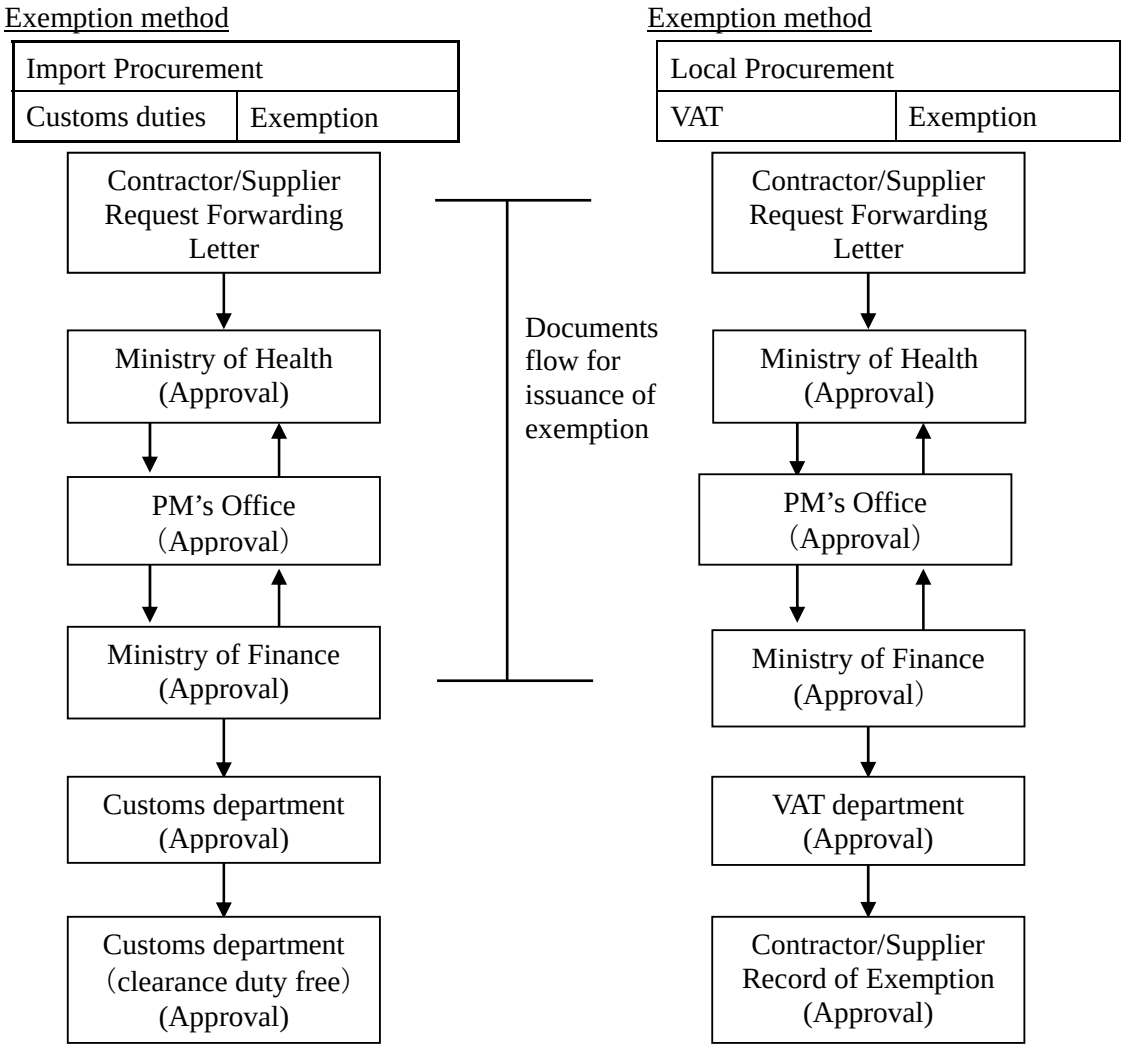


Figure 2-25 Outline of Duty and Tax Exemption Procedure

(3) Consultant

After the conclusion of the E/N and G/A, MOH will conclude a consultant agreement for the detailed design and construction supervision with a Japanese consultant company. The consultant agreement documents will come into force after obtaining authorization from JICA. To implement the project smoothly, it is important to promptly conclude a consultant agreement following the conclusion of the G/A. The consultant is required to prepare bid documents (detailed design drawings, specifications, etc.) based on this preparatory survey report in consultation with MOH and obtain approval for the content thereof from Vanuatu side in accordance with the aforementioned approval procedures. The bid work and construction supervision work will be executed in accordance with the content of the bid documents.

(4) Order of Construction Work/Equipment Procurement Work

The work of this Japanese assistance shall consist of construction work to build facilities and procurement work to procure, install, and test medical equipment. The contractors are restricted to Japanese companies meeting certain qualification requirements. Successful contractors are selected by the open bid system with a restriction on bidder qualification.

MOH will conclude a construction contract and an equipment procurement contract with each successful contractor selected by the bid process and receive authorization of those contracts from JICA. After the authorization, those contractors will commence their work and execute it in accordance with the contract.

(5) Utilization of Local Consultants

Local consultants who have sufficient knowledge about local construction projects and authorization agencies for related procedures are mobilized for the construction supervision.

Facilities engineers should be mobilized as well, as the hospital is a medical facility containing a higher ratio of mechanical and electrical works than with other general purpose buildings and for which cleanliness is required.

(6) Utilization of Local Construction Engineers and Dispatch of Specialized Japanese Engineers

The size of the construction market is small and there is no so-called “leading company” in the construction industry in Vanuatu. However, there are office buildings (reinforced concrete structure), resort hotels (reinforced concrete structure), supermarkets (light-gauge steel structure) and so on in Port Vila, and the capital city of Vanuatu. There are some small-size construction companies with five or six employees and some construction companies have experience in working for Japanese ODA projects. These companies own ready mixed concrete plants and construction machinery besides having construction workers. There should be no problem in securing local construction engineers and workers for general types of work.

The project is conducted by using a construction contractor of Japanese corporations. With regard to the implementation of special types of construction work (sewage treatment tank work etc.), local construction engineers were employed under the supervision of Japanese engineers and Japanese construction engineers are employed only where local engineers cannot complete the task sufficiently. It is essential to ensure sophisticated checks of workmanship and technical guidance centered on the management of process, quality and safety.

Besides, with regard to the areas including work requiring a relatively high level of quality management such as installation, pilot operation and adjustment of medical equipment, it is imperative to have technical instruction and the management by Japanese expert engineers who have abundant experience.

2-2-4-2 Implementation Conditions

(1) Temporary Work Plan without Disturbance to the Existing Hospital Activities

The planned construction site of the project facilities is in a location that obstructs the patients' access path to the existing hospital facilities. Therefore, a temporary access path should be arranged during the construction period. A temporary work plan that garners top priority to the continued operation of the hospital and safety is developed by separating the traffic lines of patients, medical staff and logistics with temporary partitions during the construction period. A dedicated entrance to each construction area is set to ensure access for construction vehicles and such like, so as to separate their traffic lines from the access path for ordinary vehicles and patients. Safety of third parties is ensured by arranging a security staff. Temporary work buildings such as consultants' office, contractors' office and material warehouse are planned based on the guideline of JICA.

Besides, leased generators are installed for temporary offices because blackouts occur occasionally. Drain water penetrates into the ground from soak pits after being purified in a temporary sewage treatment.

Countermeasures are taken to minimize vibrations and noise during the ground work and building frame work as a joint effort with contractors.

(2) Improvement of Technical Performance of Local Construction Workers

As stated previously, there are relatively many small to middle-size reinforced concrete structure or light-gauge steel structure buildings in the city of Port Vila. While a series of small-scale buildings are currently under construction, their construction work is being carried out mostly by local construction workers, though their construction methods are not very complicated. Because these local workers have insufficient experience in building medical facilities such as in the project, where high accuracy and a sophisticated level of workmanship are required, it is essential to invite skilled workers from Japan or a third party country. The construction work should be conducted by local workers under the guidance of the skilled workers. This method is essential particularly in the special water-proofing work for the underground water reservoir and the building of an X-ray shield, etc.

(3) Material Procurement

Even though many construction materials are imported products except for crushed stones and gravel, they can be procured in Port Vila including ready mixed concrete, crushed stones, gravel, metal roof material, sash and fixings. On the other hand, considering the quality and manufactural capacity, some fittings, X-ray related items, electric panels, public address, sanitary devices, equipment of a public system, pumps and air conditioning system are procured from Japan or third party countries. The procurement and transport plan should be developed carefully so that there is no disturbance to the construction process or construction period. Several local

construction companies have a ready mixed concrete plant. One of them is judged as having sufficient ability with its test equipment for evaluating the concrete and an established system to preserve data.

(4) Special Construction Method

While designs that allows construction methods familiar to local operators is used as much as possible in the project, some methods to secure performance and quality are less familiar to the local operators. These include a water shield technique for placing solar panel frames on metal roof, water-proofing work for an underground pit with high durability. Particularly, periodical maintenance is essential for roof seals and painting of external walls. During the construction period, the facility maintenance manager of the hospital is requested to fully master these techniques. The contractors and supervisors shall give guidance to him or her.

(5) Procurement of Equipment

With this plan, the collaboration with the construction work is shown in the table2-23. As for these constructions, the consultant shall perform adjustment between construction contractors and/or equipment suppliers and performs directions if needed. Moreover, in this plan, the move of existing equipment, especially Laboratory related equipment is included, and smooth enforcement is aimed at, discussing the process and the method of the move about the move with VCH.

Table 2-23 Collaboration Work of Construction and Equipment

Department	Equipment	Contents of construction
Radiology	General X-ray machine	Installation of radiological protection and a ceiling rail for movable rack
Operation theater	Anesthesia machine with ventilator	Installation of the exhaust pipe of surplus gas, and medical gas piping
	Ceiling operation light	Anchor plate supply and installation for ceiling installation
	C-arm X-ray machine	Radiological protection
	X-ray Viewer	Reinforcement work for surface-of-a-wall installation
	Scrub unit	Plumbing equipment
Laboratory	Safety cabinet	Installation of ducting for exhaust and LPG installation
CSSD	High pressure steam sterilizer	Installation of plumbing equipment and a ventilation fan
Pharmacy	Distillation unit	Plumbing equipment

2-2-4-3 Scope of Works

The demarcation of the works between the Japan and Vanuatu side is clearly defined in order to execute the project smoothly. Details thereof are shown in the table 2-24.

Table 2-24 Construction and Installation Responsibility Chart

To be covered by Japanese Side	To be covered by Vanuatu Side
	To secure and prepare land
	To get building permission
	To clear, level and reclaim the site when needed 1) Demolish existing building and unnecessary structures including foundations within the site 2) Relocate/remove existing incoming electrical power supply cable in the site 3) Remove existing incoming telephone line to the site 4) Remove/relocate existing internet cables and main server in site area as necessary. 5) Relocate existing water pipe in the site 6) Demolish existing sewage catch basins and pipe in the site
To construct Exterior Works within the site 1) Grading 2) To construct the parking 3) To construct roads within the site area	To construct Exterior Works out of the site area 1) To construct roads outside the site area 2) To construct gates and fences in and around the site 3) To perform Landscaping and Planting
To construct the building 1) Architectural Work OPD Building, Ancillary Mechanical Buildings 2) Electrical Work Power mains, Lighting and Receptacle, Wiring for Telephone and Piping for LAN system, Public Address, Interphone, Fire Alarm, Lightning Protection, Grounding, TV system, Emergency Generator 3) Mechanical Work Water Supply, Drainage, Hot Water Supply, Sanitary, Fixture, LPG Supply, Fire Fighting, Air Conditioning and Ventilation, 4)Other Work Medical Gas Supply, Drainage Water Treatment System, Solar -powered Hot Water Panel, Rain Water Utilization	

To be covered by Japanese Side	To be covered by Vanuatu Side
To provide facilities for the distribution of electrical power, water supply, sewer and others 1) Electricity a. Manhole, conduits and cabling for incoming electrical power line within the site b. Substation including switchgear and transformer, main distribution board c. Connection of existing main distribution board	To provide facilities for the distribution of electricity, water supply, drainage and others 1) Electricity a. Dismantlement of the existing 250 kVA transformer b. High voltage power supply to the new substation and a metering device for the site c. Dismantlement of the existing high voltage power supply to the existing substation and metering device
2) Water Supply a. Water supply system within the site b. Rain water collection and supply system c. Provide the existing water supply connection	2) Water Supply a. The city water distribution main to the site b. Existing water supply connection and renovation work at existing Hospital
3) Sewer a. Soil & waste water work within the site	3) Sewer a. Soil & waste water work for existing facilities
4) Telephone system a. Telephone wiring, conduits and outlets b. MDF, PABX, telephone handsets	4) Telephone system a. Removal of existing incoming telephone line b. Incoming telephone line and wiring route including hand holes and conduits up to the main distribution frame (MDF) for the site. c. Temporary incoming telephone line wiring to existing facilities and connection
5) Other System	5) Other System a. Relocation of existing internet network where applicable, connection to new facilities, wiring and testing.
6)Furniture and Equipment a. Curtain Rail b. Fixed furniture c. Supply and installation of medical equipment	6) Furniture and Equipment a. Curtain and Blind b. General furniture c. Removal and installation of existing Equipment d. Removal and installation of existing Fixed furniture and General furniture

The management of schedule associated with equipment installation and the building, electrical, and mechanical constructions are important in advancing the work smoothly. The related parties should adjust the schedule with a full understanding of the installation conditions and the intended use of the medical equipment to be installed.

Further, in the project, the removal of the existing buildings, installation of a temporary path and connecting corridor to the existing hospital and improvement of infrastructure are implemented under the responsibility of Vanuatu side. Therefore, confirmation of the work progress between both parties is also important. Vanuatu side promised in M/D dated October 27th, 2011 that the removal of the existing buildings, existing telephone line, the installation of a temporary telephone line and soon were completed before this construction work starts. Elaborate discussions should be held again at the stage of detailed design explanation so as to prevent any disturbance to the work.

2-2-4-4 Consultant Supervision

The Japanese consultant company (Consultant) will conclude a consultant agreement with the MOH and execute detailed design work (preparation of bid documents, etc.), bidding work, and construction supervision work for the project.

The purpose of construction supervision is to ensure the proper execution of the contents of the construction contract, including checking the conformity of construction work to the design documents. The Consultant will strive to secure quality and manage the schedule while providing guidance, advice, and coordination during the construction period. This construction supervision consists of the following.

(1) Assistance with the Bidding and Contract Processes

The work includes the preparation of bid documents, notice of bid solicitation, acceptance of an intention to bid, screening of qualifications, briefing on the bid, distribution of bid documents, acceptance of bid documents, and evaluation of bids, all of which are necessary to determine the successful contractors who will undertake construction and equipment works. Also, advice and assistance regarding the conclusion of a construction contract between each successful bidder and MOH will be provided.

(2) Provision of Guidance, Advice, and Coordination to the Contractors

The construction schedule, the construction plan, the construction procurement plan, the equipment procurement and installation plan, shall be reviewed and necessary guidance, advice and coordination shall be provided to the Contractors.

(3) Checking and Approval of Construction Drawings, Installation Drawings, etc.

The construction drawings, installation drawings, and other documents submitted by the Contractor shall be reviewed and approved after providing necessary instructions.

(4) Inspection and Approval of Construction Materials and Equipment

The conformity of construction materials and equipment to be procured by the Contractors shall be checked by comparing them with the construction contract documents prior to approval for procurement.

(5) Inspection of Works

The quality and performance of the works shall be inspected by attending construction materials/equipment inspection tests conducted at the production plant and the tests conducted at the work site as appropriate.

(6) Reporting of Progress of Work

The construction schedule and the conditions at the site shall be fully understood and reported to the relevant agencies in both countries.

(7) Inspection of Completed Works and Test Operation

Inspection and test operation of completed buildings, systems, and equipment shall be performed. The intended performance specified in the construction contract documents shall be duly secured and an inspection report shall be submitted to MOH.

(8) Construction Supervising System

The Consultant shall assign one resident representative to the site to execute the abovementioned works. In addition, specialty engineers of each field shall be dispatched in view of the progress of work to perform necessary consultation, inspection, guidance, and coordination. At the same time, engineers in Japan shall also be assigned to carry out technical reviews and communications with the site in Vanuatu. Additionally, necessary matters of the current project, including progress of work, application for payment, and final handing-over, shall be reported to the relevant governmental agencies in Japan.

The construction supervision system is shown in the figure 2-26.

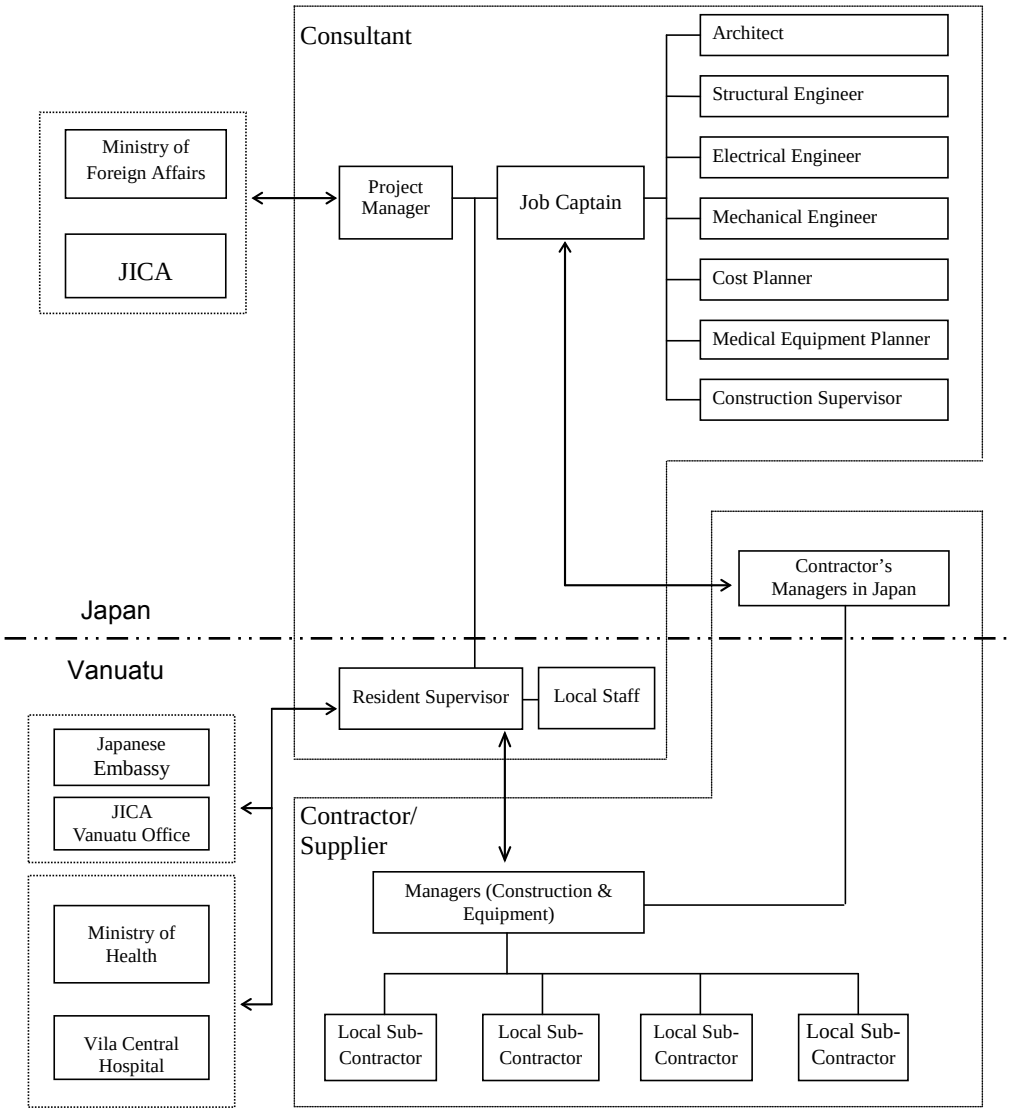


Figure 2-26 Consultant Supervision System

2-2-4-5 Quality Control Plan

(1) Materials Used

- Cement
  Cement is not produced in Vanuatu, so it must be imported. Ordinary Portland cement or a similar product is commonly used.
- Aggregate
  Because gravel is not available in Vanuatu due to its geography, lifted coral is being used as the aggregate. It is cut out from the quarry in the inland area, crushed by a crushing machine, and graded according to size. Sand produced from crushed stones is commonly used.
- Chemical admixtures
  Chemical admixtures are not used.
- Water
  The water quality should be equivalent to municipal water.

(2) Mix Proportion Plan

There is a ready mixed concrete plant within one hour transportation to the site.
Prior to the casting of concrete, the Contractor is required to prepare a mix proportion plan in accordance with the design documents and specifications of the work and submit it to the resident representative for approval. The Contractor will then produce a test mix in accordance with the plan and confirm the quality of the concrete.

(3) Casting of Concrete

In Vanuatu, a concrete pumping truck is a part of the ready mixed concrete plant. Concrete can be placed either by using this concrete pumping truck, cart or bucket.
Sufficient care is needed for the infilling of concrete. A vibrator or similar means should be used to construct fully compacted concrete. Additionally, care must be taken in curing after the casting of concrete to prevent cracking due to drying shrinkage.

In Vanuatu, the normal procedure is to construct columns first, then place forms for beams and floors, arrange reinforcing bars, and cast the concrete.

(4) Strength

Values of 20, 25, 30 N/mm^2 are used as the specified design strength. In view of the aggregate conditions and the building size, use 20 – 25 N/mm^2 as the specified design strength of concrete for the current structures.

(5) Quality Control of Concrete

Quality control is conducted at the aforementioned plants in accordance with Australian standards. The quality control method of the Japanese Architectural Standard Specification: Concrete Construction (JASS 5) shall be incorporated where appropriate.

Determine the strength for proportioning by trial mixing.

Conduct a compressive strength test using 28th day test pieces and confirm that the concrete exceeds the specified quality standard strength. For this test, install a water tank at the site that can cure test pieces in water. The compressive strength test should be conducted by a third party organization. The test shall be conducted every day of casting and once per 150 m^3.

Confirm that the chloride content in fresh concrete is 0.3 kg/m^3 or less using test methods commonly used in Japan.

2-2-4-6 Procurement Plan

(1) Construction Materials and Equipment

Because this Grant Aid project involves construction of the hospital facilities, the material and equipment to be selected shall be sturdy, allowing easy cleansing and maintenance of hygiene to match the purpose of the facility. Material, equipment and such like should be BS compliant, since BS is the standard widely used in Vanuatu. Items compliant to JIS are selected if there is no available standard. The procurement policies are mentioned below.

1) Local procurement

To facilitate repair and maintenance after completion of the facilities, the materials and equipment are procured locally as much as possible. Even if an item is actually imported from other countries, it is treated as a local product as far as it is easily accessible in the domestic market of Vanuatu (i.e., items constantly available without requiring import procedures in the domestic market). Most construction materials distributed in the market are products imported from Australia, New Zealand or China.

2) Procurement by import

Procurement through import from Japan (or third party countries such as Australia and New Zealand where appropriate) is considered with regard to materials and equipment that are judged to be difficult to procure locally, insufficient in terms of the required quality or unlikely to secure stable supply. In such a case, it is essential that contractors should keep a punctual construction period by promoting preliminary procedures smoothly including the tax exemption process based on close communication with the MOH of Vanuatu for import and custom clearance.

3) Transportation plan

The port of Port Vila is a trading port that can accept 40 ft containers. It is less than half an hour’s drive from the port to the planned construction site. The roads used for transportation are well developed.

4) Procurement plan

Based on the above-mentioned review, principal construction materials and equipment to be procured for the project are categorized into those for local procurement, those to be procured from Japan and those to be procured from a third party country, and indicated in the table 2-25.

Table 2-25 Procurement Plan for Major Construction Materials and Equipment

Type of work	Material and equipment	Procurement			Remark
		Local	Japan	Third country	
Reinforced concrete work	Portland cement	○			Local products are satisfactory.
	Fine aggregate	○			Local products are satisfactory.
	Coarse aggregate	○			Local products are satisfactory.
	Concrete	○			Local products are satisfactory.
	Deformed bar	○			Local products are satisfactory.
	Form	○			Local products are satisfactory.
Steel work	Steel frame(hot dip galvanized)	○			Local products are satisfactory.
Masonry	Concrete block	○			Local products are satisfactory.
	Glass block	○			Local products are satisfactory.
Water-proofing work	Asphalt waterproofing	○			Local products are satisfactory.
	RC eave gutter, Synthetic rubber sheet	○			Local products are satisfactory.
	Epoxy liquid-applied membrane water proofing w/glass fiber reinforcement	○			Local products are satisfactory.
	Polysulfide sealing around joinery jambs	○			Local products are satisfactory.
	Silicon sealing material (for pane and sash peripheral sealing)	○			Local products are satisfactory.
Plastering work	Cement mortar	○			Local products are satisfactory.
Tile work	Homogeneous ceramic tiles (295 × 295, 195 × 195, 95 × 95)	○			Local products are satisfactory.
Stone work	Terrazzo block	○			Local products are satisfactory.
Carpentry	Wood for fittings	○			Local products are satisfactory.
Roofing work	Steel folded plate	○			Local products are satisfactory.
Metal work	Light-weight ceiling substrate (T bar)	○			Local products are satisfactory.
	Light-weight ceiling substrate	○			Local products are satisfactory.
	Decorated metal ware, handrail	○			Local products are satisfactory.
	Curtain rails, roof drain, etc.	○			Local products are satisfactory.
Metal fixture work	Aluminum fixtures		○		Local factory's ability is not satisfactory.
	Steel fixture		○		Local factory's ability is not satisfactory.
	X-ray shielding door, window		○		Specialized product
	Metal parts for fixture		○		Follow the supplier of fittings
Glass work	Ordinary sheet glass, 5mm	○			Local products are satisfactory.
	Lead-containing glass, 14mm	○			Local products are satisfactory.
Paining work	Interior painting	○			Local products are satisfactory.
	Exterior painting	○			Local products are satisfactory.
Interior finish work	Plaster board	○			Local products are satisfactory.
	PVC sheet for floor	○			Local products are satisfactory.
	Inorganic protection coating calcium silicate board	○			Local products are satisfactory.

Type of work	Material and equipment	Procurement			Remark
		Local	Japan	Third country	
Finishing unit work	Sink, hanging cupboard	○			Local products are satisfactory.
	Wooden furniture	○			Local products are satisfactory.
	Doorplate, guide plate, etc., building plaque		○		Local products are satisfactory.
	Curb	○			Local products are satisfactory.
	Steel grating	○			Local products are satisfactory.
	Weather-resistant polycarbonate	○			Local products are satisfactory.
Electric facility work	Substation	○			Local products are satisfactory.
	Transformer	○			Local products are satisfactory.
	Emergency generator	○			Local products are satisfactory.
	Distribution boards		○		No local product. Procured in Japan to ensure quality.
	Cabling pipe	○			Local products are satisfactory.
	Box	○			Local products are satisfactory.
	Electric cable	○			Local products are satisfactory.
	Cable	○			Local products are satisfactory.
	Lighting fixture	○			Local products are satisfactory.
	Wiring device	○			Local products are satisfactory.
	Public address system		○		No local product. Procured in Japan to ensure quality.
	Interphone system		○		No local product. Procured in Japan to ensure quality.
	Fire alarm system	○			Local products are satisfactory.
	Lighting protection	○			Local products are satisfactory.
Water supply , Drainage and Sanitary fixture work	FRP panel tank		○		No local product. Procured in Japan to ensure quality.
	Pump		○		Procured in Japan by quality comparison.
	Hot water solar panel	○			Procured locally to ensure maintenance.
	Electric water heater	○			Procured locally to ensure maintenance.
	Sanitary ware	○	○		Procured locally to ensure maintenance. Procured in Japan when local products are unavailable.
	Piping material	○			Procured locally to ensure standard and maintenance.
	Thermal insulating material	○			Procured locally to ensure standard and maintenance.
	Fire protection equipment	○			Procured locally to ensure standard and maintenance.
Air conditioning and ventilation work	Air conditioner		○		Procured in Japan by quality comparison.
	Ventilation fan	○			Procured locally to ensure maintenance.
	Refrigerant pipe, drain pipe		○		Procured in Japan by quality comparison.
	Air intake and outlet		○		Procured in Japan by quality comparison.
	Duct material		○		Procured in Japan by quality comparison.
	Air filter		○		Procured in Japan by quality comparison.
	Automatic control equipment		○		Procured in Japan by quality comparison.
	Sewage treatment plant		○		No local product. Procured in Japan by quality comparison.
	Medical gas facility		○		Procured in Japan by quality comparison.

(2) Procurement of Medical Equipment

In principle, equipment of the project will be planned to procure from Japan. However, procurement is planned from the third countries for the items which cost remarkably expensive transportation fee such as beds. And it is desirable that the local agents would be placed in Vanuatu or neighboring countries for the equipment which need periodical maintenance or consumables supply. Since for some equipment the manufacturer's choice will be narrowed if it limits to Japanese products in taking into consideration of the agents and securing the competitive bidding, the country of origin will be extended to the third countries in such equipment.

The procurement list for major items of equipment is shown in the table 2-26.

Table 2-26 Procurement List of Major Equipment (Plan)

Equipment	Procurement country		
	Vanuatu	Japan	Third countries
Ultrasonic nebulizer, Endoscopes, Refrigerator, Radiology apparatus, Instruments set, Centrifuge, Blood cell counter, Gynecological examination table, Incubator, and so on		○	
Defibrillator, Patient monitor, Anaesthesia machine, Laparoscope set, Bed, Autoclave, Biochemical analyzer, Colposcope, and so on		○	○

2-2-4-7 Operational Guidance Plan

(1) Initial Operational Guidance

The initial guidance on medical equipment operation should be provided by technicians and/or engineers sent from the supplier at the time of delivery and installation, and medical service staff for the project facilities and equipment maintenance technicians shall be invited. The guidance for equipment to be installed should consist of the operation method, precautions during handling, and daily inspection, trouble shooting.

(2) Operational Guidance Plan

In the project, the operational guidance is conducted for the practitioners of the equipment, such as medical staff and engineers of maintenance department, to train daily maintenance activity by utilizing Japanese soft component (technical assistance), which is originally requested by MOH. And each specialty of the hospital is to formulate a business plan as a basis which charges the management budget for the following fiscal year. The claim of a maintenance budget is the plan teaching to the engineer of the maintenance department about a budget accumulation method required for supply of replacement parts, consumables etc needed for equipment management.

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

The study team has, through its field investigation conducted from March 6 to April 4, 2011, confirmed that the issues arising form equipment operations and maintenance. And for the purpose of tackling with the issue and strengthening the management of equipment operation and maintenance, Vanuatu side requested Japanese government the technical assistance regarding the management and manipulation of medical equipment including practical training coping with emergency cases.

In order to avoid break downs, new technique is not needed and only the daily maintenance is important, but there is no such system in VCH and that sometimes leads to the break downs. So in this cooperation, training the staff including medical and maintenance staff regarding the daily inspection before and after the use of the equipment will be conducted and also give them the knowledge how to reinforce the management system in order to get budget which is needed for the maintenance.

So to secure the minimum sustainability of the Japanese cooperation, it expects to be beneficial to implement the technical assistance which meets request from Vanuatu side.

See the Appendix 5 for the detailed plan.

2-2-4-9 Implementation Schedule

The implementation schedule of the project after the conclusion of the Grant Agreement (G/A) is shown in Figure 2-27; it is comprised of detailed design work and bidding work by the Consultant, construction work by the Contractor, and construction supervision work by the Consultant.

(1) Detailed Design Work

A consultant agreement shall be concluded between the MOH and a Japanese consultant regarding the detailed design of the current project (preparation of bid documents), and the Consultant shall obtain authorization for the contract document from the Japanese government. Next, the Consultant shall prepare bid documents based on this preparatory survey report in consultation with MOH and obtain approval of the MOH.

The period necessary for the detailed design (preparation of bid documents) is estimated to be five months.

(2) Bidding Work

The period necessary for the bidding work is estimated to be four months in actuality.

(3) Construction Work by the Contractor and Construction Supervision by the Consultant

After concluding the construction contract, the Contractor shall commence construction work. The Consultant commences the construction supervision work at the same time.

The composition of the facilities of the project is shown in the table 2-27.

Table 2-27 Construction Detail of VCH

Major project breakdown	Facility
OPD Building (Two storied building)	First floor: Operation Theater: Operation rooms (2), Recovery, Operation Hall, Central Sterilization and Supply, Equipment room, Changing room Radiology Department: X-ray(2), Control room, Ultrasound Scanning, CRT room, Reception, Office Laboratory Department: Hematology/ Serology/ Blood bank/Biochemistry /Cytology/ Histology/ Microbiology/ STI/Virology/TB/Wash room/ Media room/ Malaria/Blood Sampling/ Blood Donation/Tea room/ WC/ Reception/ Office/ Locker room Second floor: Emergency Department: Waiting, Reception/Staff room, Resuscitation room, Treatment room, Observation room, Dirty room, Sterilization room Outpatients' Department (General Clinic): Waiting, General Consultation room (7), Nurse Station, Treatment room, Plaster room, Medical Record, Reception, Pharmacy, Locker room, Conference room Specialized equipment: Rainwater Utilization System

Major project breakdown	Facility
Ancillary facilities (One-story)	Elevated Water Tank Pump room Transformer room Blower room Sewage Treatment Plant, Soak Pit
Medical equipment	The Equipment necessary the project facilities; Emergency Department, Outpatients' Department, Operation theater, Radiology Department and Laboratory Department.

The facility configuration in the scope of the project is indicated in the following table.

The period of construction is estimated to be 18 months; the contents of the work are shown in the figure below.

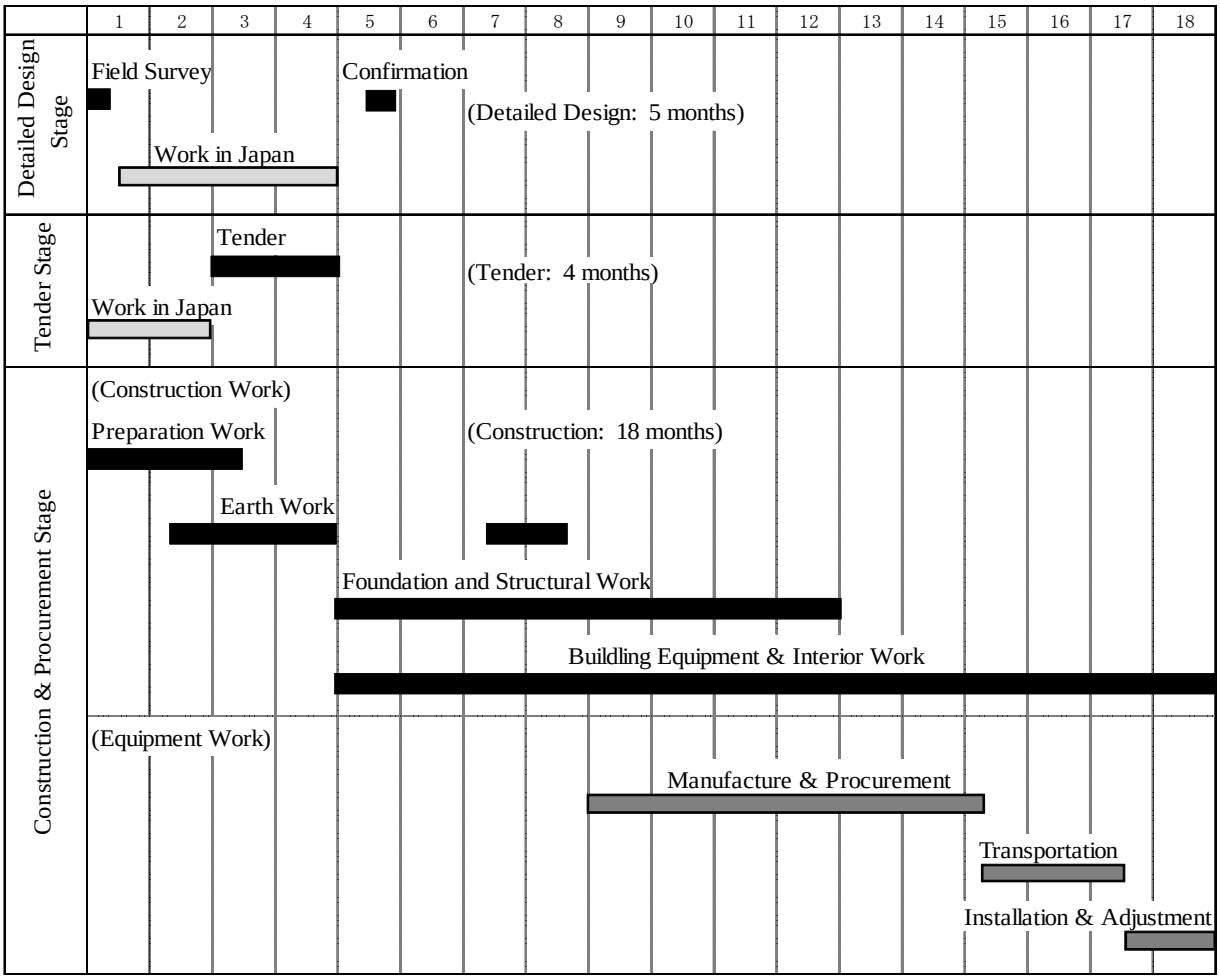


Figure 2-27 Project Schedule

(4) Procurement Supervision

After concluding an equipment supply contract, the supplier begins procuring the equipment. The Consultant starts the procurement management and construction supervision works at the same time. The period of procurement and installation of equipment is estimated to be 10 months; the details of that period are shown in the figure 2-27.

2-3 Obligations of Recipient Country

The principal measures and work to be undertaken by Vanuatu side are described below.

(1) Measures and Procedures

1) Application and acquisition of necessary permits for the construction for the current project.
2) Issuance of the Banking Arrangement (B/A) and the Authorization to Pay (A/P) and bearing of the related charges.
3) To ensure prompt unloading and custom clearance at ports of disembarkation in the Vanuatu and to assist internal transportation therein of the products.
4) To accord Japanese nationals and third party country citizens 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 Vanuatu 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 Vanuatu with respect to the purchase of the products and the services be exempted.
6) To ensure that the facilities constructed or rehabilitated under the Grant Aid and the products be maintained and used properly and effectively for the implementation of the project and to bear all the expenses, other than those covered by Grant Aid, necessary for the implementation of the projects.
7) To take procedures, managing contracts, and bearing charges regarding electricity, telephone, gas, water supply, and wastewater drainage related to the project.

(2) Work related to Construction Work

All the work to be undertaken by Vanuatu and the schedule thereof consist of a pre-construction phase, a construction phase and a post-construction phase as shown in the table 2-28. A budgetary request for work scheduled for a fiscal year must be made by July of the year before. A fiscal year begins in January and ends in December.

Table 2-28 Vanuatu Side Works and Implementation Schedule

Items			1st year	2nd year	3rd year	4th year
General Schedule of the Project				Construction period		
Related works preceding the construction works（Figure2-28）		To be completed by	▽ Request of Budget (July)			
B-1	Demolition of the existing Dental Facility and rough grading	Before tender				
B-2	Demolition of the existing Store and rough grading	Before tender				
B-3	Demolition of the existing Stairs	Before tender				
B-4	Removal of the exiting trees	Before tender				
B-5	Construction of temporary road for existing hospital	Before tender				
B-6	Demolition of the existing wall fence for the existing hospital access and the project site	Before tender				
B-7	Construction of pathway with covered roof for the existing hospital access	Before tender				
B-8	Demolition of the existing canopy	Before tender				
B-9	Demolition of the existing supply water/drainage pipes	Before tender				
B-10	Temporary incoming telephone line wiring to the existing facilities and connection	Before tender				
B-11	Removal of the existing telephone line	before tender				
B-12	Banking Arrangement for Detailed Design	At Consultant agreement				
	Banking Arrangement for Construction	At Construction Contract				
B-13	Arrangement of Tax exemption					
Related works during facility construction （Figure2-29）		Request of Budget (July) ▽				
D-1	High voltage power supply to the new substation and a metering device for the site	Five months before the completion				
D-2	The city water distribution main to the site Existing water supply connection and renovation work at existing Hospital	Five months before the completion				
D-3	Dismantlement of the existing high voltage power supply to the existing substation, transformer and metering device	Five months before the completion				
D-4	Incoming telephone line and wiring route including hand holes and conduits up to the main distribution frame (MDF) for the site	Five months before the completion				
D-5	Transfer of IT line, connection work to the project and testing	Five months before the completion				
D-6	Arrangement of Tax exemption	Throughout the year				

Items			1st year	2nd year	3rd year	4th year
Related works after facility construction					▽ Request of Budget (July)	
A-1	Construction of roads outside the project site area and gates & fence	At completion of the facility				▬
A-2	Landscaping and Planting	At completion of the facility				▬
A-3	Curtain and Blind	At completion of the facility				▬
A-4	General furniture	At completion of the facility				▬
A-5	Removal and installation of existing Equipment	At completion of the facility				▬
A-6	Removal and installation of existing fixed furniture and General furniture	At completion of the facility				▬
A-7	Removal of temporary incoming telephone line to the existing hospital	At completion of the facility				▬
A-8	Arrangement of Tax exemption	Until completion of the facility				▬

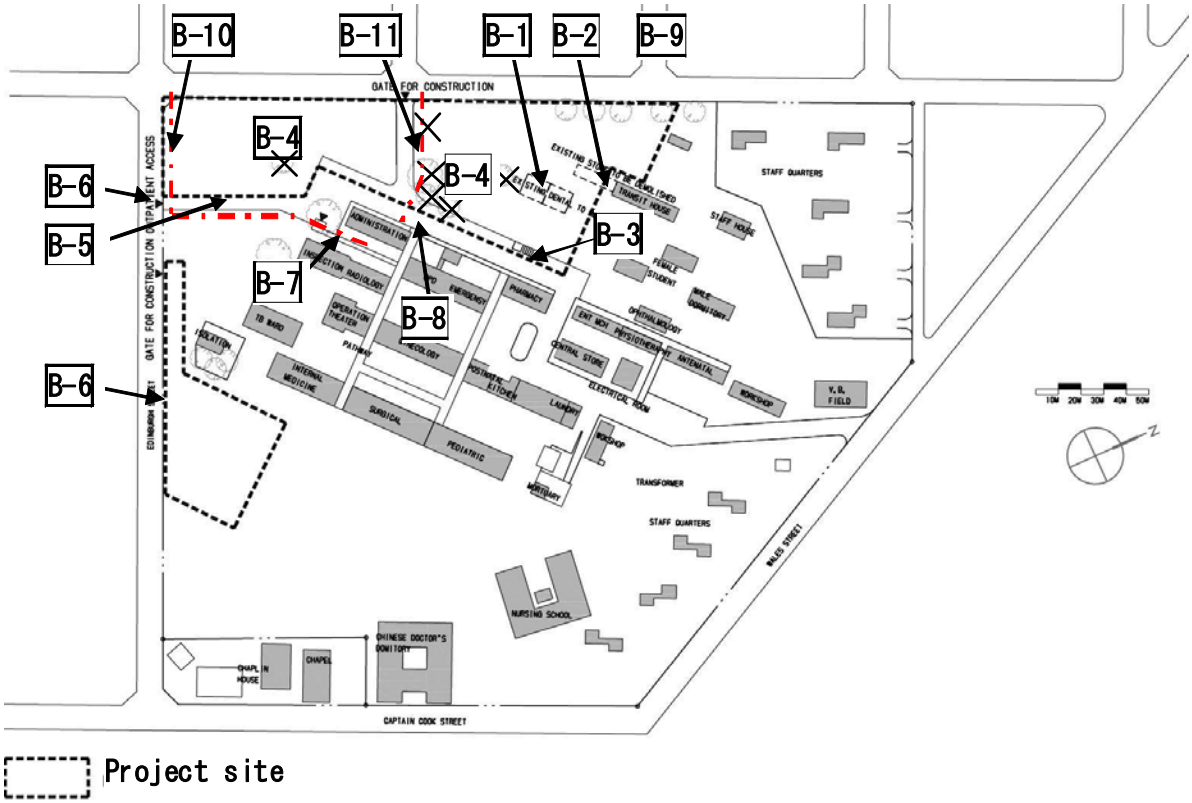


Figure 2-28 Vanuatu Side Works Preceding the Construction Works

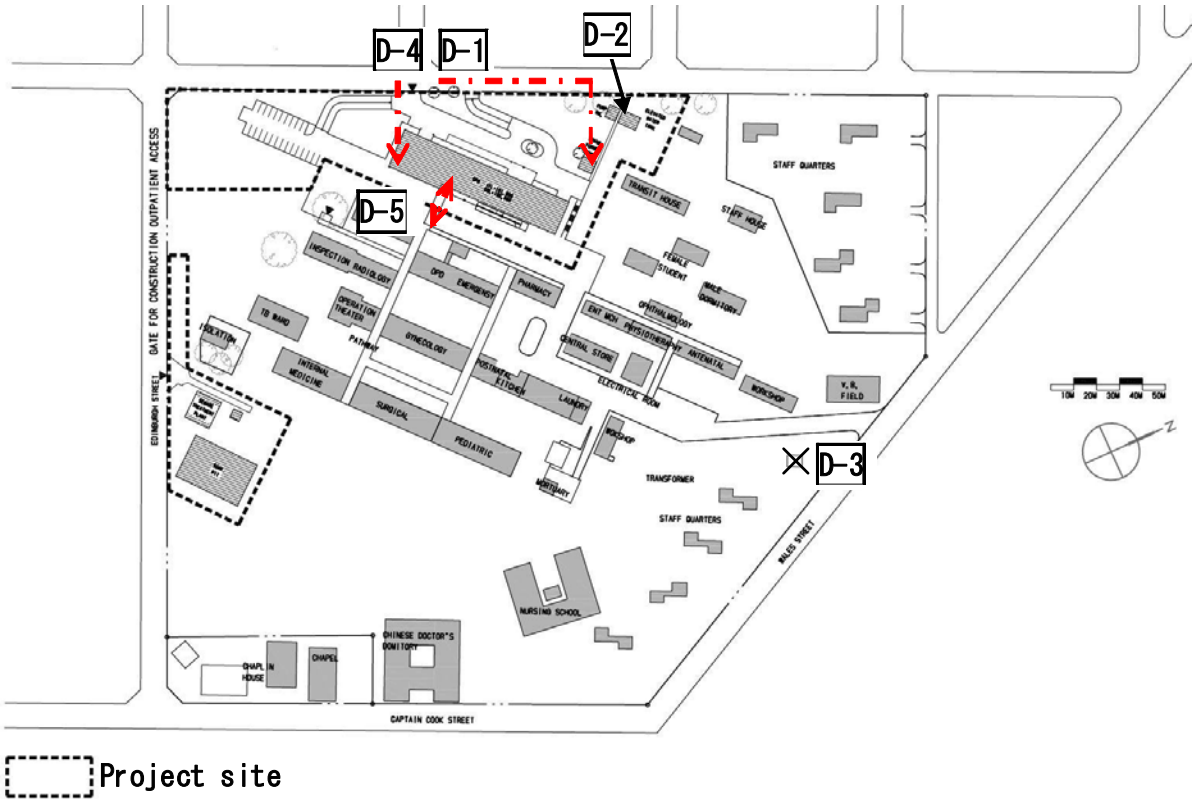


Figure 2-29 Vanuatu Side Works During Facility Construction

(3) Technical Assistance (soft components)

① Prior public relation activities

② Selection of and communication with trainees

(4) Miscellaneous

Bearing of expenses spent on items not covered by the current Grant Aid project.

2-4 Project Operation Plan

(1) Personnel Plan

In the present condition, the number of the regular personnel is in the situation which could not respond to the demand of the medical services so the temporary reemployment of the personnel who retired the hospital is made up for managing the demand. The salary expense for the temporary staff could not be covered in the annual budget and therefore the cost is coming from the management cost of the hospital, which causes the situation into chronic shortage of operational expenses in recent years. The Vanuatu government supposes that the budget's shortage is filled up by the health financial support by SWAPs from 2011. About the nurses who run short especially in VCH, it determined to accept nurses from Solomon Islands to VCH and NPH around three years until the present student nurses graduate. The present nurse increase will be based on the agreement of Vanuatu and Salomon Islands, and the dispatch expense will be covered with a supplementary budget. The graduates of the nursing school which is at VCH site is to be accepted in VCH from 2014, and the increased amount of the personnel expenses of about 11 million VUV in total (3.6% of personnel expenses in 2010) needs to be appropriated for the budget.

The present personnel assignment situation and the personnel plan after this planned implementation are shown in the table 2-29.

Table 2-29 Personnel Assignment Plan in VCH

（Unit：1,000VUV）

Medical Staff	Current（2010）	Increased number	Annual salary	Increment（Annual × increased number）
Doctor	31	0	-	-
Registered Nurse/Midwife	85	10	1,100	11,000
Nurse practitioner*	8	-	-	-
Assistant nurse	14	-	-	-
Inspection engineer	9	-	-	-
X-ray engineer	4	-	-	-
Dentist	3	-	-	-
Dental technician	5	-	-	-
Physiotherapist	3	-	-	-
Office work and auxiliary personnel	52	-	-	-
Maintenance staff	7	-	-	-
Dietitian	0	-	-	-
Pharmacist	5	-	-	-
Total	226	10	-	11,000

（Resource：Annual report of VCH in 2010）

*) Nurse practitioner：In Vanuatu, in order to compensate a doctor's shortage, the qualifications to take fundamental measures as nurse practitioner are given by training experienced nurses.

(2) Maintenance Plan

1) Facilities (buildings, mechanical system, and electrical system)

Maintenance management of VCH is performed in the same section of facility and equipment. Although daily maintenance, a repair request, etc. is progressing by with an AusAID resident engineer's instruction from last year.

In completion of the new facility, in order to realize a required medical service, there are the following apparatus and systems, and a maintenance management staff with special knowledge is needed.

① Chief engineer (Engineer)

a) The whole maintenance management (adjustment with the hospital chief, MOH, and other assistance organizations)
b) Annual maintenance management budget control
c) Plan and implementation of the maintenance plan for the hospital facility and equipment
d) Education and instruction of the technical staff
e) Understand high-pressure industrial and building power system, an air-conditioning system and drainage / water disposal associated system

② Mechanical technician

a) An air-conditioning machine and pump fan operation management
b) Medical gas system operation management
c) A water disposal system and effluent treatment system operation management
d) Solar-powered hot water supply panel operation management

③ Medical equipment technician

a) The annual maintenance management plan of medical equipment
b) Medical equipment (electricity and electronic relation) maintenance management
c) Education of the equipment maintenance management to the staff

In order to perform maintenance control continuously, each staff member's consciousness reform, development of technical abilities and strengthening of functional collaboration between hospital management and persons in charge of the maintenance are necessary. Moreover, it is desirable to employ newly a chief engineering technician, a mechanical technician, and a medical equipment technician and to perform maintenance services in the light of troubles prevention. Fortunately, the new electric technician was employed in the end of year 2010. However, it is not considered so easy to employ any more considering current budgetary constraints. Therefore we should focus on enhancement of technical capability of current personnel. In the project, the technical assistance, that is, soft component is planned to carry out and to train existing engineering technicians.

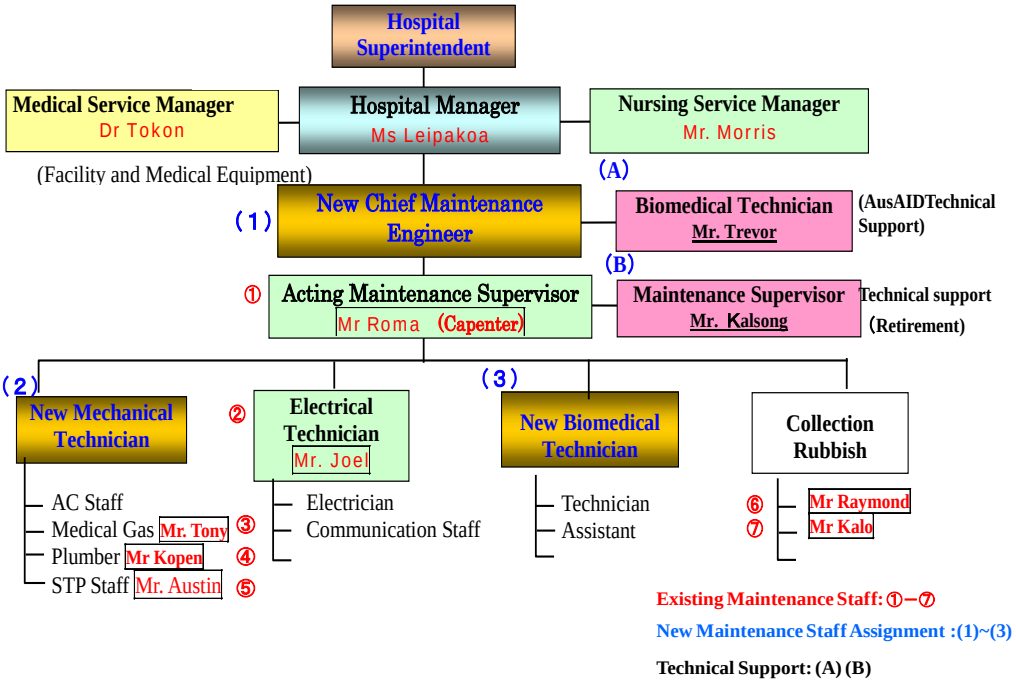


Figure 2-30　VCH Maintenance Organization Chart

Although it was said that a dispatch engineer (A) would be completed at the time of field investigation, the replacement has already been assigned by AusAID, which is very important of the technical support in the above-mentioned organization.

Moreover, the skilled maintenance supervisor (B) employed till last year has full knowledge of all the apparatus, such as the existing oxygen generator, and therefore, the employment of person who has equivalent capability is desirable for the maintenance of the new institution.

2)　Medical equipment

As maintenance management work concerning medical equipment, the following work is fundamental and required.

①　Daily inspection

There is no agency to provide maintenance services in Vanuatu and the expense of dispatching engineers from neighboring countries always costs too much which means it is difficult to cope with in case of the significant failure of the equipment. So in this plan, as it is important to avoid the failure from the viewpoint of the preventive maintenance, a measures of introduction and implementation of the daily inspection to the operators are the most priority.　It is a fundamental procedure to perform a check of operation before the commencement of work, and to perform clean and check of equipment at the time of finishing work daily.

Although the medical worker is also taking charge of equipment management in VCH , daily check is seldom performed in addition to cleaning of the circumference. In order

to improve this present condition and to raise maintenance management ability, daily check is due to be trained by technical assistance (soft component).

② Calibration of the measurement equipment

Clinical inspection equipment: Instruction of equipment operation is performed in the technical guidance by the dispatch engineer of AusAID.

Although there is a little inspection equipment newly supplied in this plan, it presupposes a dispatch engineer at the equipment delivery will trainee the staff in VCH for the equipment to be calibrated periodically.

Diagnostic imaging equipment: Suitable accuracy management is performed under instruction of the radiologist who is experienced in service in the medical facilities in New Zealand.

Instruction about accuracy management is scheduled for the time of equipment delivery about the equipment which is due to be introduced in this plan.

③ Correspondence at the time of the failure

Currently, the periodical maintenance activities are not performed and it is corresponded to procure the spare parts, etc. when a serious failure occurs.

About the medical equipment maintenance supplied in the project, the equipment operator itself performs daily check while the newly employed electrical engineer mainly conducts replacements of parts which is relatively difficult.

The engineer has experienced the maintenance administrative task of electric equipment in UNELCO, and holds sufficient technologic abilities to preserve electric equipment in the hospital. Moreover, since the training of medical equipment maintenance has been received under the dispatch engineer of AusAID over three months, he has engineering skills of fundamental maintenance management. However, in order to perform the maintenance and repair of medical equipment for various type of equipment, the further knowledge by the training should be needed. Since there are a few personnel of maintenance, the engineer takes wide range of maintenance management of facility equipment and electric apparatus other than medical equipment.

Since it seems in the present condition that the possibility of increase of the personnel is very low, maintenance administrative plan and organization by the present maintenance management staff is to be implemented.

④ The inventory control and the budget measure of spare parts and consumables

The present supplying system of consumables and spare parts is based on a budget claim at the time of necessity, which causes the delay of the parts and in the worst case, the equipment stops by the shortage of the parts. In the project, in order to cope with this problem, it is proposed expecting administrative and maintenance expenses are

appropriated at the time of business plan decision. As concrete contents about budget planning, a periodic check plan, etc. are guided by the above-mentioned technical assistance, consumables and spare parts required for equipment operation can be supplied timely.

(3) Financial Plan

1) Policy

In the project, since much increase of the MOH is not expected immediately, it was presupposed that a project scale is in the range in which management expense does not increase.

Expenditure of VCH for the past five years shows that personnel expenses are in about 80% of budgets (sum total of personnel expenses and operational expenses), and the situation quite serious in management. The operational expenses were insufficient and the medical service was not secured in VCH because management expense has been diverted about the extraordinary personnel's salary. As the result, situations of the shortage of medical services are getting social problems.

The Ministry of Finance has carried out financial investigation and instruction, in order to cope with the problem.

In this plan, according to the financial planning for the improvement of VCH's management by the Ministry of Finance, it strengthen the collection of the medical treatment fees from patients in terms of revenue side, and advancing financial management by cost control is to be enforced in expenditure side.

2) Revenue

① Estimation

The track records of the collected amount of medical treatment fees were 10,600,000 VUV in 2010. In deliberations with a finance official, although final collection target figures were the same as the management budget amount (74 million VUV), they decided to set in 20 million VUV which was the amount in 2008. It is because the target figure was considered to be a range which can be attained by preparing of and promotion by a post of revenue official in charge in VCH and have actually attained in the past. Moreover, the official says that he is ready to make the increase of the amount of the budget by the increase of collected amount. In the management reform of VCH which the Ministry of Finance promotes, they regarded collection strengthening of the medical treatment fee as the important measurement and have a great hope for the result.

② Estimation result

The target figure of collected medical treatment fees of VCH is shown in the table 2-30.

Table 2-30 The Present Condition of Annual Earnings of VCH, and Comparison of Future Prediction

（Unit：1,000 VUV）

Accounting year	Current (2010)	Estimation (New building)	Increment
Ⅰ Medical treatment fee			
1. Hospitalization expense	*6,131 cases	18,209=6,744cases×675×8day×50%	-
2. Examination expense for consignment	500 cases	1,856=550cases×3,375×100%	-
3. Training acceptance	100 cases	1,100=110cases×10,000×100%	-
4. Commission inspection	n/a	2,025=600cases×3,375×100%	-
5. Others	n/a	n/a	-
Ⅱ Certificate issuing commission	n/a	600=200cases×3,000×100%	-
ⅢTOTAL（Ⅰ＋Ⅱ）	10,600	23,790	13,190

*The hospitalization number will be based on data in 2009.
The number of cases rate of expansion after the new-building opening will be assumed to be increase of ratio 10% in 2010.

About the growth of the income, it is predicted principally caused by new visitors, the increasing operation number, related hospitalization and consignment examination that it is largely based on the new buildings effect.

It can be expected that uses of VCH about various inspections and foreigner's medical examination by private sector clinic in Port Villa city contribute the revenue augmentation of VCH. Since there are no data, the number of cases is based on the rough number by on site hearings.

As for collection rate, examination expense for consignment and training acceptance can expect 100% because they are entrusted from the clinic of a private sector and remunerations by the acceptance for medical student unit certification. However, hospitalization expense assumed the collection rate to be 50% mainly for the local resident with few cash earnings. Certificates are commissions in the case of the medical inspection certificate issuance before acceptance of the immigration from foreign countries, and foreign voyages, which are assumed to be the collection rates of 100%. Collection of delivery expense was abolished by the Health minister from a viewpoint of the improvement in welfare in March, 2010. The remuneration unit price is based on the remuneration unit price table by VCH.

3) Expenditure

① Estimation

Expenditure of VCH is classified into the following two items. Among these, personnel expenses and operational expenses are appropriated for hospital accounting (Table

2-31). The VCH pharmacy a part of Sefa province medical-supplies warehouse is fixing a database by introducing the executive software (M-supply) which is also introduced into the end of 2010 with the central medicine warehouse (CMS). Most of the medical supply budget as well as MOH budget is supported by donors including Japan. Therefore, since most of the financial supports from donors do not appear in the account as an expenses, it is not considered as the object of this financial planning.

Table 2-31 Trial Calculation of VCH Expenditure

Account details	Items of Expenditures
Hospital account	Personnel expense
	Operational expense
Drug account	Drug expense

② Estimation result

Table 2-32 The Present Condition of Annual Management and Maintenance Expense, and Comparison of Future Prediction in VCH

（Unit: million VUV）

Accounting year	Current（2010）	Estimation (New construction two years later)	Increment (Estimation - Current)
Ⅰ Personnel expenses	309	320	11
Ⅱ Management expenses	74	107	33
Major items			
1.Medical material	1.60	2.31	0.71
2.Medical gas purchase expense	6.39	6.39	0
3. Repair maintenance cost (institution)	2.33	3.37	1.04
4. Repair maintenance cost (equipment)	9.34	13.50	4.16
5. Electric cost	20.72	30.00	9.28
6. Others	33.62	51.43	17.81
Total （Ⅰ＋Ⅱ）	383	479	96

- The increment rate of operational expenses was made into 4% of averages for the past two years.
- Since there is no increment in personnel expenses during past 2 years, it is assumed that the personnel expenses will be maintained as the same amount as the current amount (2010) plus wages of 10 nurses which will be assigned.
- New building is assumed to be completed in year 2014.

The aggregate expenditure in 2010, 383 million VUV is increased to 479 million VUV after the implementation of the project, and it can predict that the amount of increase will be set to 96 million VUV, and the rate of increase will be 25%.

The increase of the personnel of ten nurses of the Salomon country for the three years from 2011 will occur, which is accepted on another budget, and in order to accept ten graduates of the school of nursing in the premise of VCH after that, the increase in personnel expenses (1,100,000 VUV×ten persons) occurs. When it assumes that the present staff provides

management except for the nurse increas, the rates of the personnel expenses to the total amount will be 77.7% to 80.0% of the present condition, which means it falls slightly.

In the process of trial calculation, about 18 million VUV delivered by MOH as extraordinary bailout in 2010 is treated the insufficient amount of money as a supplementary budget, in the 2011 fiscal year and is appropriated as operational expenses in the 2012 fiscal year and later. Individual expenditure items assumed to increase are electricity bills and medical materials. The oxygen gas purchase expense is not assumed to increased. Since the maintenance repair of the existing oxygen plant is supported by AusAID.

(4) Management Improvement and Required Measures

The impact in the management of VCH by introducing of the new facilities and its equipment is verified using trial calculation of an income and expenditure. The comparison between the VCH present condition and the situation after the implementation of the project is shown in the table 2-33.

Table 2-33 Comparison of Financial Situations of VCH

（Unit: million VUV）

Items	After completion	Current（2010）
VCH revenue (A)	23.79	10.60
VCH expenditure(B)	479	383
VCH operational expense（C）	107	74
Cost recovery rate (A/B %)	5.0	2.8
Revenue/Operational expense rate (A/C %)	22.2	14.3

It is expected that a cost recovery rate improves from 2.8% of the present condition to 5.0% by trial calculation, and an income/operational expense rate improves from 14.3% of the present condition to 22.2%.

In order for VCH to continue and to raise an income operational expense rate, it is required to reduce the expense and raise the collection rate of medical treatment fees. Furthermore, when the Ministry of Finance and MOH accept the independency of management in VCH to some extent, it is expectable that this plan contributes to health finances the following point.

① The responsibility of the range on management becoming clear between VCH and MOH, and VCH should cover their operational expenses with the income by themselves.
② Management of VCH does not apply a big burden to the health finances in Vanuatu, and MOH can turn toward maintenance of the other community medical institution which is behind in development instead of the budget allocation to VCH.

In the improved management of VCH, it is required by performing cost control of management expense first to aim at saving. The subject and management proposal possible to cope with are shown below.

① About medical materials, such as oxygen with much expense of a yearly amount, a bid should be offered by the calculation of an annual amount of consumption, and the reduction of the price can be aimed.
② Electricity bill: Aim at saving of electric cost by the switch-off campaign of the electrical appliances (lighting, air-conditioning, etc.) which are not used.
③ By combining the materials inventory control and order method to the VCH medicine warehouse of each specialty useless orders are reduced.

On the next stage, it is indispensable in improved management to make an effort to increase an income by steady collection of the medical treatment fee accepted officially at VCH. Although the new assignment of a revenue collector to VCH starts and collection will be promoted beginning in the 2011 fiscal year, registration of patient, medical examination, and the overall management in the process of collection from issue of a bill to the payment in accounts are important, and those are the issue which should be tackled in all the hospitals. In addition, since the finance official is positive is ready to reflect the income in the management budget of VCH considering the increase in a medical treatment fee, and self-support accounting of VCH, it will be guessed from now on that VCH is self-support accounting which it follows gradually towards autonomous systematization.
In management planned investigation, the survey team having meeting with an office manager, the medical service division manager, a maintenance management engineer, JOCV members, and the finance financial advisor in VCH and having interview with a vice-minister, the head of the financial affairs division, etc. in MOH. As a result, there exist the persons who have awareness of the issues in its special field of study about management of VCH, and who have useful management proposals for an improvement inside. However, according to the point by the financial officer, there is no place where it argues about these ideas publicly by the Vanuatu government employee and the donor persons concerned relevant to VCH management together, and it should be the necessity of building the mechanism of arguing about the issue, holding a meeting periodically and implementing the adopted solution. Specifically a VCH steering committee should be founded, where the knowledge of the specialist in the inside and outside of the hospital and experience are concentrated, and the subject on management should be tackle. The members of committee is assumed not only a VCH senior official but the vice-minister and head of the financial affairs division of MOH and finance financial advisor, etc. Although it is under examination in MOH about the personnel plan of hospital superintendent in VCH which position is the vacant seat, to exercise powerful leadership and to promote an improvement of the VCH management by the superintendent is desired.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Expense of Vanuatu side Obligation Works

Costs and expenses of Vanuatu side obligation works are listed in the table 2-34.

Currently, the obligation works that is to be carried out by Vanuatu side is shown in the items listed in Table 2-34. Vanuatu side promised to secure the budget for the works and undertake the works in the M/D in explaining the Draft (signed on October 27, 2011). Vanuatu's fiscal year runs from January to December and a budget request must be filed by the July of the year before the year in which any construction work is to be carried out.

The total costs to be borne by Vanuatu come to 29,240,000 VUV. This amount is judged as acceptable to be borne because the percentage of costs to be borne by the Vanuatu side versus the total budget (1,252,000,000 VUV) related to healthcare services in the MOH in 2010 is 2.3%.

Also, for each fiscal year, the costs to be borne by Vanuatu are 15,640,000 VUV before the project commences, 7,200,000 VUV during this construction period, and 6,400,000 VUV after the project is delivered. They account for 1.2%, 0.6% and 0.5% of the above health services budget respectively.

Table 2-34 Expense of Vanuatu side Obligation Works

Construction Expense Item		Expenses (VUV)
Related works preceding the construction works		
B-1	Demolition of the existing Dental Facility and rough grading	6,130,000
B-2	Demolition of the existing Store and rough grading	1,550,000
B-3	Demolition of the existing Stairs	370,000
B-4	Removal of the exiting trees	240,000
B-5	Construction of temporary road for existing hospital	1,890,000
B-6	Demolition of the existing wall fence for the existing hospital access and the project site	100,000
B-7	Construction of pathway with covered roof for the existing hospital access	1,780,000
B-8	Demolition of the existing canopy	230,000
B-9	Demolition of the existing supply water/drainage pipes	650,000
B-10	Temporary incoming telephone line wiring to the existing facilities and connection	700,000
B-11	Removal of the existing telephone line	500,000
B-12	Banking Arrangement for Detailed Design	200,000
	Banking Arrangement for Construction	1,300,000
B-13	Arrangement of Tax exemption	—
Sub-total		15, 640,000

Construction Expense Item		Expenses (VUV)
Related works during facility construction		
D-1	High voltage power supply to the new substation and a metering device for the site	1,500,000
D-2	The city water distribution main to the site Existing water supply connection and renovation work at existing Hospital	300,000
D-3	Dismantlement of the existing high voltage power supply to the existing substation, transformer and metering device	2,500,000
D-4	Incoming telephone line and wiring route including hand holes and conduits up to the main distribution frame (MDF) for the site	1,400,000
D-5	Transfer of IT line, connection work to the project and testing	1,500,000
D-6	Arrangement of Tax exemption	—
Sub-total		7,200,000
Related works after facility construction		
A-1	Construction of roads outside the project site area and gates & fence	950,000
A-2	Landscaping and Planting	50,000
A-3	Curtain and Blind	825,000
A-4	General furniture	4,000,000
A-5	Removal and installation of existing Equipment	50,000
A-6	Removal and installation of existing fixed furniture and General furniture	25,000
A-7	Removal of temporary incoming telephone line to the existing hospital	500,000
A-8	Arrangement of Tax exemption	—
Sub-total		6,400,000
Total		29,240,000

(2) Cost Estimate Conditions

1) Time of cost estimate April 2011

2) Currency exchange rate 1 VUV ＝JPY0.89 (as of April 2011)

3) Project period The periods for detailed design, bidding, and construction are as shown in the project schedule.

4) Miscellaneous The project will be implemented in accordance with the Grant Aid system of the Government of Japan.

2-5-2 Operation and Maintenance Cost

(1) Maintenance Costs

At a review of operation maintenance costs required under the project, an increase in the maintenance costs firstly will be reviewed in comparison to the maintenance costs required for the existing facilities.

The annual maintenance costs in the first year following completion of the facilities and that of the second year and later are shown in the table 2-35.

Table 2-35 Estimated Maintenance Costs

(Unit: VUV)

Item	Initial fiscal year	Following fiscal year
① Electricity charge	9,725,184	9,725,184
② Telephone charge	1,886,436	1,886,436
③ Fuel cost of generator	63,360	63,360
④ Water charge	2,013,000	2,013,000
⑤ LPG gas charge	117,000	117,000
⑥ Oxygen gas charge	3,060,000	3,060,000
⑦ Water treatment chemical costs	1,134,000	1,134,000
⑧ Neutralizer and disinfectant costs	242,000	242,000
⑨ Building maintenance cost	0	630,000
⑩ Filter replacement cost	0	48,000
⑪ Periodical inspection on power receiving/transformer systems	0	180,000
Total ① to ⑪ (facility maintenance cost)	18,240,980	19,098,980

① Electricity charge ····· 9,725,184 VUV/yr

Contract demand for the project facilities is estimated below based on the size and specifications of the facilities.

The contract demand for the project facilities will be approximately 50%, on average, of the transformer's capacity. The load of the project facilities will account for 60% thereof.

Table 2-36 Presumed Electric Power Consumption

	Transformer capacity (kVA)	Contract demand (kW)	Newly built facility (kW)
Newly built facility	500	250	180

- Electricity rate system

  Metered rate 46.9 VUV/kWh

Table 2-37 Electricity Charge

	Charge (VUV)	Consumption (kW)	Used hour (h)	Day	Month	Load factor	Total (VUV)
Newly built facility Meter rate	46.9	180	8	30	12	0.4	9,725,184

② Telephone charge ····· 1,886,436 VUV/yr

Assuming a basic contract for the local telecom company's (TVL) fixed telecommunication network, telephone costs are estimated below based on the expected frequency of use of TVL's and other telecommunication networks.

Note that local call and long-distance call charges are the same in Vanuatu.

・ Telephone rate system

Domestic calls:

TVL land line	21.87 VUV/min - per-second charge
Smile telecommunication network	21.87 VUV/min - per-second charge
Other mobile telecommunication network	28.87 VUV/min - per-second charge

Table 2-38 Telephone Charge

	Chage (VUV)	Number of lines	Used hour (min/each)	Frequency (times/day)	Day	Month	Load factor	Total (VUV)
TVL land line	21.87	—	3	50	25	12	1.0	984,150
Smile telecommunication network	21.87	—	3	20	25	12	0.6	590,490
Other mobile	28.87	—	3	20	25	12	0.6	311,796
合　　計								1,886,436

③ Fuel cost of generator····· 63,360 VUV/yr

Fuel costs are estimated below based on the actual data of four power blackouts a year and average of 6 hours per blackout in the local area.

The power generator will have a capacity of 100 kVA under the project.

・ Fuel rate system

Fuel consumed by generator	16.5 ℓ/h
Unit price of fuel	200 VUV/ℓ

Table 2-39 Fuel Cost

	Cost (VUV)	Consumption (ℓ)	Used hour (h)	Day	Month	Annual consumption (ℓ)	Load factor	Total (VUV)
Generator fuel Consumption	200.0	16.5	6	4	—	396	0.8	63,360

④ Water charge····· 2,013,000 VUV/yr

The estimated water consumption at the project facilities is as follows.

Table 2-40 Presumed Waterworks Water Consumption

	Water supply per day (m^3/day)
Newly built facility	60

・ Water rate system

Metered rate 93.2 VUV/m^3

Table 2-41 Water Charge

	Charge (VUV/m^3)	Water supply (m^3/day)	Day	Month	Total (VUV)
Newly built facility Meter rate	93.2	60	30	12	2,013,000

⑤ LPG gas costs····· 117,000 VUV/yr

LPG gas is used in Laboratory department. Gas consumption is estimated as follows.

Table 2-42 LPG Consumption

Facility	Use	Consumption per day (kg/day)
Laboratory	Test	5

・ LPG gas rate system

LPG gas rate 390 VUV/kg

Table 2-43 LPG Charge

	Price (VUV/kg)	Consumption (kg/day)	Day	Month	Annual consumption (kg/year)	Load factor	Total (VUV)
LPG price	390	5	25	12	1,500	0.5	117,000

⑥ Oxygen gas charge····· 3,060,000 VUV/yr

Oxygen gas is used in the Operation Theater, Radiology Department, General clinic, Emergency Department. Its consumption at the project facilities is estimated as follows.

Table 2-44 O_2 Consumption

Facility	Use	Consumption per day (ℓ/day)
Newly built facility	Operation Theater, etc.	5,000

N_2O gas is used in the Theater. Its consumption at the project facilities is estimated as follows.

Table 2-45 N_2O Consumption

Facility	Use	Consumption per day (ℓ/day)
Newly built facility	Operation Theater, etc.	500

・ Medical gas rate system

O_2 gas rate 10,800VUV /6 kℓ cylinder

N_2O gas rate 114,000VUV /3 kℓ cylinder

Table 2-46 Charge

	Charge (VUV/SL)	Consumption (ℓ/day)	Day	Month	Load factor	Annual Consumption (ℓ/year)	Total (VUV)
O_2 Charge	1.8	5,000	25	12	0.5	750,000	1,350,000
N_2O Charge	38.0	500	25	12	0.3	45,000	1,710,000

⑦ Water treatment chemical costs ……1,134,000 VUV/yr

City water supplied to the elevated rainwater tank will be sterilized and softened. Consumptions of water sterilizer and water softening salt are estimated below.

Table 2-47 Consumptions of Water Softening Salt

Name	Use	Consumption per day (kg/day)
Salt	Water softening	30.4

Table 2-48 Consumptions of Water Sterilizer（NaClO）

Name	Use	Consumption per day (ℓ/day)
Sodium hypochlorite	Water sterilizer	1.1

・ Rate system

Water softening salt 120 VUV/kg

Water sterilizer 500 VUV/kg

Table 2-49 Consumptions of Water Sterilizer and Water Softening Salt

	Charge (VUV/kg)	Comsumption (ℓ/day)	Day	Month	Load factor	Annual Consumption (ℓ/year)	Total (VUV)
Salt	120	30.4	25	12	0.9	8,200	984,000
Sodium hypochlorite	500	1.1	25	12	0.9	300	150,000

⑧ Neutralizer and disinfectant costs ····· 242,000 VUV/yr

Wastewater will be drained from the facilities to the soak pit via sewage treatment. Wastewater from the Laboratory Department will be drained to the sewage treatment after going through a water treatment process such as disinfection and neutralization. Disinfectant and neutralizer will need to be added.

Table 2-50 Consumptions of Neutralizer and Disinfectant

Name	Use	Consumption per day (cc/day)
Caustic soda	Neutralization tank	450
Sulphuric acid	Neutralization tank	1,800
Sodium hypochlorite	Disinfection tank	400

- Rate system

Caustic soda	400 VUV/kg
Sulphuric acid	300 VUV/kg
Sodium hypochlorite	500 VUV/kg

Table 2-51 Charge

	Charge (VUV/kg)	Consumption (ℓ/day)	Day	Month	Load	Annual Consumption (ℓ/year)	Total (VUV)
Caustic soda	400	0.45	25	12	0.9	120	48,000
Sulphuric acid	300	1.80	25	12	0.9	480	144,000
Sodium hypochlorite	500	0.40	25	12	0.9	100	50,000

⑨ Building maintenance costs ·····630,000 VUV/yr

Relatively easy maintenance materials will be adopted for both the exterior and interior of the project facilities. Therefore, the building maintenance costs spent on the maintenance of the interior/exterior of the buildings are estimated to be 1/2 - 1/3 of that of similar buildings in Japan. Building maintenance costs are necessary in the second year and later.

- Rate system 200 VUV ㎡/yr

Table 2-52 Building Maintenance Cost

	Cost (VUV)	Area (㎡)	Total (VUV)
Building Maintenance Cost	200	3,150	630,000

⑩ Filter Replacement Cost ……48,000 VUV/yr

Middle efficiency filters will be installed in the Operation Theater, and pre-filters will be installed in individual air conditioning systems. The expected replacement interval of each filter is indicated below. The pre-filters will be reusable and thus will not incur any replacement costs.

- Rate system

  Pre-filter Cleaning approx. 2 times/month

  Middle efficiency filter 1 time/year

Table 2-53 Filter Replacement Cost

	Cost (VUV)	Number	Load factor	Total (VUV)
Newly built facility Middle efficiency filter	30,000	2	0.8	48,000

⑪ Periodical inspection on power receiving/transformer systems (commissioned to UNELCO) …… 180,000 VUV/yr

The power receiving system and high-voltage transformer under the control of the local electric power company, UNELCO, will undergo maintenance inspection commissioned to UNELCO. Periodical maintenance inspections will be conducted by UNELCO's engineer(s) every year, and the costs thereof will be equivalent to the costs required in Japan.

- UNELCO periodical inspection fee 180,000 VUV/One time

Table 2-54 Preliminary Calculation Result

	Charge (VUV)	Number of times for Periodic Inspections	Total (VUV)
Periodical inspection on power receiving/transformer systems	180,000	8	180,000

(2) Estimation of Expected Increase of Operational Cost

Among above calculation of the building maintenance cost of the project facilities, the totally increasing cost of VCH is to be estimated compared to present condition, which is before the new facility construction. Since there is a transfer of the existing facilities equivalent to the present condition, there shall be no significant increase of management expense. The items of expenditure which newly occurs by implementation of the project are shown in the table 2-55.

Table 2-55 Estimation of Expected Increasing Operational Cost

(Unit : VUV)

Expected increasing accounts	Second year from the completion of the project
1) Electricity charge	0
2) Telephone charge	0
3) Fuel cost of generator	63,360
4) Water charge	0
5) LPG gas charge	0
6) Oxygen gas charge	0
7) Water treatment chemical costs	1,134,000
8) Neutralization and disinfectant costs	242,000
9) Building maintenance cost	630,000
10) Filter replacement cost	48,000
11) Periodical inspection on power receiving/transforming systems	180,000
12) Equipment maintenance expense	-120,000
Total 1)～12) (Increased amount of management expense)	2,177,360

Equipment operation cost ……-120,000 VUV /yr

The equipment plan is formulated for the purpose of the equipment supply for satisfying the demand of the medical services, and is limited to the range in which maintenance management is possible by the MOH and VCH side.

Management expense does not increase from the equipment procurement of this plan because the content is basically the renewal of equipment. Although the number of the existing X-ray machine is to be replaced with the same number, adopting the specification not using a film, allow no purchase of chemistry articles such as developing solutions and fixing solutions, and the increase of management expense is not caused.

When the administrative and maintenance expenses fluctuated by this plan are offset, it becomes the reduction of about 120,000 VUV and the breakdowns are as follows.

Table 2-56 Operational Cost of Medical Equipment

Items	Expenses（Yen）
Consumables expense	-130,000
Spare-parts expense	10,000
Total	-120,000

Table 2-57 Equipment which Need Consumables

	Name	QTY	Item	Unit (Yen)	Total (thousand Yen)
1	CR printer	2,100	Film（14 × 17 inch）	288	605
2	General X-ray	-10,500	Film（14 × 17 inch）	30	-315
3	Automatic printer	-10,500	developing solution, fixing solution	40	-420
Total					-130

The film number of sheets of CR printer is limited to when requiring precise readings, and the estimation of it is made as 1/5 of the present number of general radiographic inspection.

Table 2-58 Equipment which Need Replacements

	Name	QTY	Item	Unit (thousand Yen)	Total (thousand Yen)
1	ＣＲ printer	1	Filter（¥20,000/pc・2 year）	10	10
Total					10

Remark：1VUV=1 yen is used for an exchange rate in estimation.

(3) Financial Situation

1) Budget of MOH

Although the MOH budget in the 2010 fiscal year increased compared with the last fiscal year, this is based on the supplementary budget accompanying the increase in the personnel retiring allowance, and it does not depend on medical-examination service. While the donation by donors is not included, public health-related expenditure depends on the donor greatly over many years. Moreover, on the MOH budget (2010), it is 12% of national budgets, and is 11.6% of growth in a last-fiscal-year ratio.

Table 2-59 Transition of MOH's Settlement

(Unit: million VUV)

Year / Break down	2008		2009		2010	
	Budget	Expenditure	Budget	Expenditure	Budget	Expenditure
Minister Secretary	34	43	44	43	48	46
Upper administer	301	300	281	285	436	422
Health service	1,212	1,207	1,178	1,181	1,252	1,283
－Hospital service	725	717	695	699	753	788
－Regional health	302	308	309	310	317	317
－Public health	70	68	59	60	58	53
－Medical supply	115	114	115	112	124	125
Total	1,547	1,550	1,503	1,509	1,736	1,751

Resource：MOH (2010)

According to MOH, the budget of MOH could not expect to increase for a while. However, the direct financial support from AusAID and NzAID is planning to start from this year. So the steady budgetary allocation to VCH can be reasonably expected even if it is not sufficient amount.

2) Transition of management cost in VCH

Table 2-60 Transition of VCH's Settlement

(Unit: million VUV)

Year / Breakdown	2008		2009		2010	
	Budget	Expenditure	Budget	Expenditure	Budget	Expenditure
Personnel expense	264	266	272	251	309	267
Management expense	78	78	60	79	74	87
-Maintenance cost (Facility)	11.1	6.4	1.7	7.3	1.7	2.3
-Maintenance cost (Equipment)	5.0	2.9	0.5	6.0	0.5	9.4
-Maintenance cost (Vehicle)	1.9	2.6	0.8	1.2	0.8	0.7
Total	342	344	332	330	383	354

Resource：Financial agency in MOH data

Among the management expenses, the maintenance cost is 23.0% (Facility: 8.6%, Equipment: 3.7%) in 2008, 18.4% (Facility: 9.2%, Equipment: 7.6%) in 2009, 14.2% (Facility: 2.6%, Equipment: 10.8%) in 2010. The rise of the equipment maintenance cost was due to the break down and the purchase of the replacement parts of the oxygen generator. Thus, it is thought that the cause by which the management expense varies greatly by annual is caused by the lack of the maintenance management until serious failure occurs. In order to prevent the expensive repair charge accompanying serious failure, it is required to perform periodic check and preventive repair intentionally. Although the maintenance budget was at an average of 20% for the past three years, periodic checks and repairs can not fully be carried out because the budget runs short constantly. However, by activity of Business plan which was introduced each department, the reservation of the required budget for the maintenance management can be secured from 2010.

According to the trial calculation the increase of the operational expenses in 2 years after implementation of the project, compared with the present (2010) expenditure, it will turn about 2.2 million VUV, which Vanuatu side agreed to secure in the M/D in explaining the Draft (signed on October 27, 2011) and is equivalent to 2.5% of the management expenditure of year 2010. The operational expenses are considered to be in a range that can be offset with the management budget by the estimation which will be increase of 33 million VUV against the management expense in 2010, which was described in the project operation plan. In VCH, while VCH continues much more efforts by the instruction of the Ministry of Finance towards the improvement in the health of management, making an income increase and securing costs, for replacement parts and consumables is expected. MOH can secure personnel expenses and operational expenses required of VCH for the time being by gaining financial support of SWAPs by donors, such as AusAID which starts from 2011. Furthermore, it is expectable by technical assistance to enable VCH to make business plan for maintenance management actions such as daily and period checks and to appropriate the required cost. Considering above all, it can be judged that the maintenance management plan exists in an appropriate range.

Chapter 3. Project Evaluation

CHAPTER 3. PROJECT EVALUATION

3-1 Recommendations

3-1-1 Precondition of the Project Implementation

In implementing the project, for smooth promotion of the entire project schedule it is important to securely carry out the necessary work to be conducted by Vanuatu described in "2-3 Obligations of Recipient Country." This must be done at an appropriate timing before and during the construction work in the framework of this cooperation project.

3-1-2 External Conditions to Complete Entire Schedule of the Project

As a precondition for completing the entire schedule of the project, the following points should be improved and addressed as agenda and external conditions for the Vanuatu side to cope with.

(1) Agenda for Vanuatu Side and Suggestion

1) With regard to the facilities to be newly built in this cooperation project, it is requested to ensure continuous usage of facilities and equipment in a good condition by securing the necessary budget for their appropriate operation and maintenance as well as by giving adequate guidance to healthcare staffs on proper handling.
2) By reflecting the maintenance cost of medical equipment in the budget, it is possible to implement necessary periodical inspections and to prevent serious equipment failure. This will help minimize any degradation of the healthcare services. Further, in future, it is desirable to budget reserves for purchasing replacement equipment in future so that smooth renewal of the equipment at the end of its life cycle could be achieved.
3) To realize autonomic development of the hospital based on sound operation, it is imperative to plan appropriate financial and funding plans, to capture the income / expenditure status continuously and to feedback the results in the operation of the facilities for further improvement.
4) To improve performance of maintenance, technical guidance is planned before commissioning. Accordingly, the MOH and VCH should get the maintenance staff in charge of the medical equipment and facility equipment prepared for the technical guidance well in advance of the timing of technical training.

(2) External Condition of the Project

The four policy goals stipulated in “Healthcare Sector Strategies (2010–2016)” as priority goals for the Vanuatu healthcare sector include i) improvement of national health condition, ii) improve access to healthcare services at medical facilities of all levels, iii) improve healthcare service quality at medical facilities of all levels, iv) improve management and have more effective and efficient use of resources. The project addresses particularly the goals cited in ii) and iii). However, to achieve the original goal, i.e. the improvement of healthcare indicator, comprehensive activities as mentioned above are necessary. Implementation of “Healthcare Sector Strategies (2010–2016)” by the Vanuatu Healthcare Sector is an imperative external condition to ensure the project takes place and its effects are maintained.

3-2 Project evaluation

3-2-1 Relevance

Implementation of the project as Grand Aid by Japan is assessed appropriate with the following reasons:

(1) Beneficiaries of Project

Because VCH is positioned as the top referral hospital in Vanuatu, all the people in the country (234,000 people) are the beneficiaries of the project. By enhancing the qualities of healthcare services and clinical educations, nationwide propagation of the benefits of the project is expected.

(2) Consistency with Health Policies of the Recipient Country

The relevance of the project is considered high due to consistency with the health policies of the Vanuatu government.

The Project Purpose “Medical services at VCH are improved” is in line with “Healthcare Sector Strategies (2010–2016)”, the priority goal of the Vanuatu Health Sector. Reviewing the relationship between the four policy goals stipulated in the said strategies (see 3-1-2 (2)) and the project, Component 1 (Facility construction) and Component 2 (Provision of medical equipment) directly contribute to ii) Access to healthcare services, and iii) Quality improvement (see Chapter 1 “Figure1-7: Framework to achieve goals for healthcare policies”). To be more specific, these two components are directly consistent with “Improvement of infrastructures for appropriate equipment and machines” and “Provision of effective, efficient and high-quality services” among the 10 specific agenda stipulated in these strategies.

Further, when comparing the project with “Corporate Plan (2011–2013),” which is the mid-term action plan within the “Health Sector Strategies”, the project is expected to significantly contribute to the realization of “Improvement of appropriate infrastructures” through Component

1 and Component 2 among the five priority areas (provision of quality healthcare, development of healthcare human resources, improvement of appropriate infrastructures, reinforcement of healthcare information system, and, reinforcement of healthcare financial system) (see Figure 3-1).

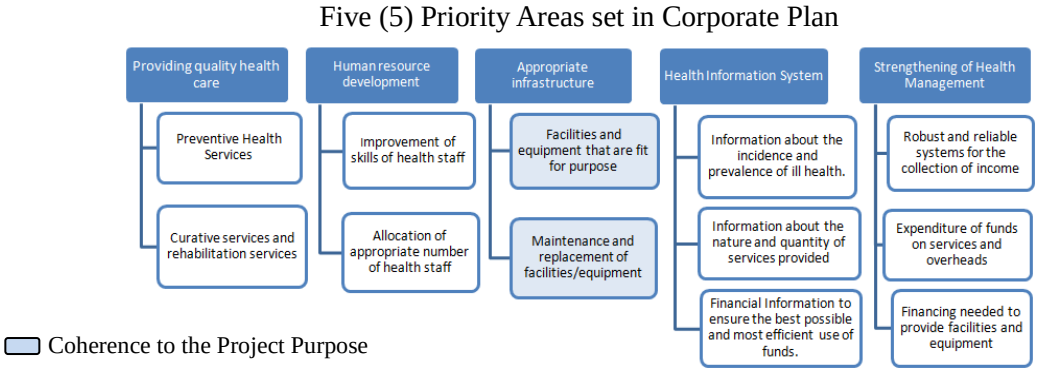


Figure 3-1 Relations between Corporate Plan and the Project

The VCH the project is positioned as the national referral hospital at the tertiary level in Vanuatu. However, many support organizations operating in Vanuatu have been providing support to medical organizations at the secondary level or below. Hence, it is possible to address all levels of medical networks, if the quantity and quality of services by VCH, a tertiary hospital, are improved through the project.

Besides, considering the positioning and roles of the VCH in the recipient country, it can be concluded that VCH will be able to fulfill its expected roles in future via the assistance of the project. The VCH is positioned as the national referral hospital with the roles such as 1) provide acute phase medical services by specialist doctors, 2) determine overseas referral of patients, and 3) post-graduate training (for specialist doctors) within government-approved framework. By improving medical environment of VCH, the doctors and nurses who received training in VCH are delegated to lower level medical organizations. This will indirectly help Vanuatu achieve the policy goals stated in ii) and iii) of “Health Sector Strategies”.

(3) Need to Improve Facilities

VCH has been playing a role as a core hospital in Shefa Province (the province with the largest population in Vanuatu) for about 37 years since its construction in 1974, while being positioned as the top medical organization in the country. Nevertheless, they are affected by age-related degradation because little refurbishing has been carried out for some time. On top of this, due to scattered layout of the facilities and so on, there is no environment suitable for providing adequate services. To address this situation, there are urgent requirements to improve healthcare services by consolidating the functions of the Outpatients’ and Emergency Department and Central Clinical Service Department in a new facility.

Considering these situations, the need to improve some facilities of VCH in the project is very relevant.

(4) Sustainability

With regard to the facility and machines plan, the scope is limited to the extent appropriate for securing technical and financial continuation based on the current operation performance (number of healthcare staff, technological level, ability to bear financial burden, access to consumables and spare parts etc.). Accordingly, no sophisticated technology should be required for operation and maintenance.

The facilities to be improved in the project are also suitable for operation and maintenance with the funds, human resources and technological level of the Vanuatu side.

Besides, the Vanuatu Government is very much committed to the project. Therefore, the hospital's performance is expected to be securely continued also in the planning phase and during the implementation of the project under the initiative of the MOH. Maintenance of the facilities and the staff deployment after the completion are conducted at the responsibility of the MOH.

(5) Profitability

In the facilities of the project, the beneficiary-pays principle is in place, where the local citizens pay for the medical services. Nevertheless, most local citizens live a self-sufficient life without many interactions with the market economy. As stated in the financial plan, the collection recovery rate versus the invoiced medical treatment fee is slightly higher than 10 percent. The profit and loss balance of VCH revealed that most of the income was derived from the governmental healthcare budget. Further, most of the healthcare budget came from financial support offered by development partners. However, from this fiscal year, SWAPs have started they will give direct support to the healthcare budget. A review of personnel expenses and operation costs has begun also in the VCH. Based on these facts, the project has some problems in terms of profitability. Nevertheless, VCH is the one and only tertiary medical facility in the recipient country and its services are provided mostly for social welfare purposes rather than for profitability in an environment where sophisticated healthcare services are hardly accessible to the general public. It is expected that the facility will gradually move forward to the autonomic stage after depending on assistance from development partners for while.

(6) Impacts on Environment and Society

1) Environment

① Facilities

The project involves addition to the existing facility within the current hospital site. According to the facility plan, the area of improvement is limited to approximately one-fifth of the total site. The drain water from the facilities is accumulated in sewage

treatment tank and drained by penetration draining into the soil of the penetration layer within the site after being processes to an appropriate water quality based on the standard of Vanuatu. Accordingly, the impact on the surrounding environment is extremely low and the environment assessment is not necessary.

② Medical equipment

Because the current equipment plan involves renewal of the existing machines, additional impacts on the environment by procuring machines are considered to be very limited. With regard to the radiological equipment, reduction of chemical liquid wastes including development agents and stabilizers is projected in the equipment plan by eliminating the need for films through introducing a CR system. While there is no recovery system for liquid wastes in the current VCH and the aforementioned purification tank system is not appropriate to process waste water, this equipment plan reduces the burden of liquid waste treatment in VCH, which will contribute to further improvement of the environment.

2) Social economy

While we have to consider the relationship between the VCH and the private clinics in the surrounding area, the private clinics routinely refer their patients to the VCH for inspections and such like. Basically, the clients of private clinics are foreigners and rich persons. VCH can expect an increase in profit through increasing the number of inspections consigned by those private facilities as a result of introducing inspection equipment realized by the project. No other impact of a significant level is expected.

In recent years, degradation of healthcare services in VCH has become a social issue due to failure of an oxygen plant, late delivery of essential drugs and medical supplies, insufficiency of healthcare human resources and operation budget. The project can address some of these issues and help improve the healthcare services by renewing old facilities and machines.

(7) Necessity and Advantage in Use of Japanese Technologies

1) Facility

The scope of the project is the departments with particularly complicated functions among hospital facilities. Unlike an inpatient ward, these departments require sophisticated design technologies. Sophisticated quality control is necessary also during the construction phase. Therefore, we consider that it is necessary and advantageous to use Japanese technologies.

2) Medical equipment

This is the second cooperative project concerning this hospital taken by Japanese parties following the support to the procurement of medical equipment in 1994/1995. Many existing machines in the project facilities are made in Japan. Therefore, Japanese equipment is familiar to most of healthcare staff. If Japanese equipment is procured in the project, smooth operation can be expected. It was identified during the research for the procurement of the project equipment that failure of the machines is attributable to the power status, water quality and management of temperature and humidity. Based on this situation, adoption of Japanese design technologies and equipment is considered advantageous, because i) a series of improvements have been implemented on the equipment as countermeasures against these failure factors by positive use of Japanese building equipment technologies; ii) Japanese machines has superb durability that allows them to be used for a relatively long time.

(8) Appropriateness of Cooperation Scenario

To achieve the Project Purpose "Medical services at VCH are improved", two components ("Construction of medical facilities" and "Improvement of medical equipment") and their soft component ("Strengthening of capacities in maintenance of medical facilities and equipment") are set in the project. Because all three components contribute to the achievement of the Project Purpose, the cooperation scenario is assessed as appropriately designed. Particularly, by providing technical guidance to strengthen capacities in "maintenance of medical facilities and machines" of VCH as a soft component, linkage of hardware-related assistance and software-related assistance is ensured. By taking this approach, it is ensured that the project reaches Project Purpose.

To enhance the achievement level of the Project Purpose, it is effective to assign JOCV and senior volunteers specialized in the maintenance of medical equipment, but no candidate has not been identified. Therefore cooperation with AusAID seems to be more realistic. AusAID has assigned its technician specialized in the maintenance of medical equipment to VCH just recently. Meanwhile, the need to reinforce "human resource management" and "financial management" has been confirmed between the Vanuatu Government on the occasion of the field investigation conducted in March 2011 to reinforce the operational performance of the hospital besides the necessity to "maintain medical facilities and equipment." While these two areas are not included in the scope of direct assistance in the project, indirect support to these areas is envisaged through other Japanese schemes or cooperation with other support organizations. By taking these approaches, the project's contribution to the achievement of Vanuatu's priority agenda is expected to be further enhanced (see Figure 3-2).

In the area of "human resource management," it is appropriate to support performance reinforcement in healthcare human resources for the MOH and VCH. Particularly, Vanuatu needs the performance of its nursing staff to be improved. This decision is supported by the fact that the main focus of the support provided by Japan side has been improving the performance of nurses

including the experiences shown below: i) it was confirmed in interviews with the MOH, VCH and main support organizations that reinforcing the performance of nurses should be the top priority (addressing the needs of the recipient country); ii) a technical support project "The Project for Strengthening The Need-Based In-Service Training for Community Health Nurses" (2011–2013) is currently in place; iii) a nurse is assigned to VCH as a member of cooperation volunteers; and iv) a senior volunteer is assigned to Vanuatu College of Nursing Education for Nurses. As part of the problems in the nursing system of VCH, the lack of a supervision system, lack of an operation manual and lack of training opportunities have been confirmed.

In the area of "financial management", recruitment and placement of professionals specialized in general operation management is planned because it is difficult to secure JOCV and senior volunteers specialized in financial management for hospitals.

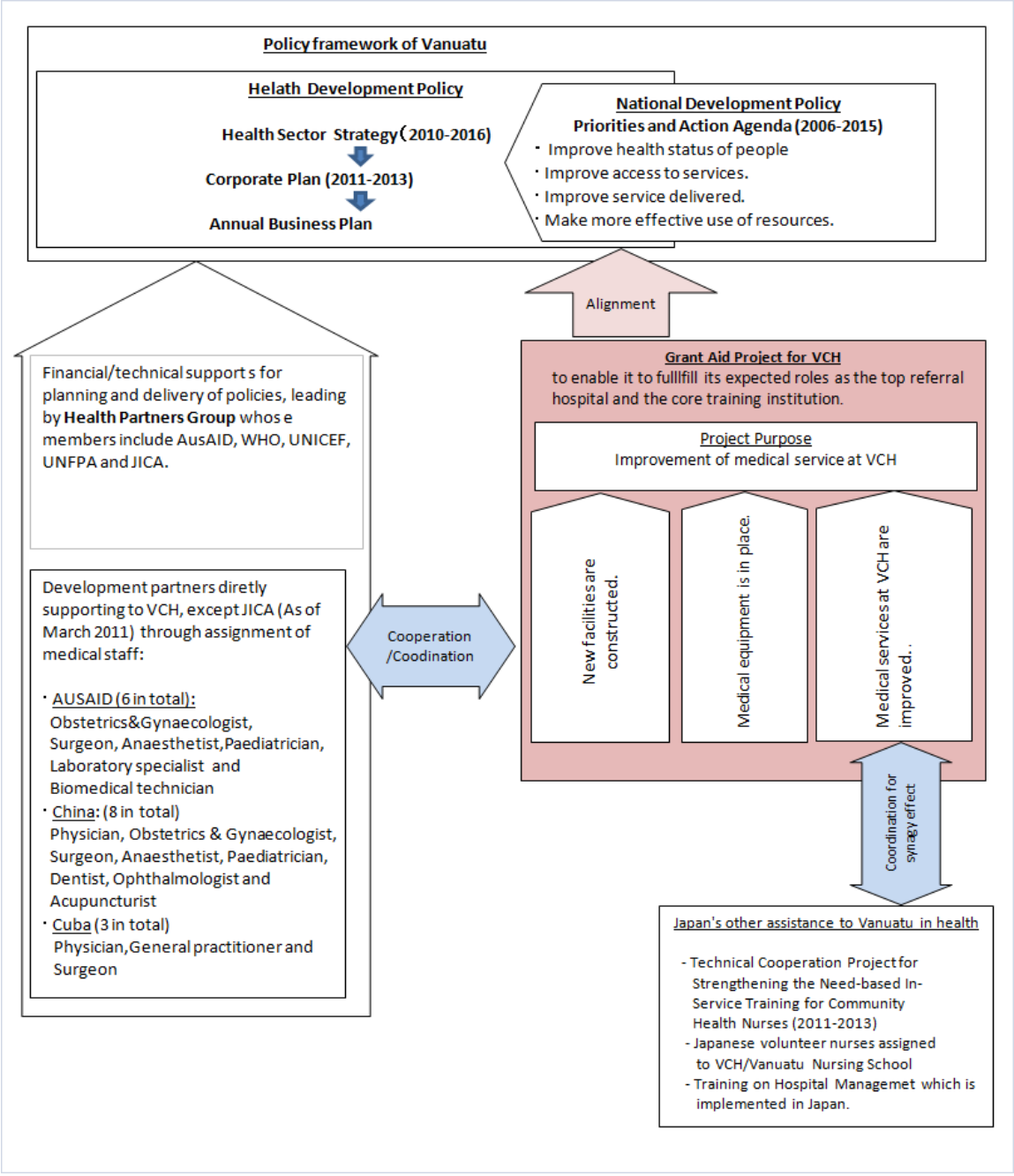


Figure 3-2 Intervention Scenario of the Project

3-2-2 Effectiveness

The project contributes to the achievement of the Project Purpose "Medical services at VCH are improved" through the supports indicated in Table 3-1.

Table 3-1 Content of Assistance for the Project

Facility	・Assistance for Emergency Department, Outpatient's Department, Operation Theater (Theater, CSSD), Laboratory Department, Radiology Department
Medical equipment	
Facility and Medical equipment maintenance	・Assistance for training the staff including medical and maintenance staff regarding the daily inspection before and after the use of the equipment will be conducted ・Assistance for giving them the knowledge how to reinforce the management system

As an indicator to measure the achievement of the Project Purpose, the following quantitative and qualitative indicators are proposed by setting the baseline year as 2010 and the target year as 2017 (three years after the project's completion).

Because the deficit of healthcare human resources is serious, it is imperative to enhance the quality of clinical services while maintaining the current VCH functions and scale in the current plan based on the availability of in-service manpower instead of planning for the future. Therefore, the quantitative evaluation should focus on the new improvements realized by appropriate configuration of the facilities. With regard to the quality improvements in the other healthcare services, qualitative evaluation is conducted.

(1) Quantitative Indicators

Quantitative indicators to assess effectiveness of the project are as below.

Table 3-2 Quantitative Indicators

Indicators	Baseline (in2010)	Target (in 2017)	Reason of improvement in indicator	Pre-conditions
1) No. of operations	2,183 cases	2,416 cases	Capacities of emergency department are strengthend.	No significant shortage in medical supplies and medical staff happen
2) No. of outpatients to general clinic	61,770 cases	82,000 cases	Facilities/equipment are improved	No significant shortage in medical supplies and medical staff happen
3) No. of referrals to the hospital	351 cases	480 cases	Facilities/equipment are improved	There is no Change in roles of VCH as the top referral hospital in the country.
4) No. of colonoscopic examination	0	360 cases	Colonofiberscope set is introduced	The medical specialist continues to be in place

While the numbers of surgeries and general clinic patients dropped temporarily in 2010, these numbers are expected to recover to the average level during the previous three years (2007–2009) in a more appropriate environment. Besides, an increase in surgeries is expected by making it possible to carry out small surgeries in the new Emergency Department, while they are conducted in the theatre now. With regard to the number of General Clinic patients, the possibility to address more outpatients is expected by adopting a design that takes future scalability into consideration. The precondition for realizing these expectations is that "no drastic decrease of medical supplies and healthcare professionals should occur."

With regard to the number of referrals to VCH, a temporary drop was observed in 2010. It is expected that the implementation of the project contributes to the project recover the number to the average level during the previous three years in a more appropriate environment, unless there is any change in the positioning of VCH as the top referral hospital or the equipment of any other hospital exceeds the equipment level of VCH.

With regard to the colonoscopy inspection, VCH is expected to address 7–10 cases/week after introducing the colonoscopy system based on the assumption that a specialist doctor is available on continuous basis.

(2) Qualitative Indicators

Qualitative indicators to assess effectiveness of the project are as below:

① The project contributes to the improvement of performance of doctors and nurses
② The project contributes to the reduction of post-surgery infection risks
③ Efficiency in healthcare services is improved

The provision of medical equipment to VCH will reinforce its training function and contribute to the improvement of performance of doctors and nurses, because VCH is the educational facility for healthcare human resources in Vanuatu (post-graduate training facility for specialist doctors, intern training facility for graduates of Vanuatu College of Nursing Education for Nurses). The effect of reducing post-surgery infection risks can be expected, because the Operation Theatre is designed to be separated between the clean area and the contaminated area[1]. Further, the effect of improving the efficiency of healthcare services can be expected, because the facility is designed so that each patient should be directly referred to an appropriate department (General Clinic, Operation Theatre, Emergency Department), and, the necessary equipment can be used at an appropriate timing by implementing the Soft Component[2].

[1] According to JOCV working in the theatre, there has been no post-operative follow-up and no data on the post-operative infection has been collected so far. For this reason, this indicator is integrated currently as a qualitative indicator. Quantitative monitoring and evaluation will be made possible by requesting the JOCV to collect data, if he or she continues to work in the theatre also in future.

[2] While we considered including "reduction of consultation time" as one of the measures for improved service efficiency, it was impossible to set a target level because there is no baseline value so far. For this reason, this item have not been set as a quantitative indicator at present.It is suggested that baseline data and end line data with the assistance of JOCV.

While meeting the expectations for these effects, the project will also contribute to the “Access to healthcare services” and “Improvement of healthcare service quality,” the goals of Vanuatu “Healthcare Sector Strategies (2010–2016).” Based on these facts, the project is judged as highly appropriate with acknowledged usefulness.