BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE CONSTRUCTION
OF
MALARIA TRAINING AND RESEARCH CENTER
IN
SOLOMON ISLANDS

OCTOBER 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

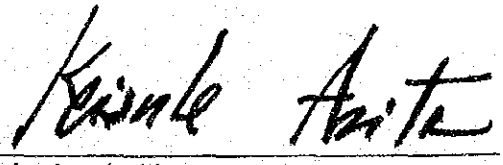
In response to the request of the Government of Solomon Islands, the Government of Japan has decided to conduct a basic design study on the Project for the Construction of Malaria Training and Research Center in Solomon Islands and entrusted the study to the Japan International Cooperation Agency(JICA). JICA sent to Solomon Islands a study team headed by Prof. Manabu Sasa, M.D., President of Toyama Medical and Pharmaceutical College from May 11 to June 3, 1986.

The team had discussions on the Project with the officials concerned of the Government of Solomon Islands and conducted an on-site survey. After the team returned to Japan, further studies were made, a draft report was prepared and, for the explanation and discussion of it, a mission headed by Prof. Takeshi Kurihara, PH.D(Med.SCI), Teikyo University School of Medicine was sent to Solomon Islands from September 16 to October 4, 1986. As a result, the present report has been prepared.

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

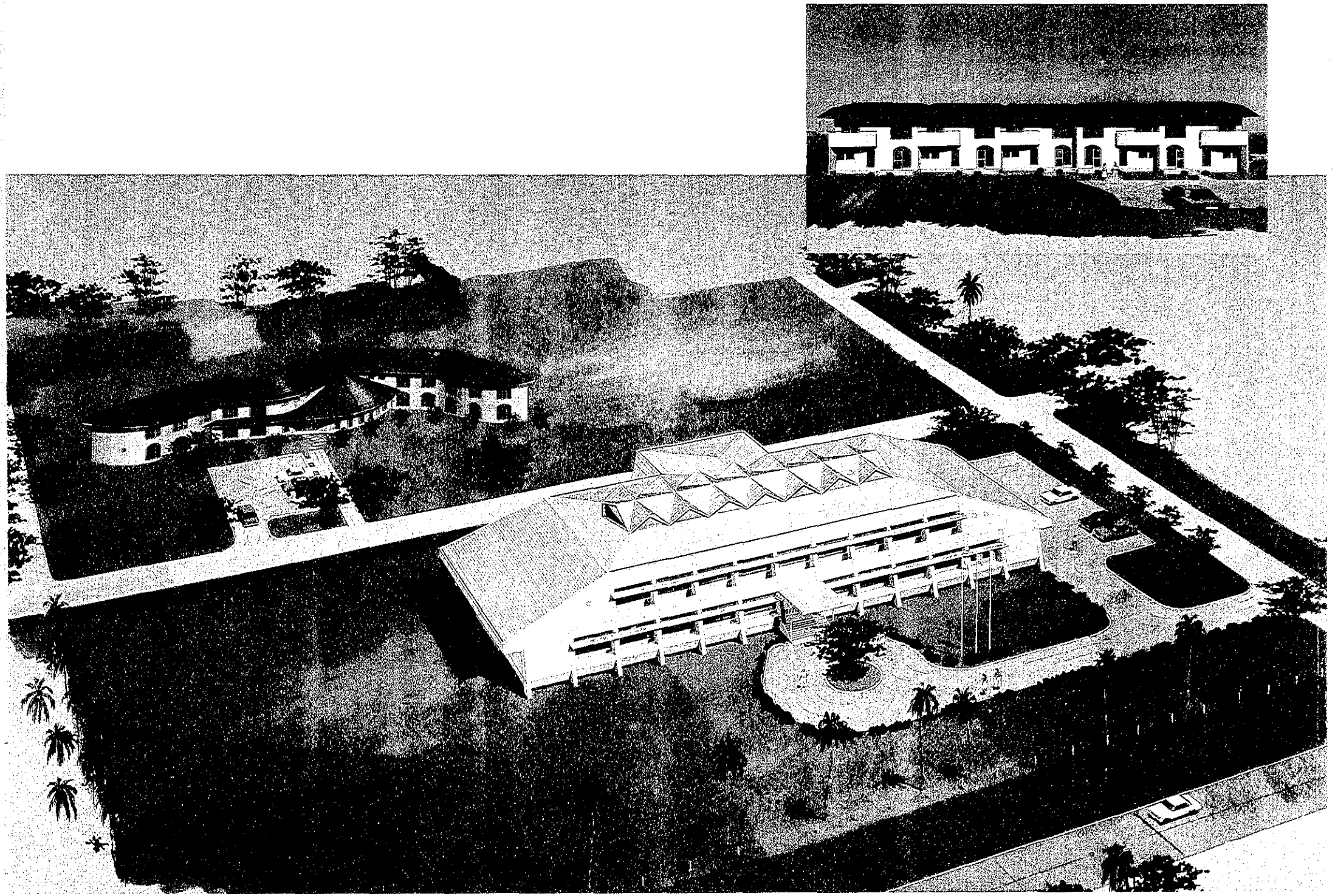
I wish to express my deep appreciation to the officials concerned of the Government of Solomon Islands for their close cooperation extended to the team.

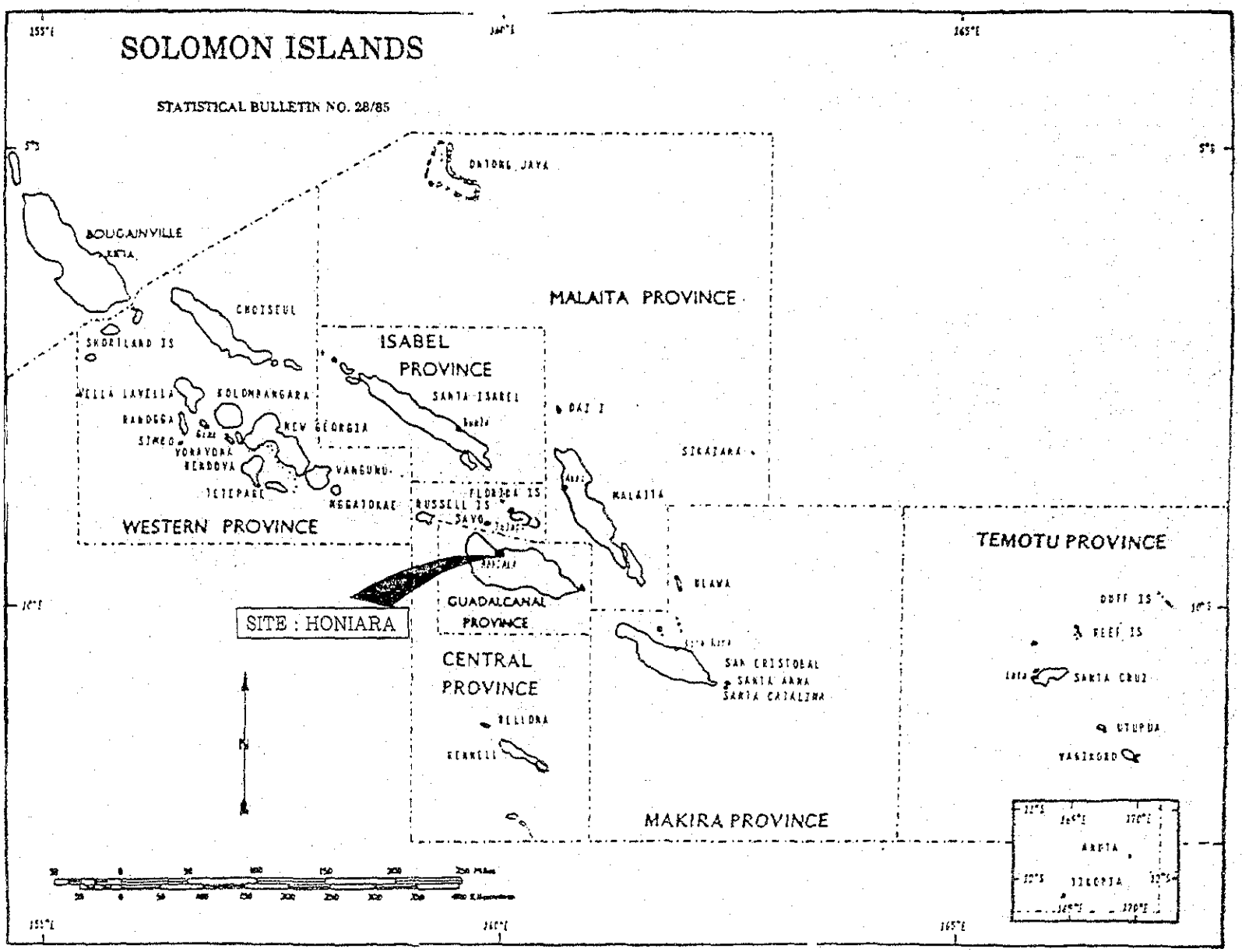
October, 1986.



Keisuke Arita

President
Japan International Cooperation Agency

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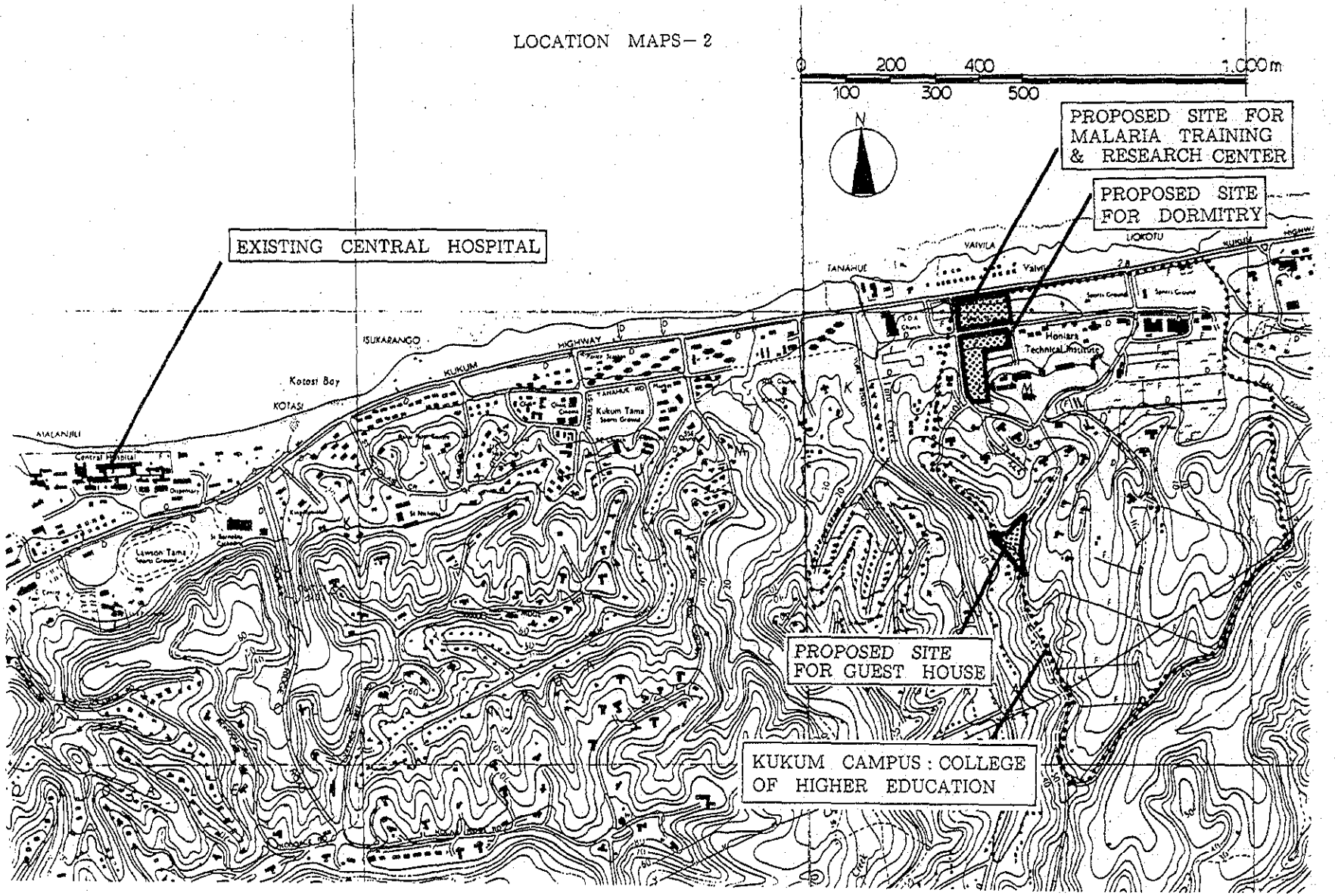
SITE : HONIARA

LOCATION MAPS– 2



Summary

SUMMARY

Malaria has long been a serious problem in the Solomon Islands. Particularly notable is the outbreak of Malaria during World War II which caused a tremendous loss of soldiers for both Japanese and American troops. Provoked by this, some international efforts for its global control were made, first by the American Army and then by WHO. The Malaria Eradication Program, commenced in 1970 as a joint program of WHO and the Government of British Protectorate of the Solomon Islands, achieved a considerable success by the middle of the 1970s. Since the end of the same decade, however, it has been prevalent once again, with the rate of its incidence reaching the highest in the world in 1983.

The Government of the Solomon Islands, in recognition of the inadequacy of the Malaria Eradication Program, started the Anti-Malaria Program (AMP) in 1980 with technical cooperation from WHO. AMP aimed at reducing the incidence rate so that the disease would no longer be a major problem of public health. Measures have been taken including spraying of insecticides for controlling adult vectors and detection of malaria protozoa through blood specimen test. The Program, however, still had a long way to go as of the end of 1985.

The following have been indicated as factors obstructing the AMP from achieving its goals: a negative attitude of the people against spraying of insecticide, insufficiency of spraying technology, the appearance of chloroquine resistant falciparum and DDT resistant vector mosquitoes, insufficiency of funds for the purchase of insecticides and inadequacy of physiological and ecological research on malaria vectors and malaria parasites.

In order to detect various causes of its outbreak and attain the target of AMP, the Government of the Solomon Islands drew up a series of projects centering on the construction of the Malaria Training and Reserch Center in Honiara. The Solomon Government submitted a request to the Government of Japan for grant aid cooperation related to its construction.

In response to this request, the Government of Japan decided to conduct a basic design study of the projects and entrusted this study to the Japan International Cooperation Agency (JICA). JICA dispatched a Basic Design Study Team to the Solomon Islands from May 11, to June 3, 1986. The team carried out a field survey and had discussions on the status quo of malaria as well as past circumstances with the officials concerned of the Government of the Solomon Islands.
From these studies in the Solomon Islands, and from further careful studies in Japan,

the study team confirmed that malaria posed a grave threat to the health of the people of the Solomon Islands, and recognized the problems obstructing the AMP from achieving its goals.
These problems can be summarized as follows:

- Shortage of well-trained staff members for the AMP.
- Lack of studies on malaria vectors and malaria parasites.

To control malaria by solving the above-mentioned problems is most important in restoring and safeguarding the health of the Island people, and therefore, this project has become of major importance to the Government of the Solomon Islands. The study team concluded that it would be suitable for the Government of Japan to extend grant aid assistance for the above-mentioned project.

The study team has also recognized that WHO has been assisting and advising the Government in the battle against malaria since the 1960s and that the Government already set up the Anti-Malaria Project Team. In this context, the team has confirmed that the Government is fully prepared for our possible cooperation both in organization and technical aspects.

As a result of discussions held between the officials concerned of the Government of Solomon Islands and the team over the contents of the request, both parties came to a conclusion that the scope of cooperation by the Government of Japan (hereinafter referred to as "the Project") should be devised as follows:

(1) Construction of a Malaria Training and Research Center in Honiara and supply of necessary equipment for it
(2) Supply of equipment necessary to improve 5 Provincial Laboratories
(3) Supply of equipment necessary to improve 44 Peripheral Laboratories
(4) Supply of insecticides for trials during the next three years.

The outline of each of these items is as follows:

(1) Construction of Malaria Training and Research Center in Honiara.

Main building : two-storied building,
reinforced-concrete structure,
floor area : 1,643 m²
principal rooms: entomology laboratory (EL)
parasitology laboratory (PL)
field research laboratory
Audio- Visual room
training laboratory
researcher's rooms

insectuary
aquarium, etc.

Dormitory: two-storied building,
reinforced-concrete structure,
floor area : 683㎡
principal rooms: bedrooms
kitchen, dining room
restrooms, shower rooms,
etc.

Guest House: two-storied building,
reinforced-concrete structure,
floor area : 385㎡
5 two-bedroom dwellings

Exterior: sewage treatment facilities, etc.

(2) Supply of the equipment

(a) Equipment necessary for Malaria Training and Research Center:
equipment for EL, equipment for PL,
equipment for field research laboratory,
equipment for training, micro-computer, etc.

(b) Equipment necessary to improve 5 Provincial Laboratories:
sets of equipment necessary for blood slide testing, etc.

(c) Equipment necessary to improve 44 Peripheral Laboratories:
sets of equipment necessary for blood slide testing, etc.

(d) Insecticide necessary for trials during the next three years:
insecticide: 40 tons of fenitrothion, spray tools, etc.

The implementing body of the Project will be the MHMS (Ministry of Health and Medical Services).

The implementation period for the Project will be 16 months, which may be divided into such phases as the detailed design, tendering and contract and construction, each taking 3.5, 1.0 and 11.5 months, respectively. In regard to the procurement of equipment, it may require 10.5 months which consist of 5.5 months for manufacture of equipment, one month for pre-shipment inspection, 2.5 months for transport, and 1.5 months for installation and final inspection.

The Government of the Solomon Islands is required to execute the following work, the cost of which is estimated at approximately 74,500SID.

1)Site clearance

2)Out-door work such as gardening, fencing, installing gates and providing exterior lighting in and around the site

3)Provision of facilities for providing electricity, water supply and telephone service to the site

The cost for operation and maintenance of the Center after its completion is estimated at 205,000 SID per year, including salary and wages for the staff.

When the Project is completed appropriately equipped facilities necessary for training technicians and performing research on malaria will be at the service of the AMP. This is expected to contribute to reducing the incidence of malaria cases and, as a result, to improving the health of the people in the Solomon Islands. Such being the case, it is highly recommended that this Project should be implemented with the grant aid assistance by the Government of Japan.

The Malaria project has been carried on under the cooperation of WHO since 1960s in this country.

Early achievement of the goals of the AMP requires harmonious implementation or well-balanced undertakings of self-efforts by the Solomon Government, grant aid assistance and technical cooperation by the Gavernment of Japan and the technical assistance from WHO.

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APPENDIX

LIST OF ABREVIATION

AMP	Anti Malaria Program
CML	Central Malaria Laboratory
HTC	Honiara Town Council
MCP	Malaria Control Project
MHMS	Ministry of Health and Medical Services
PMD	Provincial Malaria Division
PNG	Papua New Guinea
PS	Permanent Secretary
SID	Solomon Islands Dollar
SIG	Government of Solomon Islands
SPR	Slide Positive Rate
US	Under Secretary

Chapter 1 INTRODUCTION

Chapter 1 INTRODUCTION

During World War II, the troops from Japan and America lost a large part of their forces to the ravages of malaria.
Since 1970, the Government of British Protectorate of Solomon Islands and WHO undertook a Malaria Eradication Program which achieved striking success between the early and mid 1970's resulting in cessation of spraying of residual insecticide in certain parts of the country.
But since malaria again became prevalent throughout the country in the late 1970s, the Government of Solomon Islands again placed a great deal of emphasis on malaria control.

Since 1980, the Government has been implementing the Anti-Malaria Program (AMP) in an effort to reduce the incidence of malaria to a level of a minor public health problem and control it at that level.
However, in the course of carrying out the AMP, several obstacles that decreased the effectiveness of the measures taken and hindered the achievement of the program's goals gradually came into view. They are the negative attitude of the people towards the measures taken, like spraying, poor qualifications of staff members, insufficiency of funds, especially to purchase insecticide, and increase on resistance of malaria parasite to chloroquine; the goals are still far from being achieved.

Against this background, the Government of the Solomon Islands requested the Government of Japan to grant funds for a set of projects (primarily the construction of a Malaria Training and Research Center in Honiara (hereinafter referred to as the Center) and the supply of research equipment along with insecticide for trials) in order to facilitate the achievement of the goals of the AMP by removing the obstacles mentioned above.

In response to this request, the Government of Japan decided to conduct a basic design study of the projects and entrusted it to the Japan International Cooperation Agency (JICA). JICA dispatched a study team, headed by Dr.M. Sasa, President of Toyama Medical and Pharmaceutical College, to the Solomon Islands on May 11. The team discussed several items with officials concerned of the Government of the Solomon Islands and conducted field surveys, until their return on June 3 ,1986.

The minutes of discussions were signed by and exchanged between Mr. Philip Funifaka, Permanent Secretary (PS) of the Ministry of Health & Medical

Services (MHMS), and Dr. Manabu Sasa, Leader of the team, and are included in Appendix 1 for reference.

After the above-mentioned discussions and surveys were carefully conducted, the team decided that the construction of the above-mentioned Malaria Training and Research Center, and supply of the equipment and insecticide have high priorities and will probably have the effect of greatly assisting the Government of the Solomon Islands.

Therefore, those items are included in the Project.
But, the operational equipment, engineering work and water supply originally listed in the request are excluded from the Project because of the following reasons:
The supply of transportation equipment which was decided in 1985 under the Improvement Project of Malaria Transportation Equipment is to be provided for the AMP and is deemed sufficient in quantity.
The engineering and water supply work is not urgent at this time, and is connected not only with antimalaria measures, but also with general public health and other national land development programs.
So it requires a much more detailed investigation.

Chapter 2 BACKGROUND OF THE PROJECT

Chapter 2 BACKGROUND OF THE PROJECT

2-1 Present Status of Health and Medical Services

2-1-1 Organizations

Health and Medical services consist of the three components ; the government, the private (industries) and the churches. However, the government, i.e. MHMS, fundamentally is responsible for the services. With the enforcement of decentralization in 1981, the authority and services have been gradually transferred from the central government to the provincial governments. MHMS is responsible for health policies, and their strategies. The Permanent Secretary (PS), the representative responsible person of the administrative authorities, works with the two Under Secretaries (US) who assist the PS in overall health and medical fields and are responsible in the policy-making and for the adjustment and the coordination of respective health activities. The chief of each division under the US is responsible for the enforcement of each development program.

The organization of MHMS is shown in Figure-1.

The central government and provincial governments share health activities as follows:
Central government:

(1) the general plan-making, policy-making, and technical guidance and advice for health service

(2) training of qualified personnel for medical health

(3) appointment, promotion, disposition, training and discharge of staff

Provincial governments:

(1) execution and maintenance/management of routine services, and service plan-making concerning provincial health facilities

(2) planning, construction and management/maintenance of the appropriate water-supply and waste disposal facilities making use of the MHMS's technical guidance, personnel assignments and supply of funds

(3) promotion of public health, provision of health and medical services and prevention of outbreaks of diseases

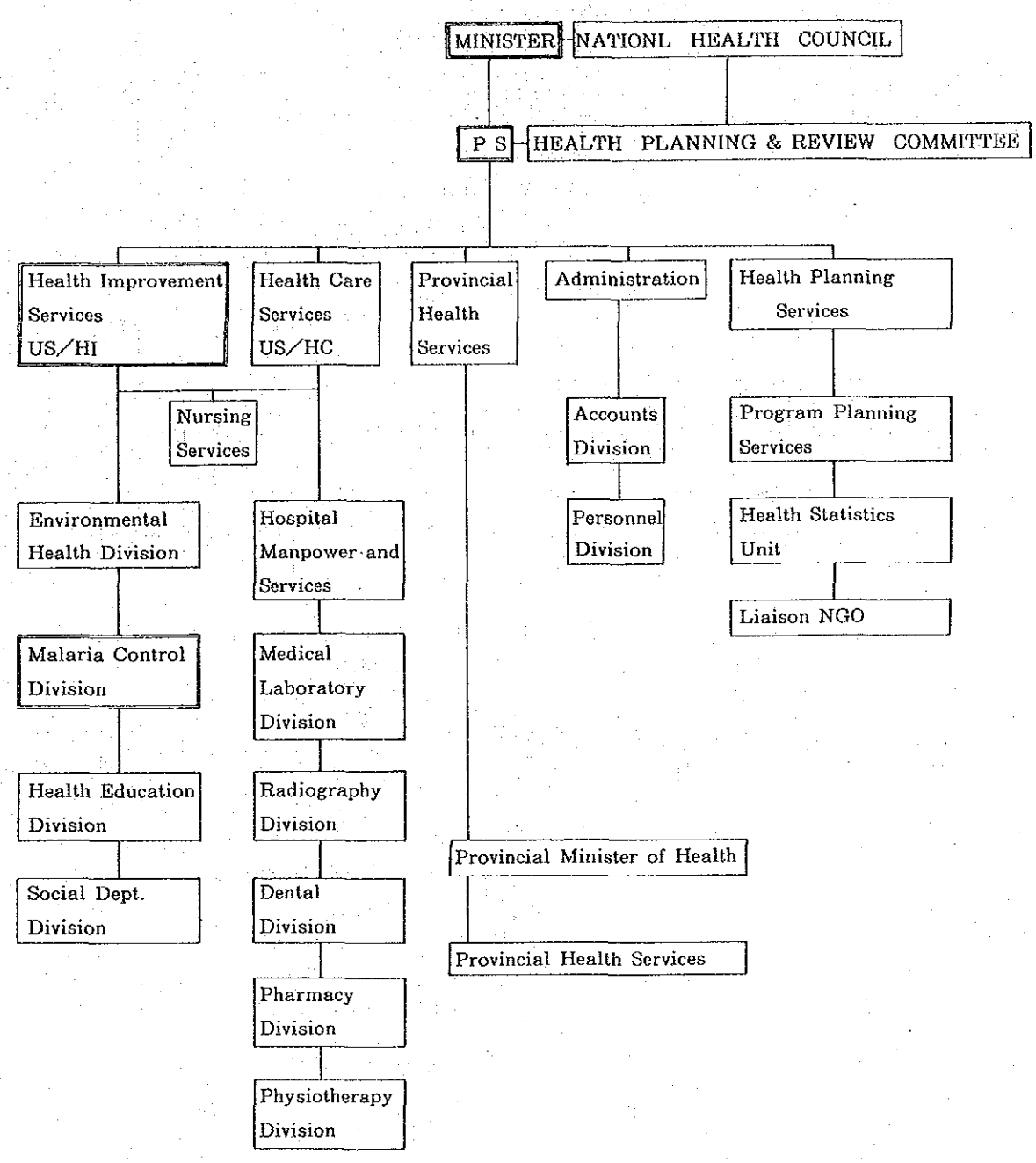
(4) provision of manpower which MHMS cannot provide for

As shown above, the malaria control is a service to be provided by the central government MHMS, and its operational agency is Malaria Control Division.

A project team named Anti Malaria Program (AMP) is organized in the above mentioned Division in order to enforce Malaria Control to good purpose with the cooperation of WHO.

Organization chart of AMP is shown in Figure-2.
261 persons are engaged in AMP at present. 134 of them are established and 127 of them are non-established. In future-project, 300 persons will be engaged in AMP by 1990 : 150 of them being established and 150 of them non-established. (Refer to table-1)

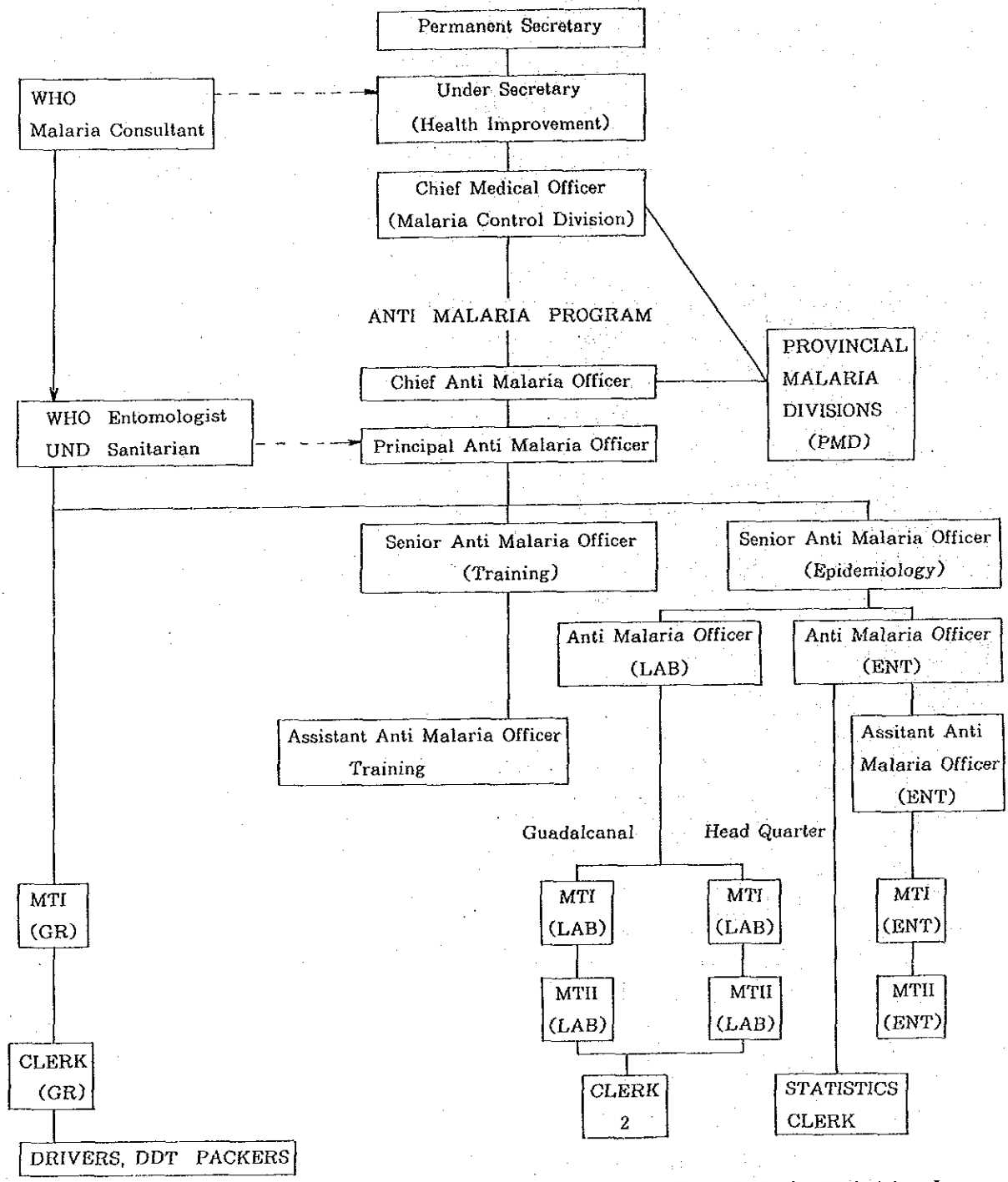
ORGANIZATIONAL DIAGRAM OF MINISTRY OF HEALTH AND MEDICAL SERVICES



Figure－1

ORGANIZATION DIAGRAM OF ANTI MALARIA PROGRAM

MINISTRY OF HEALTH AND MEDICAL SERVICES



Figure– 2

MTI : Malaria Technician I
MTII : Malaria Technician II
LAB : Laboratory
ENT : Entomology
GR : Geographic Record

Table — 1

Existing Establishment posts 1985

1. Established Posts:

Posts/Positions		Level	No.	Total
Chief Anti Malaria Officer	(CAMO)	9	1	1
Principl Anti Malaria Officer	(PAMO)	8	1	1
Senior Anti Malaria officer	(SAMO/TRA)	7	1	1
Senior Anti Malaria officer Epidimiology	(SAMO/EPI)	7	1	1
Anti Malaria Officer Laboratory	(AMO/LAB)	6	1	1
" " " Entomology	(AMO/ENTO)	6	1	1
" " " Province	(AMO/PROV)	6	7	7
Assistant Anti Malaria Officer Laboratory	(AAMO/LAB	5	1	1
Assistant Anti Malaria Officer Entomology	(AAMO/ENTO)	5	1	1
Assistant Anti Malaria Officer Province	(AAMO/PROV)	5	10	10
Malaria Technicians I Laboratory	(MTI/LAB)	4	10	10
" " I Entomology	(MTI/ENTO)	4	1	1
" " I Geographic	(MTI/GR)	4	1	1
" " I Mult. Purp Worker	(MTI/MPW)	4	30	30
Malaria Technicians II Microscopist	(MTII/MIC.)	3	30	30
" " II Entomology	(MTII/ENTO)	3	9	9
" " II Georg. Recon.	(MTII/GR)	3	3	3
" " II Mult Pur. Worker	(MTII/MPW)	3	25	25
	TOTAL	3-9	134	134

2. Non-Established Posts:

Senior Statistic Clerk	2	1	1
Junior Statistic Clerk	1A	4	4
Assistant Statistic Clerk	1B	2	2
Senior Storekeeper	2	1	1
Junior Storekeeper	1A	2	2
Assistant Storekeeper	1B	1	1
Malaria Technicians Microscopist Aid	2	5	5
Senior Mechanic	2	2	2
Junior Mechanic	1A	2	2
Assistant Mechanic	1B	2	2
Senior Driver	2	1	1
Junior Driver	1A	2	2
Assistant Driver	1B	1	1
Messenger/Orderly	1B	1	1
Malaria Technician Drug Admin. Aid	2	4	4
DDT Packer	1B	3	3
Spraymen	1A	91	91
TOTAL	1B-2	127	127
Grand Total		261	261

Five Year Proposal Plan of AMP Establishment 1986 - 1990

1. Established Posts:

Posts/Positions	Level	86	87	88	89	90
Director - (CAMO)	11	1	1	1	1	1
Deputy Director - (PAMO)	10	1	1	1	1	1
Assistant Deputy Director - (SAMO/TRA)	9	1	1	1	1	1
Senior Anti Malaria Officer - (EPI)	8	1	1	1	1	1
" " " " - (Para)	8	1	1	1	1	1
" " " " - (Ento)	8	1	1	1	1	1
Anti Malaria Officer - (Para)	7	1	1	1	1	1
" " " - (Ento)	7	1	1	1	1	1
" " " - (Prov)	7	8	8	8	8	8
Assistant Anti Malaria Officer - (EPI)	6	1	1	1	1	1
" " " " - (Para)	6	3	3	3	3	3
" " " " - (Ento)	6	1	1	1	1	1
" " " " - (Tra)	6	1	1	1	1	1
" " " " - (Prov)	6	10	10	10	10	10
Malaria Technicians I - (EPI)	5	2	2	2	2	2
" " I - (Para)	5	10	10	10	10	10
" " I - (Ento)	5	1	1	1	1	1
" " I - (GR)	5	1	1	1	1	1
" " I - (Prov)	5	28	28	28	28	28
Malaria Technicians II - (EPI)	4	2	2	2	2	2
" " II - (Para)	4	30	30	30	30	30
" " II - (Ento)	4	9	9	9	9	9
" " II - (GR)	4	2	2	2	2	2
" " II - (Prov)	4	25	27	29	31	33
TOTAL		142	144	146	148	150

2. Non - Established posts:

	Level	86	87	88	89	90
Senior Statistic Clerk	3	2	2	2	2	2
Junior Statistic Clerk	2	3	3	3	3	3
Assistant Junior Statistic Clerk	1A	2	2	2	2	2
Senior Storekeeper	3	1	1	1	1	1
Junior Storekeeper	2	2	2	2	2	2
Assistant Junior Storekeeper	1A	1	1	1	1	1
Malaria Techinicians Aid Microscopist	2	5	5	5	5	5
Stainer and cleaner	1B	1	1	1	1	1
Malaria Techinicians Aid DA	2	3	3	3	3	3
Malaria Technicians Aid Entomology	2	1	1	1	1	1
Senior Mechanic	3	2	2	2	2	2
Junior Mechanic	2	2	2	2	2	2
Assistant Junior Mechanic	1A	2	2	2	2	2
Senior Driver	4	1	1	1	1	1
Junior Driver	3	1	1	1	1	1
Assistant Junior Driver	2	1	1	1	1	1
Messenger/orderly	1B	1	1	1	1	1
DDT Packer	1B	3	3	3	3	3
Spraymen	1A	96	106	111	116	116
TOTAL		130	140	145	150	150
GRAND TOTAL		272	284	291	298	300

2-1-2 National Health Plan and Malaria Project in the Frame Work of National Development Plan

The 5-Year National Development Plan (1985-1989) is currently being implemented. The plan is characterized by the thoughts focused on the general well-being of the people and shows the objectives of the developments and the strategies how to achieve them by developing economic and human resources. The objectives of the National Development Plan are shown below. The primary objective is the development of human resources, technology and knowledge.

(1) promote physical, mental and social well-being and the advancement of knowledge ;
(2) promote the equitable distribution of development benefits ;
(3) promote greater self-reliance and local control of the national economy;
(4) strengthen diversity and productive base and capacity of the national economy ;
(5) preserve the value, traditions and integrity of the Solomon Islands society ;
(6) consolidate devolution and inter-governmental relations ;
(7) promote national unity within the diversity of the nation ;
(8) promote international cooperation and world peace.

Objective (1) above has priority over the others, which is very unusual while the current tendency is often placing the emphasis on economic development.

The implications of objective (1) are spelled out as follows :
" This means ensuring sufficient food, nutrition and housing for people ; improvement in health and control of diseases ; consolidating traditional and other forms of social security and family support ; the provision of leisure and recreation opportunities ; minimizing the social stresses resulting from change ; fostering social harmony and national security ; increased education opportunities, quality and relevance ; improvement in human capital, skills and knowledge ; and respect for individual freedom and human rights."

MHMS plans National Health Plan(1986-1989) according to the above policies.
The three objectives of the plan are to :(1) provide equitable distribution of health services ; (2) strengthen comprehensive integrated primary health care concept ; and, (3) reduce the incidence of all communicable diseases. AMP,a primary subject of the plan, is regarded as the main subject of health

issues, which is allocated a great part of the current Development Estimate of MHMS as shown hereinafter.

AMP is summarized as follows:

Objective: To reduce the incidence of malaria to a state in which it is no longer a serious public health problem and to maintain that level until realization of eradication by the development of new measures becomes possible.

Ongoing Activities:

(a) residual spraying and ultra-low volume(ULV) spraying in special areas
(b) drug mass administration
(c) expansion of diagnosis and treatment services
(d) continuous studies on malaria vector and reduction of feasible source where mosquitoes may be hatching form

Objectives to be emphasized in this Period:

1986 : establishment of a National Malaria Training and Research Center in Honiara

1987 : establishment of Provincial Malaria Laboratories

2-1-3 Estimate

The estimate consists of a Recurrent Estimate (R. E.) and a Development Estimate (D. E.)

unit: SID

	1984 (Actual)	1985 (Revised)	1986 (Budget)
R. E.	52,419,854	55,874,347	63,437,440
D. E.	13,976,702	42,814,665	35,272,000
Total	66,396,556	98,689,012	98,709,440

As shown above, in comparison with the estimate in 1986 and 1985, there are not any outstanding increases.
MHMS's estimate for 1986 is as follows.

	Total Amount (SID)	Rate in Total Governmental Estimate (%)
R. E.	3,889,100	6.1
D. E.	2,962,000	8.4
Total	6,851,100	6.9

The calculations based on the above figures show that the costs for health and hygiene per person is about 25 SID.

This budget includes aid from Australia (ADAB), the United Kingdom (UK), New Zealand (NZ), WHO, UNICEF, UNFPA and UNDP.

The Malaria Training and Research Center will be operated and managed by AMP.

1,600,000 SID has been appropriated for the AMP budget for 1986, and 1,080,000 SID in this budget has been approved by Parliament. Moreover, 60,000 SID has been appropriated in a form non-cash.

Future prospects for the AMP budget are as follows:

1987	1,826,800 SID
1988	2,003,300 SID

In spite of tight financial conditions, an increase in the budget is planned at about 10 percent a year for the future, and in this way, a positive stance has been recognized.

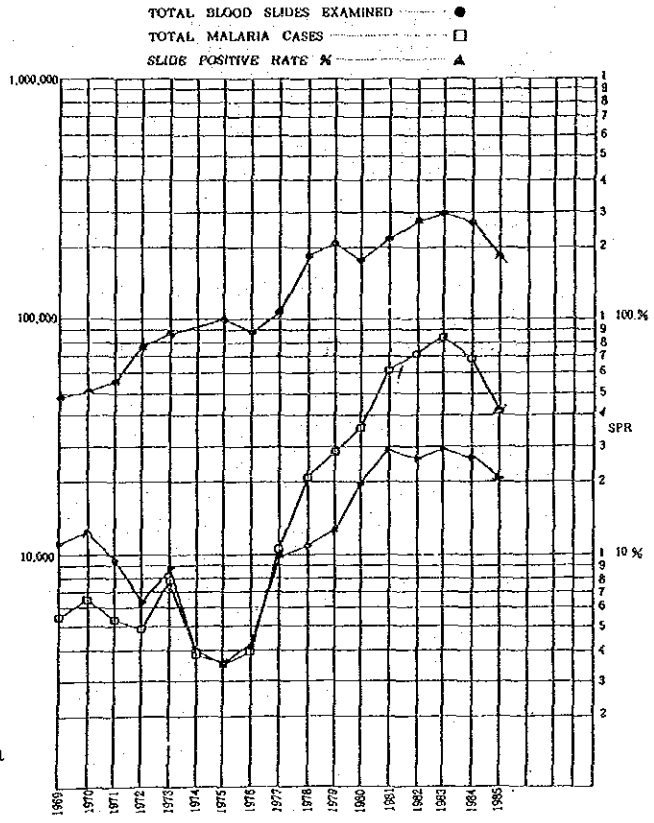
The Project will be implemented and managed by AMP. 56.8% of the Development Estimate of MHMS is allotted for AMP, which means that MHMS places most of its emphasis on AMP. The role of AMP is very important and it is expected that AMP will produce satisfactory results.

2-2 The Present Status of Malaria and Malaria Control

2-2-1 The Present Status of Malaria

Malaria, which was prevalent among many Japanese and U. S. soldiers during World War II, was effectively controlled through DDT spraying, civil engineering pojects, clinical treatment, administration of preventive medicines etc. done by U. S. Army.

Since malaria countermeansures were discontinued because of the withdrawal of U. S. Army in 1948, malaria began to prevail again. Pilot project and pre-eradication program were enforced in cooperation with the Government of British Protectorate of Solomon Islands and WHO from 1962 through 1969. As it was effective, the Malaria Eradication Program began in 1970, and the Slide Positive Rate (SPR) was reduced from 11.7% to 3.5% by the end of 1975.
This satisfactory result proved that the program had been a success and so, the enforcement of the program was ceased in 1976 except for a part of the subsidiary preventive measures.



Table－2 MALARIA STATISTICS 1969－85

Since that time, malaria cases have increased in number, and the SPR climbed to 10.6% in 1978. WHO took a great attention and conducted research on malaria in 1978. Although DDT spray was resumed since 1981 on a full scale, the SPR totaled 28.3% i.e. 84,343 patients in 1983, the peak year.
This presents 325 malaria cases per 1000 population the highest record in the world in 1983. Although the case incidence has been reduced since then, malaria is still prevalent in 1985 - SPR 20%, or about 40,000 cases.
(Refer to Tables 2 and 3)

WORLD PREVALENCE OF MALARIA 1983

Country or area — Pays ou zone	Examination rate[a] Taux d'examens[a]	Slide positivity rate (%) Taux de positivité des lames	Number of malaria cases per 1 000 population[b] Nombre de cas de paludisme par 1 000 habitants[b]	Percentage of *P. falciparum* cases Pourcentage de cas à *P. falciparum*
AFRICA NORTH OF THE SAHARA — AFRIQUE AU NORD DU SAHARA				
Algeria — *Algérie*	6.5	0.01	0.004	31.7[c]
Egypt — Egypte	2.3	0.02	0.004	2.0
Libyan Arab Jamahiriya — Jamahiriya arabe libyenne	2.0	1.2	0.25[c]	7.8[c]
Morocco — Maroc	9.1	0.01	0.006	4.0[c]
MIDDLE AMERICA — AMÉRIQUE CENTRALE				
Belize	19.9	14.4	28.72	13.8
Costa Rica	17.7	0.2	0.36	4.1
Dominican Republic — République dominicaine	5.4	1.2	0.64	100
El Salvador	6.5	21.3	13.96	14.4
Guatemala	13.9	14.5	20.08	6.5
Haiti — Haïti	6.9	17.5	12.07	100
Honduras	9.0	11.1	10.00	6.0
Mexico — Mexique	4.2	4.6	1.95	1.8
Nicaragua	13.5	3.1	4.22	7.7
Panama	18.9	0.1	0.17	43.1
SOUTH AMERICA — AMÉRIQUE DU SUD				
Argentina — Argentine	0.7	2.0	0.15	0
Bolivia — Bolivie	6.2	9.6	5.90	11.5
Brazil — Brésil	5.2	10.3	5.35	48.3
Colombia — Colombie	3.0	19.7	5.87	45.2
Ecuador — Equateur	7.9	11.4	9.05	32.0
French Guiana — Guyane française	14.8	10.1	15.01	91.6
Guyana — Guyane	6.5	3.5	2.28	8.5
Paraguay	2.9	0.1	0.02	20.4[c]
Peru — Pérou	3.6	12.7	4.61	0.2
Suriname	21.0	3.3	6.96	82.6
Venezuela	1.9	3.7	0.69	10.5
ASIA WEST OF INDIA — ASIE À L'OUEST DE L'INDE				
Afghanistan	5.2	23.7	12.38	0.2
Democratic Yemen — Yémen démocratique	14.0	12.7	17.7	99.8
Iran (Islamic Republic of) — Iran (République islamique d')	8.7	1.6	1.37	21.4
Iraq	9.8	0.2	0.17	2.3
Oman	30.6	19.7	60.25	92.4
Pakistan	2.9	1.9	0.55	32.0
Saudi Arabia — Arabie saoudite	10.3	4.3	4.41	87.0
Syrian Arab Republic — *République arabe syrienne*	5.6	0.004	0.21	0.1
United Arab Emirates — Emirats arabes unis	8.0	5.0	3.98	26.4
Yemen — Yémen	2.8	6.5	1.83	87.3
MIDDLE SOUTH ASIA — ASIE MÉRIDIONALE CENTRALE				
Bangladesh	2.4	1.7	0.43	40.8
Bhutan — Bhoutan	24.4	12.2	29.79	59.0
India — Inde	8.8	3.1	2.73	28.1
Maldives	56.3	0.02	0.13	31.8[c]
Nepal — Népal	16.6	1.1	1.85	11.6
Sri Lanka	9.4	12.1	11.36	3.5
EASTERN ASIA AND OCEANIA — ASIE DE L'EST ET OCÉANIE				
Burma — Birmanie	3.4	4.2	1.44	85.4
China — Chine	...	...	1.44	...
Indonesia — Indonésie	9.5	1.6	1.51	46.2
Lao People's Democratic Republic — République démocratique populaire lao	5.2	10.7	5.56	88.0
Malaysia — Malaisie	12.7	1.2	1.51	59.3
Papua New Guinea — Papouasie-Nouvelle-Guinée	11.3	35.4	39.79	78.5
Philippines	4.5	12.5	5.61	62.8
Solomon Islands — Iles Salomon	114.8	28.3	325.10	56.7
Thailand — Thaïlande	13.5	4.1	5.51	66.3
Vanuatu	52.2	39.7	210.47	79.3
Viet Nam	6.0	2.5	1.51	65.2
EUROPE INCLUDING TURKEY AND THE USSR — EUROPE Y COMPRIS LA TURQUIE ET L'URSS				
Turkey — Turquie	6.7	2.1	1.41	0

[a] Number of blood specimens examined per 100 population living in originally malarious areas and covered by antimalaria measures. — Nombre d'échantillons de sang examinés par 100 habitants vivant en zone initialement impaludée et couverts par des mesures antipaludiques.

[b] Population in originally malarious areas and covered by antimalaria measures. — Habitants des zones initialement impaludées et couverts par des mesures antipaludiques

[c] Imported cases. — Cas importés.

Table — 3

2-2-2 The Present Status of Malaria Control

(1) From Eradication to Control

As shown before, with the start of the " Malaria Eradication Program" in 1970, the countermeasures for eradicating malaria, principally spraying DDT, and active surveillance were enforced. This program stopped in 1976 in a large part of the country except some minor part of the countermeasures, because satisfactory results had been obtained. However, since then, the number of malaria cases has increased, and malaria countermeasures resumed in 1980 under the new name of AMP.

AMP is a Malaria Control Project. The goals are the control of the current prevalence of malaria, reduction of incidence of malaria cases to a level at which malaria is no more a public health problem and maintenance of that level until the realization of new technologies for malaria eradication in the future.

(2) The Present Status of AMP, its Budget, Program and Activities

AMP is now in a 4-years program from 1985 through 1988. The total amount of the budget for the period is 5,400,000SID (foreign aid 4,500,000 SID, SIG900,000 SID). The total amount for 1986 is 1,080,000 SID (foreign aid 180,000 SID, SIG 900,000SID). The above estimates have already been approved by Parliament.

The program from 1985 to 1988 consists of the followings:

ongoing activities:

(a) improvement and development of ongoing countermeasures (DDT spray, mass drug administration, blood examination, arrangements for preventing the breeding of mosquitoes, training activities etc.)

new activities:

(a) development of a diagnosis and a treatment network to go along with primary health care
(b) establishment of a Malaria Training and Research Center in Honiara
(c) enforcement of verification tests in Honiara and re-education of malaria staff

The current status of AMP activities is as follows.

With headquarters located in the main office of MHMS in Honiara, the AMP consists of the Central Malaria Labaoratory (CML), a training section and a supply section under immediate control of the headquarters. Seven Provinces have their own Provincial Malaria Divisions (PMD) with Anti-Malaria Officers (AMO) taking charge of the enforcement of the AMP. PMD's primary activities are blood examination and DDT spraying. There are 24 blood examination laboratories in operation across the country. As the equipment at some of these laboratories is outdated, improvement of the equipment is required.
CML is located within the premises of Honiara Central Hospital. CML has both a Parasitology Laboratory(PL) and a Entomology Laboratory(EL) . PL has 13 staff personnel and 8 microscopes. EL has 10 staff personnel. The rooms for the PL and EL are not big enough to perform satisfactory examinations and researches.
Since the Training Section does not have its own facilities, it performs its activities in the Central Hospital, College of Higher Education, etc.

It is difficult to provide substantial training without the facilities appropriate for the study of malaria.

The Supply Section, which has 2 warehouses next to the MHMS head office, stocks and distributes DDT, etc. Since one side of each warehouse has no wall, the carton boxes containing DDT are defenseless against rain entering on an angle. At present, about 50 tons of DDT are observed in these warehouses.

(3) The Problems
In National Health Plan (1986-1989), MHMS mentions the following primary problems concerning malaria control.

(a) the negative attitude on the part of the people in regard to malaria countermeasures, especially the spraying of insecticide,
(b) the difficulty in obtaining funding aid required for the implementation of the program, especially for the purchase of insecticides, because of the severe economic climate amongst donor countries,
(c) poor quality of spraying and the impossiblity of spraying all areas where spray is required.

The above problems will be solved by the education training of the people, re-education of staff, satisfactory supply of insecticide, etc.
WHO made an investigation into the prevalence of malaria after the latter half of the 1970 ' s and indicates the following points which caused the reappearance of malaria.

(a) ecological changes in the malaria vector
(b) decreased effectiveness of DDT
(c) rapid increase in the breeding sites of mosquitoes because of rapid development of paddy field
(d) the malaria parasite having resistance to chloroquine, etc.

Therefore, entomological studies of malaria vector, the study of parasite, field surveys such as conditions of the breeding sites of malaria vector, distribution of them from a geographical point of view, etc. are indispensable for an effective malaria control project in future.

2-3 Existing Equipment

(1) Central Malaria Laboratory

(a) The following equipment are installed in the Parasitalogy Laboratory of the Honiara Central Hospital :

Biology microscope (magnification : 1000x)	8 Pieces
Sample stainning equipment	2 Sets
Slide glass stand (for 200 pieces use)	5 Pieces

(b) Entomology Laboratory has :

Light trap	1 Piece
Co^2 *mosquito trap*	1 Piece
Biology microscope (magnification : 1000x)	1 Piece
Sample stainning equipment	1 Piece

(c) The Parasitology Laboratory is serving both as a research room and a service laboratory. The room, as a laboratory, has an insufficient capacity in view of space and equipment.

(2) Provincial Clinics and Peripheral Laboratories

(a) Existing equipment list for Provincial Laboratory

Place	No. of microscope	No. of microscopist
Gizo	2	3
Buala	2	3
Malu'u	1	2
Kira Kira	2	3
Tulagi	2	3
Total	9	14

(b) Existing equipment list for Peripheral Laboratory

Each of the following laboratories has one set of microscope, of which total amount is 14 sets.

Western Province : Munda, Seghe, Sasamuga, Noro, Kukudu
Guadalcanal Province : Aola, Avuavu, Binu
Malaita Province : Fahambu, Tarapaina, Rohinari
Isabel Province : Tatabe, Kolotubi
Central Province : Yandina

2-4 Description of the Requested Financial Assistance

The Government of the Solomon Islands has drawn up a set of projects in order to resolve the problems described in part 2-2-2, and has requested a grant aid from the Government of Japan for the purpose of implementation of the projects.

The request consists of the following 5 items which are listed in the order of their priority:

(1) Construction of malaria laboratories
  (a) Construction of Malaria Training and Research Center in Honiara and the supply of equipment
  (b) Construction of Provincial Laboratory in Gizo and the supply of equipment
  (c) improvement of the Provincial Laboratories in Buala, Tulagi, Malu'u and Kira Kira and the supply of equipment
  (d) Improvement of 44 Peripheral Laboratories and the supply of equipment

(2) Supply of operational equipment
  Supply of equipment necessary for field operations involving principally the spraying of DDT and the transportion of blood samples. This equipment includes, but is not limited to, vehicles and small-sized vessels.

(3) Supply of trial insecticide
  Supply of insecticide necessary for trials in which the spraying of insecticide other than DDT is contemplated.

(4) Engineering works
  Engineering works are planned so as to decrease malaria vectors through improvement of areas where mosquitoes can breed. The principal constituents of such works are drainage and reclamation. The proposed site is such as the Burns Greek area in the suburbs of Honiara, F/S of which is considered to be the most essential.

(5) Water supply

Supply of drinking water is one of the most important health measures, but consideration in regard to the emergence of noxious insects has been insufficient in the construction of water-supply facilities. Therefore, this project aims at decreasing the number of malaria-carrying mosquitoes through a water-supply and a drainage system program in conjunction with AMP.

The supply of tools, machines, materials, measuring and drawing instrument, small-sized vessels, etc. for the water-supply and drainage works have been requested.

Chapter 3 PROJECT DESCRIPTION

Chapter 3 PROJECT DESCRIPTION

3-1 Objective

The objectives of the Project consist of the construction of the facilities and the supply of the equipment under the grant aid of the Government of Japan, with a view to control malaria by contributing to the training of malaria staff, the researches in the field of entomology and parasitology of malaria vector and malaria parasite, etc.

3-2 Evalution of the Requested Financial Assistance
(Consideration of Feasibility of Assistance)

The following evaluation as to the 5 projects listed in part 2-3, has been done with respect to their functions, results of the survey, mechanism of Japanese grant aids, etc.

3-2-1 Construction of Malaria Laboratories

(1) Construction of Malaria Training and Research Center in Honiara (the Center) and the Supply of Equipment

This Center is to be furnished with malaria training facilities, research facilities and supporting facilities.

As mentioned above, obstacles for the execution of AMP are lack of understanding by people and a low level of skill of the personnel. WHO has taken a serious view of this fact and has conducted malaria training. It is, however difficult for such training to bear their full fruits because of the lack of training facilities and staff to do the training. Only a limited number of personnel can be sent overseas for training and this is often inappropriate.

Although the necessity for studies of vector mosquitos and parasite of malaria are recognized, as a matter of fact, few basic studies have actually led to any new measures against malaria as a result of a lack of researchers and poor facilities for studying;

Substancially, the studies are limited to collection and classification of such mosquitoes and ordinary blood examinations and calculation of SPR. Also, verification test of blood examinations done all over the country is planned to be performed at CML in order to improve the quality of the blood examinations.
Accordingly, it is thought reasonable to give the Center such scale and such facilities and equipment as are necessary and sufficient.

(2) Construciton of a Provincial Laboratory in Gizo and the Supply of Equipment.

In Gizo, the Provincial Laboratory is located in its provincial hospital and performs principally blood examination. Supply of equipment and construction of malaria laboratory are requested. Improvement of outdated equipment for examination is deemed as having high priority for the purpose of continuing and developing the examination,and so it would be reasonable to supply replacements for such equipment. On the other hand, construction of a new laboratory was excluded from the objects of the survey, because it was deemed as having lower priority.

(3) Improvement of Provincial Laboratories in Buala, Tulagi, Malu'u and Kira Kira and the Supply of Equipment

Improvement of equipment in these 4 Laboratories and supply of an air conditioning system to the Buala Provincial Laboratory are requested. The necessity of improvement of such equipment is recognized and the supply of equipment is thought to be reasonable, while the air conditioning system does not have such a high urgency and accordingly was excluded from the objects of the survey.

(4) Improvement of 44 Peripheral Laboratories and the Supply of Equipment

18 Peripheral Laboratories are in operation in 6 provinces other than Temotu. The following problems in implementation of anti-malaria measures are pointed out:

(a) The extreme rundown state of a portion of the equipment makes performance of the appropriate examination difficult.
(b) Operation under adverse circumstances causes a lower quality of examination and impedes operation during emergencies, in particular at night, and cloudy weather.
(c) In some villages it is often 4 or 5 days after examination that the results are revealed and medical care is commenced, as a result of an insufficient number of locations for the examination.

The following requests have been made in order to solve these problems:

(a) Establishment of Peripheral Laboratories at 40 strategic points for anti-malaria measures, which will be selected out of 96 provincial clinics in the country along with the supply of (prefabricated) buildings and equipment
(b) Supply of (prefabricated) buildings and equipment to 4 of the existing 18 Peripheral Laboratories

Repletion of these local malaria laboratories would have great supportive effects, leading directly to a grasp of the actual conditions of malaria resulting in rapid medical care and increased prevention. Hence, it would be reasonable to give microscopes with installed solar cells in order to enable examination at night and during cloudy weather. Supply of new buildings is excluded from objects of the survey because the examination is deemed to be continued in the existing buildings.

3-2-2 Supply of Operational Equipment

The supply of transport equipment which was decided on in 1985 under the Improvement Project of Medical Transportation Equipment is understood to be provided for AMP and is deemed sufficient in quantity to support its activities. Therefore, equipment for field operations other than those required for the Center are excluded from the objects to be supplied.

3-2-3 Supply of Trial Insecticide

As previously mentioned, the indoor spraying of DDT is being executed. But the effectiveness of that is decreasing in recent years. Thus, it is planned that trial spraying of new insecticides such as fenitrothion will be done for a period of 3 years for indentfying its effectiveness.

Nevertheless, as was stated before, to steadily purchase insecticide is difficult in light of funds. However, due to the nature of such trial spraying, discontinuance or reduction of the scale thereof might nullify the entire trial.

Accordingly,it would be reasonable to supply such quantities of insecticide as is required under a trial program for 3 years from this point on.

3-2-4 Engineering Works
3-2-5 Water Supply

These items were excluded from the objectives of the present survey because it is connected not only with anti-malaria measures, but also with general public health and other national land development programs, and because it requires a much more detailed investigation.

The facilities and equipment which will be constructed and supplied under the project are deemed to be as follows ;

(1) Facilities

The Center has the following functions.

(a) Training Section : Training of AMP staff.
Education training of the people.
Training of anti-mararia technicians coming from PNG Vanuatu and other Pacific countries.
Training of doctors.

(b) Laboratory Section : Research of Parasitology and Entomology for AMP.

(c) Administration Section: Operation and administration of the above two sections.

(2) Equipment

Following major equipment are necessary for the activities of Malaria Training and Research Center,Provincial Laboratory and Peripheral Laboratory.

(a) Equipment for Malaria Training and Research Center :
Equipment for Entomology Laboratory , Equipment for Parasitology Laboratory,Field Research Laboratory,Microcomputer and etc.

(b) Provincial Laboratory (5 Places) :
Each of the following laboratory has one set of equipment for blood examination (Biological microscope, Solar-cell system, Portable generator, and etc.)
Gizo, Buala, Malu'u, Kirakira, Turagi

(c) Peripherel Laboratory (44Places) :

Each of the following laboratories has one set of equipment for blood examination (Biological microscope, Solar-cell system, and etc.)

Western Province	: Choisuel,Nila,Pangoe,Wagina,Keru,Posarae, Pienuna, Irigila
Guadalcanal	: Marau, Kuma,Babanakira,Tangarare, Lambi, Visale,Maratoha
Malaita	: Gwaunatolo, Ata'a, Atori, Olomburi,Manawai Takataka,Tawaro,Afio,Buma,Sikaiana,Luaniua
Makira /Ulawa	: Namuga,Tawaraha,Hadja, Marogu,Waihaga
Isabel	: Samasodu,Allardyce, Kia, Baolo
Central Province	: Tengano, Penneli, Leitongo,Siota
Temotu Province	: Manuopo, Nangu, Utupia,Taumako, Numbuko

(d) Insecticide and Protective clothing

Fenitrothion 40t,Spray training equipment and Protection wear.

3-3 Outline of the Project

3-3-1 Operation of the Project

(1) Operating Agency

Facilities and equipment granted under the Project will be operated and managed by AMP, Malaria Control Division, Health Improvement Services of MHMS. When Malaria Training and Research Center in Honiara is established, it is scheduled to integrate the CML and the training section into a new organization. WHO is sending an advisor and two specialists for malaria control. The facilities will also be utilized by them.

(2) Personnel Plan

Actual number of staffs engaged in CML is as follows:

Parasitology Laboratory : 13 persons, including one JOVC member. Moreover, a WHO expert is supervising.

Entomology Laboratory : 10 persons, including a WHO specialist.

Furthermore, when Malaria Training and Research Center is established, all persons who are engaged by CML will be shifted to the new center. In addition, the training staff, some of the staff of the Malaria Control Division and the specialists from WHO will use the new center.

From the point of the factors mentioned above, it has been evaluted that the personnel plan will be sufficient for the operation of the new facilities.

Expected staff of the Center is as follows:

Director	1
WHO Adviser	1
WHO Parasitologist	1
WHO Entomologist+ S.I. Counterpart	2
Field Researsh Specialist	3
Technician(LAB)	12
Technician(ENT)	9
Guest Lecturer	2 ~ 3
Training Staff	2
Clerk	1~ 2
Total	34 ~36

3-3-2 Outline of the Facilities and Equipment

The floor area of the facilities is calculated as follows, in accordance with the requirement described in the clause 4−2−2 (1).

(1) Facilities

(a) Malaria Training and Research Center

Section	Floor Area(㎡)	Principal Room
Training	341.9	A. V. Rm., Training Lab., Library, Lecture Rm., Lectre's Rm.
Laboratory	466.0	Parasitology Lab., Entomology Lab., Field Research Lab., Researchers Rm.
Administration	199.1	Director's Rm., General Office, Staff Meeting Rm., Advisor's Rm.
Others	639.4	Corridor, Stair Case, Toilet&Shower Rm.
Total Floor Area	1643.0	

(b) Dormitory

Section	Floor Area(㎡)	Principal Rooms
Residence	350.9	20 Two- Bed Rooms Toilet & Shower Rm., Laundry
Public	282.3	Dining Rm., Lounge, Corridor, Store
Administration	50.6	Office, Residence for Administrator
Total Floor Area	683.0	

(c) Guest House

Section	Floor Area(㎡)	Principal Rooms
Residence	385.0	5 Two- Bed Room Dwellings
Terrace, Veranda	68.3	
Total Floor Area	453.3	

(2) Equipment

Following intems are planned as main equipments.

(a) Malaria Training and Reseach Center

1) Parasitology Laboratory

Stereo Microscope	2	Pieces
Biological Microscope	1	Piece
Electrophoresis Apparatus	1	Piece
Walk-in Refrigerater	1	Set
Laboratory Equipment	1	Set
Laboratory Table	1	Piece

2) Entmology Laboratory

Stereo Microscope	4	Pieces
Biological Microscope	1	Piece
Insect Sampling Appartus	1	Set
Laboratory Table	1	Piece

3) Training Room

Training Microscope	42	Pieces
Microscope Sampling Table	1	Piece
Training Laboratory Table	6	Sets

4) Field Reserch Laboratory

Camping Set	3	Sets
Portable Generator	2	Pieces
Insect Collector	1	Set

5) Lavivorous Fish Room

Small Aquarium	20	Pieces
Fish Breeding Equipment	1	Set

6) Audiovisual Room

VTR System	1	Set
Slide Projector	2	Pieces
Over Head Projector	2	Pieces

7) Computer Room

Scientific Micro-Computer	1	Piece
Copy Machine	1	Pieco
Printing Machine	1	Set
Typewriter	1	Piece

8) General Purpose Equipment

4 WD Car	2	Sets
Motor Cycle	2	Sets
Motor Boat	1	Set

(b) Provincial Laboratories (5 Places)

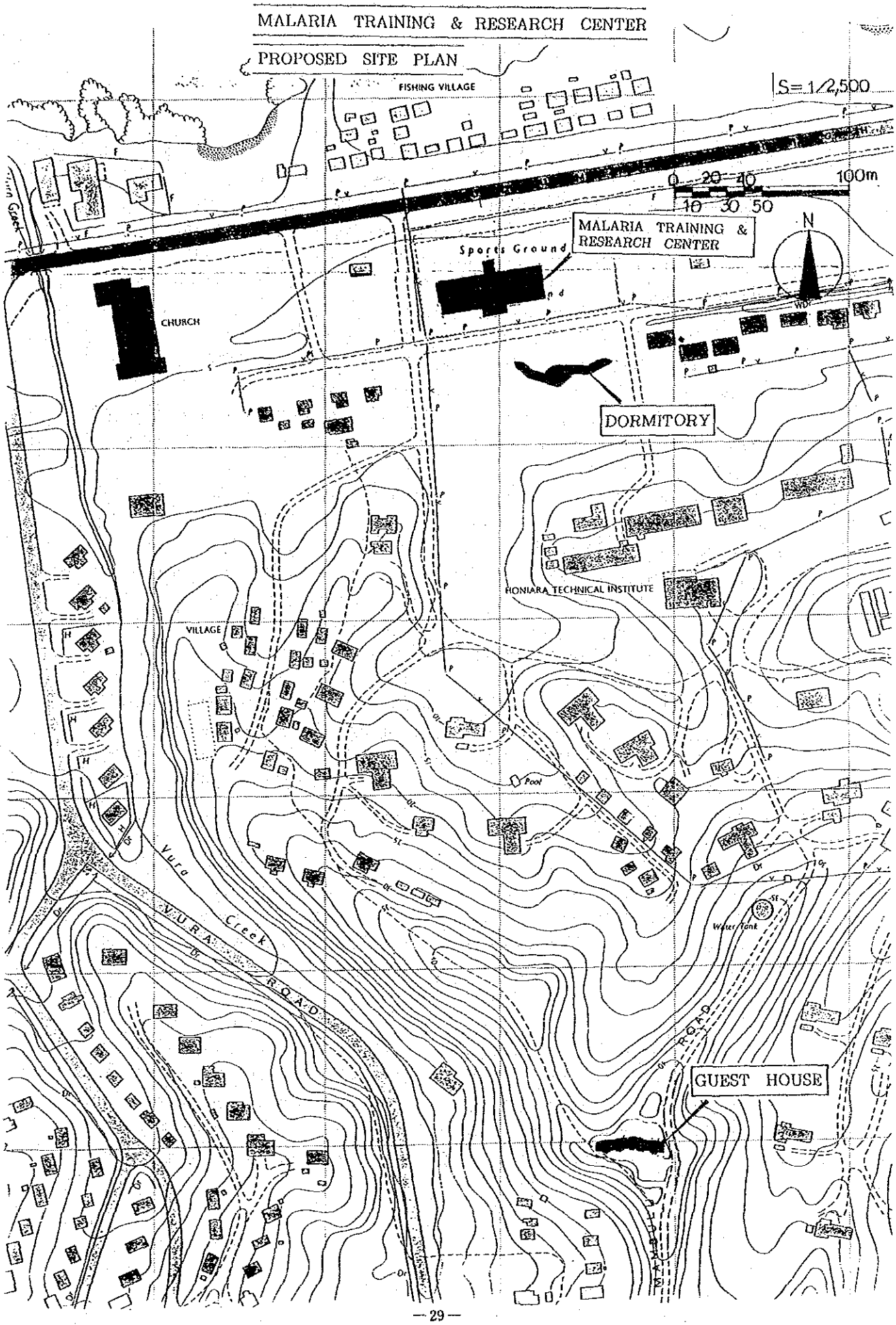
Solar-Cell System	5	Sets
Microscope	5	Sets
Dyeing Set	5	Sets
Portable Generator	5	Pieces
Laboratory Equipment	5	Sets

(c) Peripheral Laboratories (44 Places)

Solar-Cell System	44	Sets
Microscope	44	Sets
Laboratory Equipment	44	Sets

(d) Spray Equipment and Insecticide

Spray	20	Sets
Protection Wear	200	Sets
Insecticide (Fenitrothion)	40	t


MALARIA TRAINING & RESEARCH CENTER
PROPOSED SITE PLAN
S=1/2,500
0 20 40 100m
10 30 50
FISHING VILLAGE
MALARIA TRAINING & RESEARCH CENTER
Sports Ground
CHURCH
DORMITORY
HONIARA TECHNICAL INSTITUTE
VILLAGE
Pool
Water Tank
Vura Creek
VURA ROAD
GUEST HOUSE
N

3-3-3 Present Conditions of Project Site

(1) Location and Owner

The project site is located in the Kukum Campus of College of Higher Education, approximately 4km east from the center of Honiala City. The site consists of three parts, one for the Center, the second for the Dormitory and the last for the Guest House.

(a) The site for the Center : The land of the site is flat and along Kukum Highway. The ground area is approximately 7,200㎡ and used as sports ground. The site is so nicely situated that the Building of the Center faces on Kukum Highway connecting Honiara International Airport to Honiara City.
The owner is the Government of Solomon Islands.

(b) The site for the Dormitory : The Site is located southward of the site for the Center and separated by a road. The ground area is approximately 10,500㎡ . The land shapes is L form, a wing of which is a low land and humid.
The owner is College of Higher Education.

(c) The site for the Guest House : The site is detached from the former two sites and located in the housing zone for the senior staff of the College. The site is situated on the top of a hill; the height above Mean Sea Level is appoximately 43m and the views from which on the sea northward and on the mountains southward are worthy.
The owner is College of Higher Education.

(2) Site Preparation

No substantial work for site preparation deems necessary except for the leveling work on the land for the Guest House to acquire enough flat land for accommodating the Guest House.

(3) Infrastructure

(a) Water Supply

There is a water main of 9 inches running along Kukum Highway on the northern side of the site for the Center. It's water pressure is 3kg/cm² and quality is good by data. A water tank situated near the site for the Guest House at the height of 35m above Mean Sea Level from which the water to the Guest House should be supplied.

(b) Drainage

There is a public sewage line running along Kukum Highway to which the waste and sewage water for the Center and the Dormitory should be discharged. A septic tank and underground soakway for the Guest House should be provided.

(c) Power Supply

33kv high-tension cable is strung along Kukum Highway and the power is supplied in 415v(3phases) to each site.

(d) Gas Supply

There is no city-gas system. LP gas is available in Honiara.

(e) Telephone Service

Trunk line of the Telephone Authority is laid under Kukum Highway.

(4) Climate

The Climate in Solomon Islands is equatorial, thus warm and humid. It is, however, moderated by the south-east trade winds from April to November and the north-west trade winds from November to April.
The average coastal daytime temperature is 28℃ and at night this may be reduced to an average of 22℃.
Humidity ranges from 60% to 90%.
April to November tends to be the driest season and November to April the wettest. Average rainfall is approximately 3,500mm per year.

(5) Earthquake

Solomon Islands are on the Circum-Pacific Earthquake Belt. According to the Report No.81/14 issued by Ministry of Lands, Energy and Natural Resources in 1981, the situation of earthquakes which have occured in the Region Guadalcanal is as follows;
The number of earthquakes with magnitude 5.5 or more, which are potentially risky, during the period from 1960 to 1980 is 34; 16 were felt in Honiala city, 2 of which have caused minor damages.
Most of the seismic activities are seen in the region of the south coast and far off the south coast of Guadalcanal. No earthquake with the epicenter in the north coast of the island has been reported.
The case more violent than magnitude 8.0 has not been recorded since 1934.

3-3-4 Technical Assistance of the Government of Japan

The Government of Solomon Islands has been endeavouring to control Malaria since 1960 with technical assistance of WHO. But Malaria is still the biggest public health problem in 1985. The Government of Solomon Islands points out the reasons why malaria control activity is not successful despite the great efforts of the Government and WHO, of which the major ones are as follows;

* Lack of researches for malaria vectors and malaria parasites.
* Insufficiency of training for malaria staff.

The technical assistance of Japan could contribute to eliminating those problems which hinder the Government of Solomon Islands from controling Malaria.

It would be recommended that the following assistances be extended by the Government of Japan to the Government of Solomon Islands:

(1) Dispatch of malaria specialists focusing on the researches for malaria and malaria vectors.

(2) Training malaria staff in Japan or in third countries.

Chapter 4 BASIC DESIGN

Chapter 4 BASIC DESIGN

4-1 Design Principles

4-1-1 Facilities

In regard to the basic design for the construction of the Center, one should keep the following items in mind to accomplish the purpose of this project as efficiently and effectively as possible.

(1) As a center for malaria control, sections for training and research should be planned so as to fulfill their functions effectively in one united body without interfering one another.
(2) The design should be made to allow expanison and remodeling in future according to the advances in malaria control and progress in medical techniques.
(3) Taking into account the technical and economic surroundings of the project, less maintenance and low running cost will be projected.
(4) The design should be suitable for the climate, as well as the natural and geographical features of the site.
(5) Safety and hygiene should be considered for the people using the facilities.
(6) The facilities are designed in accordance with Solomon Islands building code. When no Solomon Islands code is available, New Zealand Standard (NZS), Australian Standard (AS), Japanese Architectural Standard Specification (JASS), Japan Industrial Standard (JIS), etc. will be applied according to the guidance of the authorities concerned Solomon Islands.

4-1-2 Equipment

The Survey Team carries out basic design of the equipment taking into consideration the background, situation, object and the function of the Project which aims at contributing to improving the Anti Malaria Program in Solomon Islands.
Major principles for the basic design of the equipment are as mentioned below.

(1) To design the training equipment for the education of AMP staffs or cooperators to facilitate the AMP.
(2) To design the research equipment and materials necessary for basic research and analysis of parasitology and entomology, and for taking most effective steps to cope with AMP.
(3) To design the laboratory equipment for 5 Provincial Laboratories and 44 Peripheral Laboratories and support the completion of AMP.
(4) To design all equipment under the consideration of easy maintenance and provision of enough spare parts for five years and consumables for three months operations.

4-2 Basic Design

4-2-1 Site Plan

(1) Malaria Training and Research Center

The approach to the site should be from the road located at western side of the site. The building of the Center is located on the south-west corner of the ground with the following reasons.

(a) To locate the building close to the approach point to the site.
(b) To provide a marginal land in the easten part of the ground for possible future development.
(c) To provide a marginal land in the northen part of the ground for possible future upgrading of Kukum Highway.

(2) Dormitory

The approach to the site should be from the road at the northen side which separate the site from that for the Center. The building of the Dormitory is located on the eastern wing of the land with the following reasons.

(a) Not to place the building on the low and humid land which consists the western wing of the land.
(b) To locate the building eastward from the building of the Center in view ensuring the view on the sea.

(3) Guest House

The building is so placed that the longitudinal axis is laid on east-west direction with the following reasons.

(a) To ensure the views on the sea and the mountains from the windows.
(b) To prevent low sunshine from west and east from penetrating in rooms.

4-2-2 Facilities

(1) Floor Area Requirement of Principal Rooms

(a) The Center

The main activities performed in the Center are as follows;

1) Training for malaria control
2) Test of blood slides for HTC and verification test
3) Physiological research of malaria parasite
4) Ecological and physiological research of vector mosquitoes
5) Survey and research concerning extermination of vector *mosquitoes and their larva*
6) Administration and data processing of the activities of AMP

The floor area of each room must be determined based on the numbers of equipment and working tables and chairs for staff to be accommodated.
The data of the Japanese standard design for the research facilities, the results of the interviews of the expected users and the survey of the existing laboratories served very important references.
The followings show the process and the results of determination of the floor area. When the total area determined of the research section is compared with statistics that show the relation between the number of staff and the floor area in Japanese research facilities, it is close to the average value and demonstrates the adequacy of the scale of this plan as a whole.(Appendix 2-1)

Total Floor Area	Floor Area of Research Rooms	Floor Area of Training Rooms	Total Floor Area of Research Section (room area+ area for common use)
1,643㎡	466㎡	342㎡	948㎡

1) Training

The following courses are presently carried out or are planned to be carried out in the near future, using this laboratory.

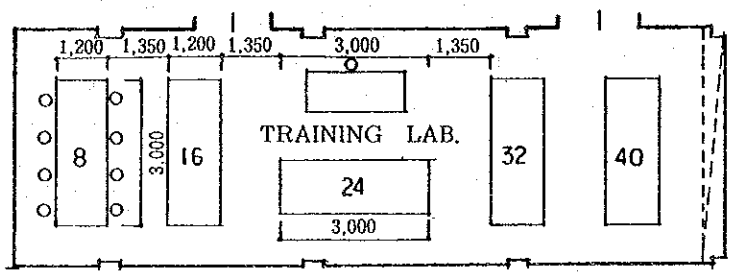
	Duration of one course (weeks)
Training of microscopist	6
Training of entomological technicians	6-12
Field staff training (Advanced)	8-12
Field staff training (Middle)	2-4
Training of doctors for malaria	2-4
Training of nurses for malaria	2-4
Training of microscopist aids	6
Total:	42-56

Number of Trainees per course:	20 on average (min. of 10, max. of 25)
Number of courses held concurrently: (presumed)	2-3

At present, WHO is performing malaria training in PNG for the staff for *malaria control in PNG, the Solomon Islands and Vanuatu.*
This program is planned to be closed at the end of this year or in the next year. In that case, there is a possiblity of transferring that program to the Center.

a. Training Laboratory

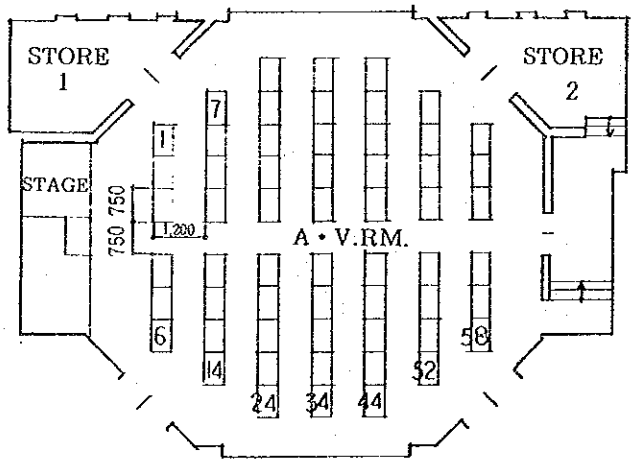
Supposing that training for two courses can be conducted (each consisting of 20 trainees). The request specifies that the laboratory should have a capacity for accommodating 40 trainees. The request is conceded appropriate.
According to the standard design, 5 laboratory tables (for 8 trainees each) are arranged and a laboratory table for an instructor is positioned in the center.
The layout is as follows;



85.3㎡

b. A. V. Room

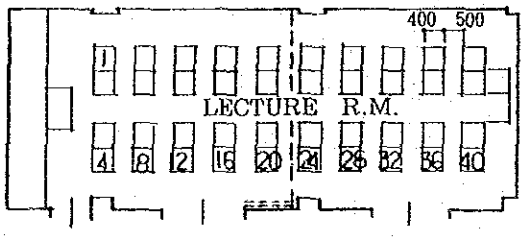
Besides being used as a lecture room, this room is also planned to be used as the hall for a joint conference. As the number of trainees taking the courses simultaneously is anticipated 40-60, the number of the fixed desks, about 60, is thought reasonable. The desks are arranged at 120cm intervals.
The layout is as follows;



99.6㎡

c. Lecture Room

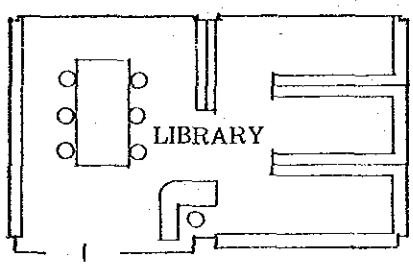
This room is adequate for joint lecture of 2 courses and, providing a movable partition at center of the room, it can also be used for separate 2 courses simultaneously.



50.9 ㎡

d. Library

A half of the room is for stack section, capacity of 3,600 books, another is for reading room section with 6 seats for readers.



48.6 ㎡

ii) Research

a. Parasitology Laboratory (PL)

Examination of blood slides coming from HTC and the verification test are planned to be carried out at the PL.
The verification test refers to the re-examination of 100% of the positive cases and 10% of the negative cases which are examined at provincial labs and peripheral labs in whole country.
From the annual reports 1985, the presumed total number of slides to be examined is calculated and the number of microscopes is necessary estimated as follows;

	Whole Country	HTC
Presumed number of total samples	250,000/yr	50,000/yr
SPR	22%	22%
Total number of positive cases	55,000/yr	11,000/yr
Total number of negative cases	195,000/yr	39,000/yr

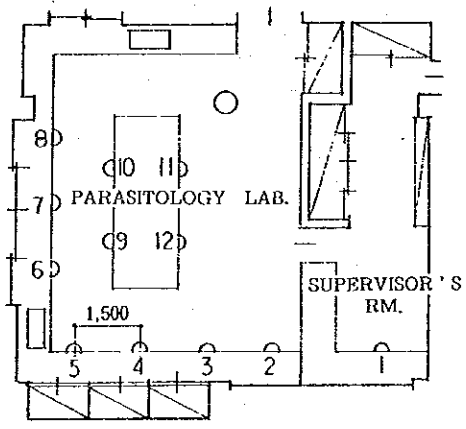
Presumed number of slides to be examined at the Center per year:
Total number of slides from HTC + (Total number of positive cases in the country − Number of HTC positive cases) + 1/10 (Total number of negative cases in the country − Number of HTC negative cases) = 50,000 + (55,000−11,000) + 1/10 (195,000−39,000) = 109,000

Therefore, supposing the three cases, the numbers of slides per one microscope will be calculated as follows:

case	number of slides per microscope
Examination with the present 8 microscopes	13,700/yr (2.19 times current values)
Examination with 12 microscopes	9,130/yr (1.46 times current values)
Examination with 16 microscopes	6,812/yr (1.09 times current values)

The number of the slides per day will be 54.8, 36.5 and 27.2, respectively. Although all those cases are realistic considering the capacity of average inspectors , 12 microscopes are thought to be adequate under the actual circumstances.

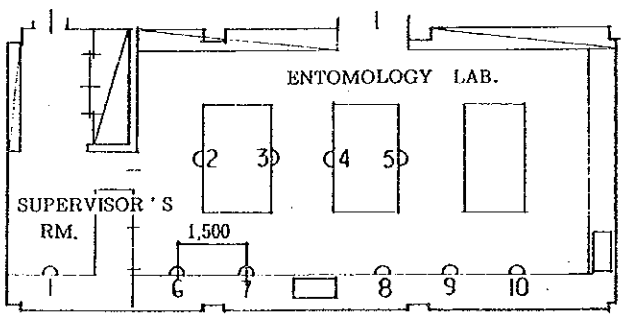
In the existing PL, the microscopists examine blood slides lined up on a table. The same method is expected to be used in this plan. When the estimated number of microscopes as mentioned above are arranged at 1.5m intervals according to the standard design of the research facility (Appendix 2-2), the layout of PL will be as follows:



5 6 . 7 ㎡

b. Entomology Laboratory (EL)

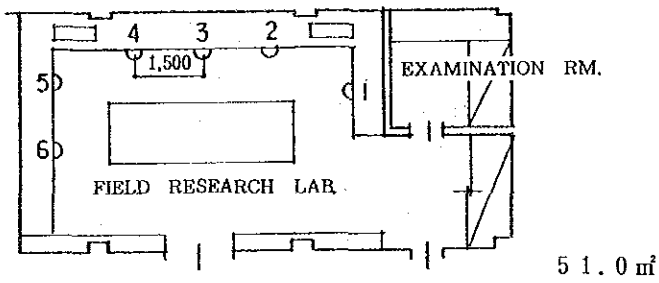
Ten staffs are estimated to work in the EL. In the request, the EL was allocated larger space than the PL., in spite of fewer workers. The EL needs extra space for breed mosquito larva, for the insecticide test as well as for unfolding equipment for insect collection. Therefore, reserving the room for the extra space, the layout of the EL will be as follows:



6 8 . 0 ㎡

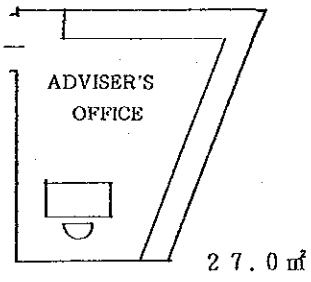
c. Field Research Laboratory

The principal activities which are expected to be performed in this room are a follows;
Pilot studies on the effective usage of insecticides, development of new and effective methods for the control of mosquito larvae, comparative studies in the methods of mass drug administration, basic studies in the biology of the vector mosquitoes and so on. Three specialists and three counterparts are expected to use the room. A small examination room is provided as an attached room. The layout will be as follows;

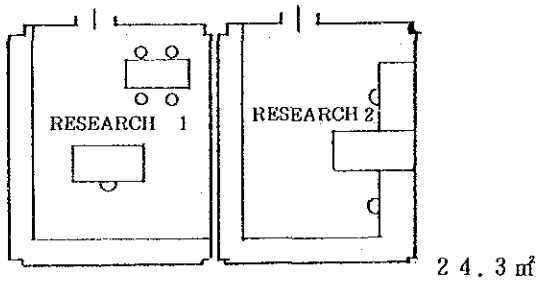


d. Private Laboratory

In accordance with requests from expected users as well as a survey of existing facilities, we designed rooms almost same in size as the ones in the request.



DRAFT REQUEST

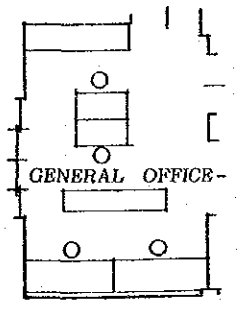


BASIC DESIGN

ⅲ) Administration

a. General Office

This room is for the use of 2 clerks and 2 training staff. The clerks are seated reception and corridor side, and the seats on the window side will be for training staff. The layout is as follows;



28.4㎡

(b) Dormitory

On the basis of the standard floor area commonly used in Japan, its scale was calculated as follows.

Bedroom/Living room (capacity for 2 persons)	13.6㎡	13.6 ÷2= 6.8㎡/ person
Storage space	22.3㎡	22.3÷40= 0.56㎡/person
Bathroom, washstand+ washroom+ laundry	66.3㎡	66.3÷40= 1.66㎡/person
Dining Room, Kitchen,	63.6㎡	63.6÷40= 1.59㎡/person
Lounge	21.4㎡	21.4÷20= 1.07㎡/person
Building manager's office	28.3㎡	28.3÷40= 0.71㎡/person
Total	683.0㎡	683.0÷40= 17.08㎡

(c) Guest House

With reference to a standard house of the Solomon Islands Government, we adopted a two-bedroom type house which has the entrance in the living room. The area for one house, 77㎡, is thought to be of the proper size for the floor area in comparison with several standards of Japanese public corporations (refer to Appendix 2-2-3).

Floor area of the facilities

On the basis of the before-mentioned caluculation of the scale, the floor area for each room is summarized as follows ;

a) The Center

Section	Room	Floor Area(㎡)	Remarks
Training	A. V. Rm.	116.6	include the stores
	Library	48.6	
	Training Lab.	85.3	
	Lecture Rm.	50.9	
	Lecturer's Rm.	40.5	2 rooms
Research	Parasitology Lab.	77.0	include Supervisor's Rm.
	Refrigerator	12.2	
	Freezer	3.2	
	Preparetion Rm.	13.0	
	Entomology Lab.	85.1	include Supervisor's Rm.
	Field Research Rm.	58.3	include Consultation Rm.
	Insectary Rm.	21.9	
	Aquarium	49.4	
	Preparation Rm.	12.2	include Aquarium
	Field Research Rm.	36.5	
	Researcher 1,2 Rm.		
	Entomologist Rm.	97.2	4 rooms
	Parasitologist Rm.		
Administration	General Office	28.4	
	Director's Rm.	28.4	
	Adviser's Rm.	28.4	
	Staff Meeting Rm.	36.5	
	Computer Rm.	12.2	
	Duplicator Rm.	9.7	
	Store	55.5	4 stores
Others	Cleaner's Rm.	9.7	
	Pantry	10.1	
	Toilet	63.9	
	Corridor Stair Case Hall	552.7	
Total Floor Area		1,643.4	

b) Dormitory

Section	Room	Floor Area	Remarks
Residence	Bed Rm.	283.8	Bed Rm. for 2 people (20 rooms)
	Toilet, Shower Rm.	38.9	2 rooms
	Laundry	27.4	2 rooms
Public	Dining Rm.	49.9	
	Kitchen	13.7	
	Lounge	21.4	
	Corridor, Stair Cases	197.9	
Administration	Office	6.9	
	Administration's Rm.	21.4	
	Store	22.3	3 rooms
Total Floor Area		683.6	

c) Guest House

Section	Room	Floor Area(㎡)	Remarks
	Residence for two people	385.0	5 residences
	Terrace, Veranda	68.3	for 5 residences

(2) Floor Plan

(a) The Center

Three draft plans were drawn up by the survey team and discussed between the officials concerned of AMP and the members of the survey team.
Based on the issues of the discussions, the plan proposed here was elaborated. The administrative offices are located by the entrance on the first floor for the convenience of the staff. Audio-visual room which may be open to public is just in front of the entrance hall for preventing disturbance in Research section and Training section caused by the moving of the public.

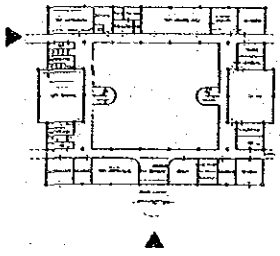
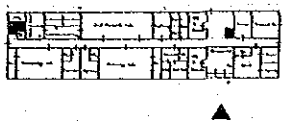
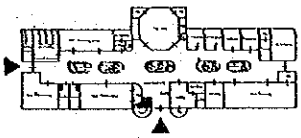
The concept of overall zoning consists of placing research section on the left wing , and the administration on the right wing of the first floor, and placing private laboratories on the left wing and the training section on the right wing of the second floor. Since stairways will be located on both the left and right wings, the former stairway will be used by researchers and the latter by trainees, and thus the movements of the people using each section are clearly separated. The entire structure will then be effectively functional.

(b) Dormitory

The existing dormitory of the College of Higher Education in the Solomon Islands, was referred to for designing the Dormitory. Each room will accommodate 2 persons instead of 4, because most of the trainees staying here are supposed as not only youngsters but also adults. For security, the second floor is used by women and the building manager's office is located at the foot of stairs leading to the second floor. As the length of corridors is close to 60m which may cause an odd feeling on the people walking along, the corridors are curved to stop their single view and make cozy spaces.

(c) Guest House

Because there is a great variation in life style, a two-bedroom type standard house of the Government of Solomon Islands is referred to for the design of the Guest House. The House projected is composed of 5 dwellings in a form of a terrace house having two stories.

		A		B		C	
Plan Type		Atrium Type		Middle Corridor Type		Middle Corridor With light Well Type	
Plan(G.F.)							
MATRIX	Zoning	It is difficult to obtain such zoning as each section, research and training, does not interfer each other.	×	Facing on the middle corridor that branches away, each section is segmented into a space.	○	Though the sight of the whole building can be obtained through wellholes, the traffic line branches away and is easily segmented.	△
	Staff Traffic Line	It has a long traffic line and is affected by a rainstorm.	×	Though the traffic line is short, it has high density and crossover because of the doors lining both sides.	○	By making bridges in the wellhole sections, the traffic line can be shortened closer to that of the middle corridor type and crossing of the traffic line is prevented at the same time.	○
	Ventilation	It has excellent ventilation.	○	The ventilation is fairly difficult.	×	Through keeping ventilation in the wellhole, it can obtaine fairly excellent ventilation from the draft of the heated air.	△
	Natural Lighting	The sunlight from both sides provides sufficient natural lighting.	△	It is necessary to have a device, such as large, high windows or louvers to reflect the sunlight because each room has natural lighting only from one side. In any case,the corridor needs artificial lighting.	△	The same as scheme B for each room. However the corridor can get sufficiently lighted from roofwindows.	○
	Environment	Removal of existing green could be increased due to a large construction area.	×	The removal of green can be minimized due to the compact shape.	○	It has a compact shape close to scheme B.	△
	Internal Space	It can make a favorable space inside including an inner court.	○	It is easy to keep clean as it is shut in.	△	By installation of wellholes and plant boxes, a comfortable inner space can be created.	○
	Building Cost	It has a large total floor area and a large external wall area due to a long corridor. The building cost is high because of them.	×	Building cost is held down because it has a shorten corridor and a minimum external wall in proportion to the floor area.	○	The corridor area is just slightly smaller than that of scheme A. But its external wall area is closer to that of scheme B and it has middle cost between the above two schemes.	△
Evaluation		△		○		○	

Table－4

(3) Elevation

The facilities will function not only as a center of malaria control having influence on all over the Solomon Islands but also as a center of training and research in malaria of its neighbouring oceanic countries.
Therefore, the building of the Center should be designed as suitable to local climate and its modern and international characteristic.

Also, careful considerations are needed for the design of the dormitory and the guest house. Because the trainees, guest instructors and guest researchers will live under strain away from their families, it is necessary for the residents to experience a smooth psychological transition between their public and private life. In other words, it is important to create an environment where they can carry on their lives in relaxation.
Therefore, the buildings will be so designed as to give a cozy and pleasant impression.
The ridge of the dormitory is curved, the guest houses are lined side by side, the color scheme must be carefully elaborated and so on.

The climate is hot throughout the year. The direct sunlight is unwelcome in buildings.
The deep eaves will be adopted for the facilities.

(4) Section

Usually, the ceiling height of a laboratory is set higher than 2.7m to allow installation of tall equipment. Though there is no plan to install tall equipment at present, the floor height was decided at 3.6m to provide a ceiling height of 2.8m for future needs.

In many traditional buildings in the country, the high-floor style is adopted to prevent moisture from the earth. It is also convenient in the laboratory to have a space under the floor as piping space for easy maintenance and reconstruction. The height of the first floor will be 1.5m with 75cm of clearance under the footing beam. It is also advantageous for minimizing damage from floods or high tides.

Air-conditioners will be installed in Parasitology Lab., Entomology Lab., Field Research Lab., Computer Room, Audio Visual Room and in consideration of the necessity and reducing running cost.
Other rooms should be planned to have natural ventilation instead of air-conditioning.

Louver windows are adapted not only to the opening of exterior walls of rooms but also to that of partition walls on corridor side to ensure maximum ventilation through the rooms.
The building of the Center has a central corridor system and the floor of corridor on first floor has openings, as shown on the drawing. This devise, with the openings on the roof of the corridor, is for improving the ventilation by air draft.

(5) Principal Finishing Scheme

By studying finishing material for the facilities, special attention must be paied to rust prevention because the site has more than 3,000mm of annual rainfall and is located close to the sea. The external steel plates will be coated with fluororesins and the building will have a high-class elastic spray tile finish which is water-proofing, applied to prevent the reinforcement form rusting due to leakage from cracks in the external wall or neutralization which starts from the concrete surface.
Furthermore, super-weatherproofing fluororesin coating will be applied to prevent deterioration of elasticity. As a result, the unit cost of the external finish increased two to three times more than a conventional finish. It is, however, thought to be an adequate measure considering the severe climatic conditions and difficulties in maintenance in the country. The outer wall of the building will be finished in a color which does not show dirt, and the louver will be in a light color to take indirect sunlight in.

The interior finishing materials and workmanships must be chosen considering those which are common in the country in view of facilitating the maintenance of the building and the procurement of spare parts.
The floor will be finished mainly with vinyl tiles.
The wall will be coated with plaster and finished with paint. If there is a demand for a soft appearance according to the usage, paneling will be applied with local materials as an accent.

(6) Structural Scheme

(a)Frame Types

The Project consists of

- The Malaria Training and Research Center (two-storied)
- Dormitory (two-storied),
- The Guest House (two-storied), and
- Other Facilities (warehouse,etc.)

Frame type of each of these buildings shall be as follows in consideration of the purposes and constructional conditions of each building and local conditions:

1) The Training and Research Center

The main structure of the Training and Research Center shall be reinforced concrete.

Since a considerable number of partition walls shall be built for the purposes of this building, walls framed by girders and columns shall be reinforced concrete and used as shearing walls, which bear part of horizontal forces.

The roof truss shall be in wood, and its structural calculations shall be made by giving consideration to its dead loads and wind loads.

2) Dormitory and the Guest House

For the purposes of these buildings, box frame type reinforced concrete structure shall be employed, and walls shall be considered as shearing walls.

The main structure of these buildings shall be box frame type reinforced concrete structure, with the roof truss in wood.

3) Other Facilities

The frame type of the main structure of each facility shall be determined in accordance with the purposes and scales of respective facilities.

(b) Standard Codes of Design

In Solomon Islands, the Building Standard Law is now under preparation, and no standard for structural design has been established except for those regarding earthquake. For the structural design of the Project, therefore, Standards used in Japan and Australia shall be complied with provided that, with regard to earthquake, New Zealand Standard (NZS) shall be employed.

(c) Design Loads

1) Dead Loads

Dead loads shall be determined in accordance with requirements of each building, including weights of members.

2) Live Loads

In consideration of the purposes and requirements of each building, live loads thereof shall be those shown in the following table:

Roofs	0.25 kn/m²	25 kg/m²
Laboratories	3.0	300
Classrooms	3.0	300
Offices	3.0	300
Dormitories	1.5	150
Corridors, Balconies	3.0	300

3) Seismic Force

In compliance with NEZ 4203, seismic force shall be determined using the following formula:

$$V = Cd \cdot Wt$$

Where, V = Total horizontal forces at the time of earthquake.
Wt = Total weights of buildings.
Cd = (seismic design coefficient) C. I. S. M. R.
in which c=0.15, a factor determined from fig. 3 (NZS p.45) and the specific period of building (Guadalcanal belongs to Zone A), I means importance factor, S structural type factor, M structural material factor and R risk factor.
Hence, Cd = 0.15 x 1.3 x 0.8 x 1.0 x 1.0 = 0.156

4) Wind Loads

Design wind loads shall be determined using the following formula:

$$p = g \cdot c \cdot A$$

Where, g (velocity pressure) = $60 \cdot \sqrt{h}$ (h<16m)
h = height of building above the ground level
C = wind pressure factor
A = area upon which wind pressure acts
P = structural wind loads

5) Allowable Bearing capacity

According to the Geological Map of Guadalcanal, the surface of the ground of the site is thin Nagalimbiu Alluvium, which is underlaid and supported by the Honiara Reef Limestone. According to the Ministry of Transportation and Public Works of Solomon Islands and local construction companies, the supporting stratum around Honiara lies rather shallowly underwater and a considerably high level of allowable bearing capacity can be expected.

Cone penetrometer investigation carried out at three locations in each of the sites for the Malaria Training and Research Center and the Dormitory has revealed that their allowable bearing capacity exceeds 10t/㎡ in general. The investigation, however, has also showed that the allowable bearing capacity of some part of the site for the Dormitory at GL-1.5m is approximately 5t/㎡ . Therefore, with regard to this part, it is required to confirm the supporting layer and to execute improvement work prior to the commencement of the work. A method to replace the soil of the part with good quality soil or to reinforce it with plain concrete will be suitable.

Hence, the allowable bearing capacity of the site as a whole shall be 10t/㎡ . Load test shall be conducted prior to the commencement of the work to confirm the allowable bearing capacity of the site.

Foundation systems shall be independent footing or continuous footing.

Guest House to be located on the hill is expected to have good quality soil, and therefore the allowable bearing capacity shall be set at 10t/㎡ and *continuous footing shall be used.*

(d) Materials

Imported materials shall be used to construct structures with the exception of concrete aggregate and concrete blocks.

1) Cement

AS1315 and JIS R5210, Ordinary Portland Cement.

2) Reinforcing Bars

Round bars:JIS G3112, SR24 and AS1302 Grade 230. Deformed bars: JIS G3112, SD30, SD35 and AS1302 Gade 410.

3) Concrete

For the main structures of the buildings, Concrete of Grade 20 (its compressive strength on the 28th day is 200 kg/cm²) shall be used by giving it a relative stiff consistency (slump is approximately 15).

(7) Mechanical and Electrical Systems

(a)Water Supply System

The amount of water to be used by the Malaria Training & Research Center has been calculated as follows.

Trainees	40 persons x 80 ltr/day	=	3,200 ltr/day
Researchers	26 persons x 80 ltr/day	=	2,080 ltr/day
Lecturers	2 persons x 80 ltr/day	=	160 ltr/day
Workers	4 persons x 80 ltr/day	=	320 ltr/day
Labs classrooms	4 rooms x 250 ltr/day	=	1,000 ltr/day
Aquarium		=	1,000 ltr/day
	Total	=	7,760 ltr/day

The amount of water to be used by the Dormitory and Guest House has been calculated as follows.

Trainees	40 persons x 100 ltr/day	=	4,000 ltr/day
Supervisor	1 person x 100 ltr/day	=	100 ltr/day
Researchers	20 persons x 150 ltr/day	=	3,000 ltr/day
	Total		7,100 ltr/day

The water supply facilities in the city of Honiara were constructed as part of the water service built with aid from the World Health Organization. Water is taken from the river, pumped to a high elevation by lift pumps, and supplied to the city by a gravity system.
Public water supply main pipe has been laid along the Kukum Highway. Water supply for the Malaria Training & Research Center and Dormitory will be led from branch pipes which tapped the public water supply main pipe by a direct supply system.
Water supply for the Guest House will be supplied from existing water tank near the premises. Lift pump facility should be provided for pumping up from the water tank to water storage tank in the Guest House.

(b)Hot Water Supply System

Electricity, gas and solar heat are the possible alternatives as the heat source for the hot water, but after giving consideration to the climatic condition in the Solomon Islands, the running costs and the facilities available in Honiara, it has been decided to use solar heat. The solar panels and storage tank will be of a single unit installed on the roof, the same type that is widely seen in the city.

Solar-heat hot water equipment will be provided for the shower facilities in the Malaria Training & Research Center and the Guest House.

The pantry of the Malaria Training & Research Center will be provided with a small (10 ltr capacity) electric water heater to supply hot water for tea and coffee. Copper pipes will be used for the entire hot water system.

(c)Drainage System

The waste and sewage water for the Malaria Training & Research Center and Dormitory shall be discharged to the public sewerage line. A septic tank and underground soakway will be provided for the Guest House. The septic tank and the underground soakway shall be built in conformity with the standards of the Ministry of Transport, Works & Utilities, Solomon Islands.

(d)L. P. Gas System

Because there is no city gas system in the city, the kitchen facilities in the Guest House and Dormitory will use L. P. gas.

(e)Kitchen System

The kitchen/dining room in the dormitory will be provided with cold and hot water facilities, a drainage system, a ventilation system and other kitchen equipment with sufficient functions to provide meals for the trainees.

L. P. gas will be used as the heat source for the kitchen equipment, and all equipment which uses fire will be provided with its own, independent hood so that the exhaust can be released outside. A grease trap will be provided at the end of the drainage pit to separate the oil and grease from the waste water before sending the waste water to the public sewerage.

(f)Plumbing Fixtures

Each building will be provided with water closets, wash basins, sinks, showers and other plumbing fixtures in accordance with the building plans.

(g)Fire Fighting System

Hose reels will be provided in accordance with Australian standards to serve as the fire fighting system.

(h)Air Conditioning and Ventilation System

According to climatic data collected over the past five years, the temperature in Honiara vary in a narrow range between a high of 30-31℃ and a low of 21-24℃. Since the maximum temperature is not particularly high, natural ventilation will be used as far as possible. In order to reduce running cost, living quarters will be provided with the same kind of ceiling fans commonly used in Honiara.

Regarding air conditioning facilities, three laboratories (not inlcuding the training laboratory), the computer room and the A. V. room will be provided with a split-type air conditioner or a packaged air conditioner. The dining room and office in the dormitory will be provided with ceiling fans.

(i)Power Supply System

The S. I. E. A.(Solomon Islands Electricity Authority) will install a new transformer for these buildings, if necessary.

A watt-hour meter will be installed on each building by the S. I. E. A., which will also provide the wiring from the transformer to the watt-hour meters.

The supply voltage will be either three-phase, four-wire 415 V-240V or single-phase two-wire 240V.

(j)Lighting and Socket Outlet System

The number and types of lights, their positioning and the switches will vary in each room out of consideration for convenience and ease of use so that the activity intended for each room can be carried out efficiently and comfortably. The lighting plan for the main room is as follows.

Laboratories5	150-200 LX
Lecture rooms	150-200 LX
Offices, research rooms	150-200 LX
A. V.room	150-200 LX
Stores	50 LX
Halls, lobby	50 LX

To ensure that sufficient natural lighting is let in, architectural considerations will be incorporated in each room.

The main type of lighting equipment to be used will be fluorescent lamps, though incandescent lamp will be used in some places. The fluorescent lamps will not have covers, but the equipment will be installed in architecturally designed hollows. (The lighting equipment in the present Malaria Research Center is provided with covers, but the covers have been damaged on more than half of the equipment and have not been replaced.)

Ordinary outlet sockets will be used, though specified sockets will be installed for the laboratory equipment and air conditioners.

(k)Telephone System

The intake point at the boundary will be installed by the telephone authority. The office of the Malaria Training & Research Center will be provided with telephone exchange consisting of about 20 circuits.
Conduits will be provided so that a telephone set can be installed in the dormitory and each guest house.