MINISTRY OF EDUCATION
THE REPUBLIC OF THE FIJI ISLANDS

No.

IMPLEMENTATION REVIEW STUDY REPORT
ON
THE PROJECT FOR CONSTRUCTION
OF
INFORMATION AND COMMUNICATION
TECHNOLOGY CENTRE
AT
THE UNIVERSITY OF THE SOUTH PACIFIC

DECEMBER 2007

JAPAN INTERNATIONAL COOPERATION AGENCY

AZUSA SEKKEI CO., LTD.

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PREFACE

In response to a request from the Government of the Republic of the Fiji Islands, the Government of Japan decided to conduct an implementation review study on the Project for the Construction of the University of the South Pacific Information and Communication Technology Centre and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Republic of the Fiji Islands a study team from 23rd July to 6th August 2007.

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

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

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

December, 2007

Masafumi KUROKI
Vice-President
Japan International Cooperation Agency

December, 2007

LETTER OF TRANSMITTAL

We are pleased to submit to you the implementation review study report on the Project for Construction of Information and Communication Technology Centre at the University of the South Pacific.

This study was conducted by Azusa Sekkei Co., Ltd. under a contract to JICA, during the period from 7th July, 2007 to 14th December, 2007. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Fiji and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

Hiroyuki Koike
Project manager,
Implementation Review study team on
The Project for Construction of Information and Communication Technology Centre at the University of the South Pacific
Azusa Sekkei Co., Ltd.

SUMMARY

SUMMARY

The Republic of the Fiji Islands (hereafter referred to as 'the Fiji Islands') is an island nation comprising approximately 330 islands and belongs to Melanesia, located in the central part of the South Pacific Ocean (south latitude 15- 22 degrees, east longitude 174 degrees - west longitude 177 degrees), and serves as a base for transportation, distribution and information for the Pacific island nations. The Fiji Islands have a population of 848,000 (according to the 2004 World Bank survey), 54.3% of whom are Fijians of Fiji origin, 38.2% Fijians of Indian origin, and 7.5% of other nationalities. English is the official language, but Fijian and Hindustani are also used. Approximately 75% of the overall population lives on Viti Levu Island, and the population of the capital city of Suva is around 77,000 (1996 survey).

A coup d'état that took place in May 2000 had sharp ramifications on the economy of Fiji, and the tourism industry and clothing industry were hit hard and directly. Where the GDP growth rate had been 8% or higher in 1999, it plunged to -2.8% in 2000 (initial predictions were for -8.2%). At the same time, however, following general elections in 2001, Fiji began gradually recovering the confidence of global society as the government began to stabilize. Economic activities began to settle down as well; an economic growth rate of 4.3% was recorded in 2001, rising to 4.4% in 2002. According to the World Bank survey in 2004, actual growth rate reached 3.8%, while the GNI per capita was 2,690 US dollars. The sugar industry, which has long been a stalwart component of the Fijian economy, is facing numerous issues that need to be resolved; in addition to problems such as irresponsible factory management, shipping means and aging and deteriorating equipment, the industry is plagued by political problems such as disputes over agricultural land leases between landowners of Fiji origin and farmers of Indian origin. The industry is also struggling with large cumulative deficits and has deteriorated into a serious situation with no way out.

Another coup d'état that took place in December 2006 severely affected the economy of Fiji. The tourism industry was seriously affected because of the increase of risk level on travel carried out by major countries due to concern about security in Fiji and announcement after the coup d'état.

The Pacific region has peculiar geographic conditions, with small islands being scattered amidst huge expanses of ocean, and there is a sharp information differential ('digital divide') in the region. Also, because the communications infrastructure itself is at an early stage of development, the development of human resources is problematic, and no industries utilizing IT have yet been developed. At the 'Pacific Island Summit Meeting' held in Japan in 2002, it was acknowledged that the 'IT-Promotion Project for the Pacific' would mitigate the digital division among the island countries and would be indispensable for the development of the South Pacific Region.

The 'Strategic Development Plan by Fiji Government 2003-2005' sets forth a vision of 'Striving for a peaceful and prosperous Fiji, by rebuilding the self-confidence that will bring stability and growth'.

According to the Strategic Development Plan, a ‘peaceful and prosperous Fiji’ means ‘peace, unity, and the harmonization of a multi national state’ and ‘prosperity for all people, particularly prosperity for those living in extreme poverty’. The ‘National Information Communications Technology Development Plan 2003-2005’ sets forth a vision of Fiji becoming a central nation in powerful and dynamic Pacific Ocean information communication technology through a digitalized economy and a people with information communication capabilities, and comprises the four core programs noted below, along with a national information infrastructure. The four core programs are: e-Government (ICT Services), e-Commerce (Ministry of Commerce, Business Development and Investment), e-Personal (Ministry of Education and & Technology Structure) and ICT Industry (Fiji Investment Trade Bureau).

The 2004 White Paper Concerning the National Information Communications Technology Development Policy of the Communications and Media Bureau of the Fiji Ministry of Information states the following as its principal policy objectives.

- Freeing up latent potential and making the most effective use of ICT anywhere in the world
- Eliminating differences in the levels of living standards, education and the ‘digital divide’, thus providing better work for the people of Fiji
- Participating in global markets
- Strategic investments and connections in private enterprise with newly identified viewpoints
- Maximizing economic competitiveness and specific market opportunities

The University of the South Pacific (hereinafter referred to as ‘USP’), which is at the centre of ICT education in the Pacific region, was jointly established in 1968 by twelve island nations (Fiji, the Cook Islands, Kiribati, the Marshall Islands, Nauru, Niue, the Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Samoa) for the purpose of meeting high-level education needs in the Pacific island nations, and is the highest international educational organization in the region. Voice-based distance education using shortwave radio transmission networks is being carried out by the USP. At the beginning of 1990, the USP introduced the first e-mail system in the Pacific island nations, and in 2000, with support from JICA, completed the USPNet, a network using satellite communication that uses 64 Kbps voice and data lines and a 128 kps video line. Although the quality was somewhat rough at 10 to 15 frames per second, the network was used to implement a distance education system. In 2005 and 2006, thanks to employment of IP and communication speed development in satellite communication and data transmission faster by 25 times was realized.

In member countries other than Fiji, including Kiribati, the Solomon Islands, Tonga, Vanuatu and Samoa, a proactive relationship of cooperation with South Pacific island nations is an important basic national policy, and these countries are working to strengthen ties within the region. Like the

Government of Fiji, these countries are interested in strengthening the activities of USP, which is keenly involved in human resources education; thus, establishing the University of the South Pacific Information and Communication Technology Centre (hereafter referred to as the 'ICT Centre') and procuring equipment and materials, which are the objectives of the Project, will mitigate the information differential in the region and contribute to promoting socio-economic development.

Given this background, the USP requested grant aid from the Government of Japan through the Government of Fiji for the purpose of building the various facilities of the ICT Centre, which is aimed at education, research and training, and to procure the computer software and acoustic materials needed for the facilities.

Based on this request, in July 2003 JICA implemented a Preliminary Study, and it was confirmed that the USP is a central presence in the promotion of IT in the Oceanic region. However, because the communication infrastructure supporting the USPNet and international telephone line network (Internet) was saturated, improvement of the infrastructure was made a condition of this project. Subsequently, detailed planning was formulated for upgrading the USPNet, and the network was connected to the AARNET (Australian Academic Research Network) with cooperation from the Government of Australia, and it was confirmed that connections to international telephone lines had been improved. Therefore, JICA made the decision to implement a Basic Design Study, and a team from the Japan International Cooperation Agency (JICA) was dispatched to conduct the Basic Design Study between February 7 and March 12, 2005. In the field study, the study team discussed and confirmed factors relating to the background and content of the Project with members of the Government of Fiji, as well as compiling documents. Additionally, the study team formulated a Basic Design Study Report, based on subsequent analysis conducted in Japan and on local briefings described in the Basic Design Overview that were implemented between August 15 and September 1, 2005.

The scale initially requested by USP side included a Common Area with two lecture halls that could accommodate 1,000 people and 500 people, respectively, a Department of Computer Science, an IT Service Division, a Research and Development Department, a Department of Engineering and a Geographical Information course. However, it was decided that the scale of the Project would include a Multi-purpose Lecture Theatre that could accommodate 300 people, a Common Area, a Computer Science Department, an IT Service Division, a Research and Development Department, and a Department of Engineering.

Although the project was delayed due to various reasons, including the coup d'état in December 2006 the Japanese government decided to conduct Implementation Study, and JICA dispatched a study team from July 23 to August 6, 2007. Through the study, the study team and the Fiji government discussed the background and contents of this project in Basic Design and confirmed that there was no modification. Moreover, we further collected information. The study team conducted an analysis in Japan and

orientation of Draft of Project Implementation Study Report for local parties from October 22 to 27, completing the Project Implementation Study Report.

The Project was formulated based on the following indicators.

1) Gradation of scale and grade of assistance

Facilities were selected that were deemed necessary for the new ICT Centre from the ICT-related divisions of the existing facilities, and the facilities and contents of the Project were selected based on the following policies.

① To give priority to facilities held to be important in mitigating the information differential ('digital divide') and assisting the self-driven development of human resources.
② To give priority to laboratories where individual students would directly use and operate computers.
③ To give priority to facilities related to education, research, and development.
④ To include facilities to be used for creating and distributing digital contents related to the regional culture.
⑤ To exclude existing facilities that are presently usable.
⑥ To limit the availability of air-conditioners only to rooms where equipment and computers are provided.
⑦ To plan the building to allow easy access to the disabled because the site is situated on a slope.
⑧ To establish a grade and scale for the facility in consideration of easy operation and maintenance.

2) Basic policies for selecting the equipment

Planned equipment will be selected based on the following basic policies:

① The equipment should be assigned to facilities in this Project.
② The equipment should directly benefit the students of the USP.
③ The equipment should be coordinated with the direct contents of Centre activities.
④ Equipment with limited benefit will be eliminated.
⑤ Equipment used mostly for personal purposes will be eliminated.
⑥ Equipment used with less frequency will be eliminated.

The principal contents of the facilities are as noted below.

Building name Structure / no. of floors	Scale	Principal facility contents	Principal equipment
Building A Reinforced concrete, 4 floors	2,602 ㎡	Public areas (Centre director's office, core staff offices, visiting staff offices) IT Service Division (Help desk, server office, workshop, parts warehouse, staff offices, General Access Computer Lab, Dedicated Computer Lab) Department of Computer Science (research laboratory, instructors' offices)	Servers, personal computers, video-conferencing system
Building B Reinforced concrete, 3 floors	2,810 ㎡	Department of Computer Science (special computer laboratory, dedicated network laboratory, workshop) Department of Engineering (laboratories, computer laboratories, workshop) Research and development section Connecting bridges (bridging corridors)	Server/rack sets, personal computers, various information communications-related testing practice systems for the Department of Engineering
Multi-purpose Lecture Theatre Reinforced concrete + steel, 3 floors	1,247 ㎡	Multi-purpose Lecture Theatre Foyer	Acoustic and video systems
Total	6,659 ㎡		

Principal contents of equipment

Target field	Equipment	Usage	Quantity
Common-use equipment	LCD projector (large)	Projection of Video Source at Multi-purpose Lecture Theatre	1
	Remote-controlled TV camera	For taking an image of participants in videoconferencing	1
	Audio system for Multi-purpose Lecture Theatre	Audio system at Multi-purpose Lecture Theatre	1
	Video system for Multi-purpose Lecture Theatre	Video system at Multi-purpose Lecture Theatre	1
	Audio-visual system for video-conferencing room	AV system for video-conference room	1
	Audio-visual system for conference room	AV system for conference room	1
Department of Computer Science	Server / rack set	Practical equipment for student of computer science department	1
	Personal computers	ditto	150

IT Service Division	Servers (advanced-function type)	Data management of USPNet	6
	Servers (ordinary-function type)	ditto	14
	Tape backup system	Data backup system for server	1
	Uninterruptible power supply unit	Safety Device for server	1
	Equipment rack	For mounting of server & other related equipment	1
	Personal computers	Practical PCs for all student in USP	120
	System for USP network control room	Control system for USPNet	1
Department of Engineering	Analog communications practice system	Practical equipment for student of engineering department	1
	Antenna technology practice system	ditto	1
	Micro-wave technology practice system	ditto	1
	Digital communications practice system	ditto	1
	Server / rack set	ditto	1

If the Project is implemented through grant aid from Japan, the total cost is estimated to be 2.494 billion yen (2.288 billion yen to be borne by the Japan side and 0.206 billion yen by the Fiji side). The Project is expected to be implemented by means of A government bonds, and construction will take 18 months.

The cooperation target of the Project will be the construction of an 'ICT' Centre that will comprise a Common Area, a Department of Computer Science, an IT Service Division, a Department of Research and Development, and a Department of Engineering, as well as the refurbishment of equipment and materials. Implementing the Project will mitigate the digital divide in Fiji and the Pacific island nations as described below, and as a ripple effect, it is expected that implementation of the Project will contribute to promoting socio-economic development. The effects can be described as indicated below.

1) Direct effects

- The ICT educational environment will be improved by increasing the number of computers to be used by the growing number of new students, particularly in ICT and Accounting courses, from 402 to 688（including 446 units to be installed in the ICT Centre (285 of which are to be procured by Japan) and 242 units in the existing facilities）.
- The environment for the computers in the Department of Computer Science will be improved from the quite inadequate conditions in the wooden building which uses dangerous insulation materials for the sake of air-conditioning efficiency.

- The computer laboratories will be improved so that the number of curricula of the Department of Computer Science can be increased from 63 courses in 2006 to 88 courses per year afterwards.
- By constructing the Multi-purpose Lecture Theatre with an accommodation capacity of 300 persons, the overcrowd condition of the lecture hall which constantly has a population density more than its capacity of 242 will be relieved.
- The capacity for ICT-related training courses designed for adults will be increased from 24 hours/week to 48 hours/week.
- The reliability of the internal network environment in the university will be enhanced through improving the equipment and setting environment for the server of the IT Services Division.
- The internal communications within the University will be strengthened by improving the operational environment through facilitating the speeding-up of the USPnet.
- The R&D segment will be reinforced by developing the Department of Research and Development which can carry out joint researches and developments with external institutions.

(2) Indirect effects

- Setting up a core IT educational and research centre within the USP will encourage the Pacific Ocean island nations to fully participate in the global information society.
- Fiji and other Pacific island countries will lead the research and development in the ICT field by leveraging the Centre, and hence will be able to develop ICT potential to contribute to human resource development, education, environmental conservation, and development of society and culture in the field of media development.
- The Department of Engineering to be newly established will resolve the shortage of engineers in this field on the islands.
- The ICT educational environment will be strengthened thereby increasing the employment opportunities in the ICT-related fields.

For the reasons outlined in (1) through (5) below, the Project is considered to be an appropriate target for cooperation through grant aid from Japan.

(1) The USP was jointly established in 1969 by twelve island countries and regions (Fiji, the Cook Islands, Kiribati, the Marshall Islands, Nauru, Niue, the Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Samoa), and, as the highest international educational organization in the Pacific Region, provides benefits to Fuji and the entire Ocean region.

(2) Currently, the number of applicants in ICT-related departments at the University of the South Pacific is increasing, but because of insufficient facilities, including lecture halls and computer laboratories, the university is unable to provide satisfactory education to students. The

implementation of the Project is expected to augment the learning environment for students in ICT-related programs and to increase the number of students graduating in ICT-related fields.

(3) Following its transfer, the ICT Centre will not require particularly sophisticated technology in terms of either facilities or equipment and materials, and it will be possible to run it with the existing personnel. Moreover, judging from past budgets of the USP, sufficient operating budgets can be assured to comfortably run the facility following the transfer.

(4) Fiji has a vision of becoming a central nation in powerful and dynamic Pacific Ocean information communication technology through a digitalized economy and a people with information communication capabilities. Fiji and the South Pacific island nations regard their active cooperative relationship as an important basic national policy, and are working to strengthen the bonds within the region. Like the Government of Fiji, the South Pacific island nations are also deeply interested in strengthening the activities of the USP, which is keen to develop human resources. For this reason, building the ICT Centre and procuring equipment and materials, which are key components of the Project, will mitigate the information differential in the region and contribute to promoting socio-economic development.

(5) The Centre will be constructed on the USP campus, on land that was leased from the national government in 1968 under a 99-year lease, and thus it has been confirmed that there will be no obstacles to the Project construction. Removal of the existing buildings and site preparation will not impose an excessive burden on the USP side. Because the building will be located on the campus, no problems are foreseen in terms of infrastructure components that will present obstacles. Additionally, the Fiji Ministry of Education has been the recipient of grant aid cooperation from the Government of Japan in the past, and no particular difficulties are foreseen in implementing the project under the grant aid system of the Government of Japan.

In order to utilize the facilities built and the equipment and materials procured as a result of implementing the Project to the maximum limit, and to realize and sustain the results of the Project implementation, the following issues have been identified as those that must be addressed by the Government of Fiji and by the USP.

(1) Maintenance of the facilities and equipment

Financially, the university has a deficit on a single-year basis because of increase in internet traffic in 2006. From 2007, it will set a limit on the Internet use by a student, and employ a system in which students should pay for the Internet use if the limit is exceeded, thus maintaining expenditure and income balance. In addition to the total amount required for heating and lighting expenses, communication expenses, maintenance control and building repair expenses being

assured at approximately 10% of annual expenditures, the Department of Planning & Facilities oversees maintenance of the various facilities, with an organizational structure that involves around 70 persons in all. Thus, the management and maintenance control capability is regarded as being fully adequate.

With respect to IT equipment and materials, all IT equipment and materials are handled by the IT Service Division, and no problems are foreseen in terms of the ability to carry out management and maintenance control capability of facilities and equipment in the ICT Centre.

However, because the computer laboratory is at the core of this facility, it was found that the floor space devoted to air conditioning amounts to just under 60% of the overall facility. Taking the service life of the equipment into consideration, it is suggested that sufficient maintenance of the air-conditioning equipment will need to be carried out, and sufficient funds will need to be assured to cover the cost of electricity usage.

(2) Upgrading of the USPNet

The Basic Design Study revealed that the current system of the UPS used digital technology dating back to around 1995, so the frequency bandwidth was such that the channels for all of the USP branch schools were fixed. Consequently, the channels of countries with high demand do not provide sufficient speed and efficiency was poor. In 2005 and 2006, the USPNet was upgraded to the system using the Internet technology, thereby realizing IP-based communication through satellite and communication speed increase. The communication speed increased by 25 times compared to before. As a result, the condition for implementing this project has sufficiently prepared. To fully utilize the multimedia environment for distance education, the faster the communication speed, more benefit will be expected.

(3) Internet environment

As a result of cooperation from the Government of Australia in 2005, connections were made to the AARNET (Australian Academic Research Network) through Southern Cross Cable on March 4, 2005, and the Internet connection environment was significantly improved, from 1 Mbps to 155 Mbps.

At the same time, however, in view of future advances in Internet technology, it is hoped that the Internet connection environment will continue to be augmented and strengthened following the opening of the ICT Centre.

Contents

[Appendices]

LOCATION MAP

THE PROJECT FOR THE CONSTRUCTION OF THE UNIVERSITY OF THE SOUTH PACIFIC
INFORMATION AND COMMUNICATION TECHNOLOGY CENTRE IN THE REPUBLIC OF THE FIJI ISLANDS

LIST OF FIGURES & TABLES

ABBREVIATIONS

Abbreviation	Original Name
AARNET	Australian Academic Research Network
ACS	Australia Computer Society
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CELT	Centre for the Enhancement of Learning and Teaching
CIO	Chief Information Officer
CROP	Council of Regional Organisations of the Pacific
CS	Computer Science
DFLT	Distance and Flexible Learning and Teaching
DFLSC	Distance and Flexible Learning Support Centre
FCS	Fiji Computer Society
FEA	Fiji Electric Authority
FTIB	Fiji Investment Trade Bureau
GIS	Geographical Information Systems
HOD	Head Of Departmeny
ICT	Information and Communication Technology
IP	Internet Protocol
IT	Information Technology
ITS	Information Technology Services
ITU	International Telecommunications Union
JICA	Japan International Cooperation Agency
LAN	Local Area Network
MaCs	Department of Mathematics and Computing Science
MDF	Main Distribution Frame
MoCBDI	Ministry of Commerce, Business Development and Investment
MoE	Ministry of Education
NGO	Non Governmental Organisation
NZAID	New Zealand Agency for International Development
PALM	Pacific Leaders Meeting
PIF	Pacific Islands Forum
PhD	Doctor of Philosophy
RDI	Research, Development and incubation
SOH	School of Humanities
SOL	School of Law
SOPAC	South Pacific Applied Geosciences Commission
SPAS	School of Pure and Applied Science
SPACS	South Pacific Computer Society
SPREP	South Pacific Regional Environmental Programme
SSED	School of Social and Economic Development
UN	United Nations
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNDP	United Nations Development Programme
USP	The University of the South Pacific
USPNet	USP Network
WSIS	World Summit on the Information Society

Chapter 1　BACKGROUND OF THE PROJECT

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1 - 1　Background, circumstances and outline of the Requested Japanese Assistance

The University of the South Pacific (hereinafter referred to as 'USP'), which is at the centre of ICT education in the Pacific region, was jointly established in 1968 by twelve island nations (Fiji, the Cook Islands, Kiribati, the Marshall Islands, Nauru, Niue, the Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Samoa) for the purpose of meeting high-level education needs in the Pacific island nations, and is the highest international educational organization in the region. The USPNet, which uses satellite communication, was completed in 2000 with support from JICA, and a distance learning system is being implemented.

In member countries other than Fiji, including Kiribati, the Solomon Islands, Vanuatu and Samoa, a proactive relationship of cooperation with South Pacific island nations is an important basic national policy, and these countries are working to strengthen ties within the region. Like the Government of Fiji, these countries are interested in strengthening the activities of the USP, which is keenly involved in human resources education; thus, building the University of the South Pacific Information and Communication Technology Centre (hereafter referred to as the 'ICT Centre') and procuring equipment and materials, which are the objectives of the Project, will mitigate the information differential in the region and contribute to promoting socio-economic development.

Given this background, the USP requested grant aid from the Government of Japan through the Government of Fiji for the purpose of building the various facilities of the ICT Centre, which is aimed at education, research and training, and to procure the computers, software and acoustic materials needed for the facilities.

The USP side initially requested the ICT Centre to be composed of a common area including two lecture halls with capacity of 1,000 and 500, a Department of Computer Science, an IT Service Division, a Department of Research and Development, a Department of Engineering, and a Geographical Information course. However, as a result of discussion, the two lecture halls were decided to be replaced by a multi-purpose lecture theatre with a capacity of 300 people.

The contents of the final request are as noted below.

1. **Facilities (targeted departments)**
   - A Common Area that includes a Multi-purpose Lecture Theatre accommodating 300 people, a Department of Computer Science, an IT Services Division, a Research and Development Department, a Department of Engineering and a Geographical Information course
2. **Equipment and materials**
   - Audio-visual equipment for the Multi-purpose Lecture Theatre, stage equipment and materials for the Multi-purpose Lecture Theatre, personal computer equipment for Department of Computer Science, servers and computer equipment for the IT Services Division, information communication equipment and materials for the Department of Engineering. Equipment and materials relating to research and development, and equipment and materials relating to geographic information systems

1－2 National Conditions

(1) Climate

Fiji features a large sea area of 700,000 square kilometers and a land area of 18,300 square kilometers, which is almost the same size as the Shikoku island of Japan. The Viti Levu island (10,430 square kilometers), where the capital city of Suva is located, and Vanua Levu island (5,560 square kilometers) account for 90% of the area. In the Viti Levu island, a mountain range runs from the northeast to southwest, blocking the trade wind from the southeast. Since such a geographical reason, the southeast area of the island where Suva locates has much rain; the northwest area of the island where Nadi and the international airport locates, on the contrary, features long dry seasons.

The climate of Suva where the Lauzala campus, USP' head campus, locates is high-temperature and humid throughout the year. As November to April is the rainy season, the temperature and amount of rainfall are higher during this period than other seasons. The direction of wind is constant; the trade wind toward southeast blows throughout the year.

Fiji and its neighboring regions are an earthquake zone. Tsunami damaged Suva on March 9, 1953, but after that, no tsunami damage has been recorded.

(2) Geographical measurement and boring test

1) Geographical measurement

Geographical survey was conducted for a project area of 68,000 square kilometers. The project area is horizontally long from east to west, featuring a height difference of 18 m. The slope is constant, which is about 1/13. At the northern part of the land is a waterway

and regulating reservoir, which also have slope. The southern end is cliff.

2) Boring test

Boring tests were conducted for seven points in the project area. The ground is made of brown surface soil and hard rock with an N value of 50 around 1 m or 2 m to 10 m below the surface. The suitable foundation for the projected building is spread footing. No pile is required for the foundation.

1－3 Condition for Environment and Society

With little environmental and social impact on its surroundings due to the fact that the Project involves construction within the existing university campus, the Project is classified as “Category C” in “JICA Guidelines for Environmental and Social Considerations.”

Since the Project concerns a university, it does not fall into the subject of the mandatory environmental impact study under Environmental Management Act formulated by Ministry of Environment in Fiji. Considering that it may still receive some instructions such as internal disposal of excavated soil, it is desirable that, when submitting a construction request to Suva Municipal Office, the project submit the same layout to Ministry of Environment at the same time.

Chapter 2　CONTENTS OF THE PROJECT

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2-1 Basic Concept of the Project

2-1-1 Objectives of the Project

This Project intends to establish a central education / research institute specialized in information and communication technology in Fiji, which will enable the South Pacific region to fully participate in the global information society and lead research and development and education in the ICT field with use of this centre, thereby promoting social economic development through mitigation of the "digital divide" in Fiji and Pacific island nations and development of ICT potential in the fields of human resources development, education, environmental preservation, society and culture in the field of media.

The objectives of this Project include an improvement of the insufficient ICT education and training functions of the USP, which is providing remote island countries on the Pacific Ocean with distance education activities using the USPNet, and an attainment of human resources security in the ICT field in Fiji and other Pacific island countries by constructing a new research and development environment for the field.

2-1-2 Outline of the Project

The USP is implementing a distance and flexibility learning program with help of USPNet for the remote Pacific Island countries. Thus, assistance in the ICT area of the USP can be regarded as a great contribution to alleviate the digital divide, which is one of the objectives of the project.

The number of applicants entering USP is constantly on the rise, and ICT (Information Communication Technology) and accounting hold an especially strong appeal to incoming students.

The assistance program of this project seeks to construct an ICT Centre comprising of common spaces, including a Multi-purpose Lecture Theatre for 300 people, a Department of Computer Science as the core of the Centre, IT Services which support the ICT environment in the campus and operates the USPNet, a Department of Research and Development which is in charge of joint research and development with external organizations, and a Department of Engineering specialized in communication technologies, and to procure the equipment necessary for these facilities.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

This grant aid project was planned for the purposes of mitigating the digital divide and thereby contributing to the implementation of the National Information Communication Technology Development Plan of Fiji and other Pacific island countries, which aims at promoting socio-economic development, through construction of an ICT Centre for education and training and research and development concerning ICT, which extends for 6,659 ㎡ in the Laucala campus of the USP, and procurement of necessary equipment for the Centre. With this in mind, the following policies for planning the project have been derived, based on the request from the Fijian Government and the outcomes of the field study and discussions.

(1) Basic Policy

The USP side initially requested the ICT Centre to be composed of a common area including two lecture halls with capacity of 1,000 and 500, a Department of Computer Science, an IT Service Division, a Department of Research and Development, a Department of Engineering, and a Geographical Information course. However, as a result of discussion, it was planned that the project will cover a Multi-purpose Lecture Theatre with a capacity of 300 people, a Common Area, a Department of Computer Science, an IT Service Division, a Department of Research and Development, and a Department of Engineering.

1) Gradation of Scale and Grade of Assistance

Those facilities deemed necessary for the new ICT Centre are extracted from the ICT-related division of the existing facilities. The requested facilities and their contents are selected based on the following policies.

① To give priority to the facilities held to be important in mitigating the digital divide and assisting the self-driven development.
② To give priority to the laboratories where students actually use computers.
③ To give priority to the facilities related to education, research, and development.
④ To include the facilities for creating and distributing digital contents related to the regional culture.
⑤ To exclude the existing and usable facilities.
⑥ To limit the use of air-conditioners to rooms where equipment and computers are provided, where as teaching staff rooms and administrative offices will basically be naturally ventilated.
⑦ To plan a barrier-free building allow easy access for the disabled.
⑧ To establish a grade and scale of the facility in consideration of easy operation and maintenance.

2) Basic policy on selecting the equipment

Equipment to be provided under this project will be selected based on the following basic policies:

① The equipment should be assigned to facilities developed in this project.
② The equipment should directly benefit the students of USP.
③ The scope should match the contents of activity for the Centre.
④ Equipment with limited benefit effects will be excluded.
⑤ Equipment used mostly for personal purposes will be excluded.
⑥ Equipment used with less frequency will be excluded.
⑦ The equipment should be selected by environment consideration.

(2) Policy on Natural Conditions

Fiji Islands are situated in the Tropical Zone. The capital city of Suva is almost always rainy, even in the ‘dry season’ from June to September. The city is sometimes hit by hurricanes in the ‘rainy season’ from November to April.

Therefore, the building plan should reflect the conditions below:

・ To consider the reinforcement of the roofing structure and rain water-proofing against

hurricanes.

- To provide eaves to protect the building from strong sunshine and heavy rain, with depth on the large enough as a measure to prevent the adherence of dirt and water leakage on the exterior cladding
- To design the administrative rooms with a corridor facing an exterior equipped with a balcony in consideration of wind ventilation
- To adopt a 'maintenance-free' (sustainable) construction material and a construction method which minimizes damage from salty wind.
- To adopt the high heat-insulation material and an insulation method which maximizes energy saving in the air-conditioned rooms such as the computer laboratories

(3) Policy on Socio-economical Conditions

Many 'colonial style' building are seen in the capital city of Suva. For modern buildings, a construction method to prevent the direct exposure of the exterior concrete surfaces has been adopted these days in order to avoid dirt due to high temperature and humidity. There are more cases today where government buildings are refurbished by a technique that covers the concrete surface with surface-treated metal sheets than before. However, considering the fact that the USP has an effective building maintenance system together with the harmony with the existing facilities, the external walls will basically be finished with mortar.

In consideration of the heat insulation, the gable side of the outer wall will be finished with board and insulation materials to the inner wall. The outer wall will be finished with mortar, which allows easy maintenance.

As for the roof, in consideration of aesthetics, metal roofing will be partially applied, however, the remaining part will be flat roof for the outdoor equipment of air-conditioners to be installed and will be applied with water proofing sheet on the heat insulation material on the roof slab, taking workability into consideration.

(4) Policy on Construction and Procurement Conditions

1) Building Plan

Foreign investment to Fiji's construction market has been suspended since the incident of the illegal occupation of the parliament in 2000. However, the construction boom in Australia and New Zealand starting from late 2003 has induced an increment of private hotel construction in Fiji. While large scale investment has slowed down due to the huge economic impact brought by the subsequent coup in December 2006, housing and small/ medium building constructions remained booming. The lack of general workforce and skilled workforce has become more conspicuous as a result, and the increased commodity prices have pushed labor costs higher. Also, price inflation in Australia and New Zealand, that enjoy good economic performances, has affected the market since its construction materials are mostly imported.

Under the circumstances, the plan should adopt Reinforced Concrete with Rigid frame construction for main body and the construction without concrete form work for floors in order to

shorten the construction period.

Furthermore, it will be necessary to select materials and adopt construction methods which will shorten the construction period, and also to include the cost to dispatch Japanese engineers or supervisors from a third country to the construction site in the construction budget.

Construction materials are mostly imported from Australia and New Zealand. Considering their soaring prices, however, it will be imperative to study procurement from Japan and southeast Asian countries as an alternative.

Applications for building permits are not required prior to construction, although necessary documents must be submitted to Suva Municipal Office and the Public Works Department of Fiji.

The current situation and plan for major infrastructures are as shown below:

① Power Receiving

Power is already being distributed via a buried 11kV high-voltage cable from the Laucala Bay road, the front road of the USP, to the sub transformer station nearest the planned construction site. However, for the sake of the building layout of the new Centre, the USP will request a relocation of the sub station. The voltage is three-phase/415V/50Hz and single-phase/ 240V/50Hz.

② Generator

Every building in the USP is equipped with a generator as necessary. This Project will newly install a generator with capacity required.

③ Communication

・Considering that the telephone system differs according to the needs of the recipient country and that IP phone network is running inside USP campus including island states by utilizing satellite communications, the Project will only cover piping work for incoming conduits and installation of house cables to main rooms of the building. The recipient country shall be responsible for installing the necessary equipment.

・Since the ITS is capable of installing fiber optics within the premise, the Project shall only provide an outline of a computer network plan.

・Considering that a distance education program named Distance & Flexible Learning is being carried out via satellite communications connecting the 12 USP-participant countries and that faster and IP-based satellite communications that generate approximately 25 times faster speed than the existing communications were deployed from 2005 through 2006, ITS is capable of carrying out the network construction and the maintenance and management, and the Project shall only provide an USPNet control room.

④ Air conditioning

・In accordance with the USP's facility and equipment standards, air conditioning is planned

only for the server room and labs where computers are used, whereas teaching staff rooms and other ordinary rooms will basically not be air-conditioned.

⑤ Water supply and drainage

・Water will be branched from the buried water supply conduit (150Φ) under the front road to water pipes dedicated to the Centre and will be supplied via water meter. As for demarcation of the construction, Fiji will be in charge of introducing water from the water main to the meter and the Project will cover the rest. The water supply method shall be determined with consideration given to stabilizing of water supply pressure and security of supplied water since the water supply pressure is not constant.

・Sewerage and miscellaneous drainage will be separate and merged at the primary tank installed outside before discharged into the main sewer pipe (150φ) within the premise.

⑥ Rubbish

・The campus has an established rubbish collection system, which requires no plan of constructing a new incinerator, etc.

2) Equipment plan

The equipment planned in this project is roughly divided into audiovisual equipment, information processors, and equipment for experiments for the Department of Engineering.

Of this equipment, the information processors (such as PCs and servers) will ideally be procured locally, since there are two or more agents or manufacturer branches with sufficient maintenance schemes and experience within Fiji, all of which can provide after-sales service. However, as those agents or branches also import their equipment from New Zealand or Australia, it is also considered appropriate to directly procure equipment from the peripheral countries with frequent economic exchanges with Fiji.

In the absence of reliable agents or manufacturer branches within Fiji, other equipment will inevitably be procured from Japan or a third country. In view of the popularity of Japanese-made audiovisual equipment around the world, including Fiji, it is considered appropriate to procure these products from Japan. With regard to the equipment for experiments for the Department of Engineering, appropriate equipment will be selected among Japan-made products or products manufactured in third countries and procured from Japan or from the country of manufacture. Given the inability to secure sufficient local after-sales service for this equipment at present, it will be necessary to request the equipment procurement firm(s) to form sufficient after-sales service schemes (e.g., establishment of an agent or a liaison office in Fiji) in procuring this equipment.

(5) Policy on Practical Use of Local Contractions

1) Building Plan

Fiji Master Builder Association is established in Fiji with the participation of more than 10 companies, in addition to the association local Architects. However, only four companies were found to be supportive and reliable as general contractors according to the project cost survey—one from New Zealand, two from Australia, and Indo-Fijian company.

The workforce for construction is insufficient due to the increment of building construction. It will be imperative to dispatch Japanese engineers and supervisors from third countries as skilled workforce cannot be expected locally.

2) Equipment Plan

As stated previously, there are no appropriate agents or manufacturer branches within Fiji, except for those representing the manufacturers of information equipment. Accordingly, it will be necessary to install equipment basically through the assistance of an engineer from Japan or from a third country. With regard to information equipment, it will be possible to implement installation work under the supervision of a Japanese supervisor, given that both agents and manufacturer branches in Fiji have engineers with proven records.

(6) Policy on Operation and Maintenance Abilities of the Implementing Agency

1) Building Plan

The financial balance of the university remained robust against deficit tendencies until 2005, and the USP sustained a sound financial constitution. However, significant increase in the student Internet usage resulting from the improvement in its Internet environment caused substantial increase in the communication fee. In addition, incorporating the USPNet's speed increase cost in both 2005 and 2006 results, the university eventually recorded a deficit. Since 2007, USP has limited the student Internet usage, and plans to build and operate a system for charging excess usage fees to make a balance between income and expenditure.

It has also secured about 10 percent of its annual expenses as budget for the amount of money used for lighting, heating, communication, maintenance, and building repairs that are closely related to operation and maintenance.

Facility maintenance of USP is conducted by Property and Facilities Section, which mainly consists of mechanical engineers, electricians, plumbers and carpenters. Since its dedicated office and repair factory have been located slightly away from the campus, necessity of strengthening its maintenance governance was apparent Hence, the existing USP maintenance scheme has been well coordinated, posing no problems related to the maintenance scheme after construction of ICT Centre.

Also, since maintenance of IT equipment has been entirely handled by IT Service Department, there will be no issues related to operation/ maintenance/ management ability of the ICT Centre.

2) Equipment Plan

The equipment planned in this project basically does not need expendable supplies. In addition, since this university has acceptable financial standing as mentioned previously, it is considered to have no problem in the budgetary arrangement for the maintenance of equipment. However, to reduce environmental impacts, models with small power consumption should be selected throughout the equipment plan. To ensure stable operation and maintenance of computers, provision of air conditioning should be considered for rooms in which computers will be installed.

Regarding the operation and maintenance system as evaluated from the technical aspect, there are basically no problems because the planned equipment will have specifications compatible with the technical level of the implementing agency or at the same level as the existing equipment. Regarding

maintenance capabilities, the IT Service Division has dedicated maintenance staff stationed at Maintenance Service Section, Department of Computer Science, Department of Engineering, and Media Center (common use equipment), and can respond to general failures of the planned equipment. In the case of failures that cannot be responded within USP, repair and other services are available from the established network of manufactures' agencies (including those in neighboring countries), and no problems are expected to occur after the completion of the ICT Center.

As of 2007, the allocation of specialized personnel is as follows:

Table 2-1 Specialized staffs of each department as of 2007

Department	Number of staff	Contents of works
CS(Computer Seiences)	2 (30*)	Training preparations / operation / maintenance / repair
ITS(IT Service)	42	Management of ICT equipment in whole USP
ENG(Engneering)	2	Training preparations / operation / maintenance / repair
COM (Common Use, Media Center, USP net)	14(Media Center6, USPNet 8)	lecture preparations / operation / maintenance / repair

*Department of CS hires 30 students per semester as a SLA (Student Lab. Assistant). They sign an agreement with USP about maintenance supporting work of the 14 weeks (8 hours/week) per semester and receive a reward in FJ $ 3/hour.

(7) Policy on Gradation of Building and Equipment

1) Building Plan

The grade of the new building is to follow the 'USP Standards & Specification." Further specifics on the heat insulation specifications will also be considered, as the air-conditioned space accounts for more than half of the total space of the ICT Centre in view of the special building usage. In addition, the offices for the staff should adopt a natural ventilation system in compliance with the USP standard.

In order to calculate the area for each room, e.g., staff office and computer laboratories, the USP standard and its special conditions should be taken into consideration. Accordingly, the total area or scale should be planned.

2) Equipment Plan

① Specification of Equipment

The specifications of the planned equipment should be of equipment grade based on equipment specifications conforming to their applications by not pursuing excessive technological advancement. In addition, the equipment to link to the existing equipment will be selected in due consideration to conformity.

② Number of Equipment

In principle, the planned equipment will be procured in the minimum quantities necessary for the launch of operations of this Centre. It would be recommended to the USP to continuously use the existing equipment in addition to the newly procured equipment in this project, or to improve and expand the equipment by procuring additional equipment on its own in the future.

(8) Policy on Method for Construction, Procurement and Schedule

1) Building Plan

The economies in Australia, New Zealand and Fiji have recently been booming and construction demand is also on the rise. Construction costs have tended to rise due to this background in the region. The development of resort facilities in Nadi and the construction of commercial buildings in the Suva district generate continuous activity. This has resulted in a shortage of labor all over the country and rising material costs. Both factors naturally drive up construction costs.

The only construction materials that can be stably produced locally are sand, gravel, timber, brick, and concrete blocks. Other materials will have to be imported from abroad. Therefore, the available material in Fiji is comparatively costly in general, and the rising costs in Australia and New Zealand are driving up costs even more.

Taking this social economical background and the sloped construction site into consideration, board finishing will be partially adopted as construction methods that should minimize the amount of concrete and plaster works requiring intensive man-hours. Such measures will help shorten the construction period.

2) Equipment plan.

Since this project is a combined project for facilities and equipment, it will be desirable to execute tenders for the construction firm(s) and the equipment procurement firm(s) at the same time in order to ensure consistency between the equipment plans, facility plans, and layout planning. However, some of the equipment planned in this project is of a type now being rapidly improved through technological innovation (such as information equipment). Given that such equipment may become obsolete during the construction process extending over one year, it will not be appropriate to execute the tender simultaneously for equipment especially vital to the facilities, such as audiovisual equipment and other types of equipment which should be of the most advanced type possible.

For this reason, the tendering of equipment will be planned in two phases. The first phase will be executed for equipment especially vital to the facilities, concurrently with the tender for facility construction. The second phase will be executed for the other equipment at an appropriate time in accordance with the completion of the facilities.

In the meantime, the equipment installation process will be formulated in close liaison between the construction firm(s) and the equipment procurement firm(s), with due consideration given to the progress of the facilities construction.

2-2-2 Basic Plan

(1) Site Plan

1) Construction site

The construction site in the University of the South Pacific-Laucala Campus is located in the Laucala Bay district facing Laucala Bay, southeast of the capital city of Suva and approximately 3 Km eastward from central Suva, an area lined with multi-story government and commercial buildings. The land for the university is divided into the upper campus with major schools and departments and the Lower Campus with the Maritime studies department. The total land area amounts to 696,000 square meters. The site runs along a gentle slope from Laucala Bay east to west, with a height difference of about 30 meters between the highest and lowest points.

A shallow canal trench, pond, and swamp are located in the campus, considerably complicating the geographic features.

Some 60 buildings are clustered on the campus, including the administration building, cafeteria, dormitories, lecture halls, a library built under Australian Aid, a USPNet Satellite Base, and a parabola antenna built under Japanese Aid.

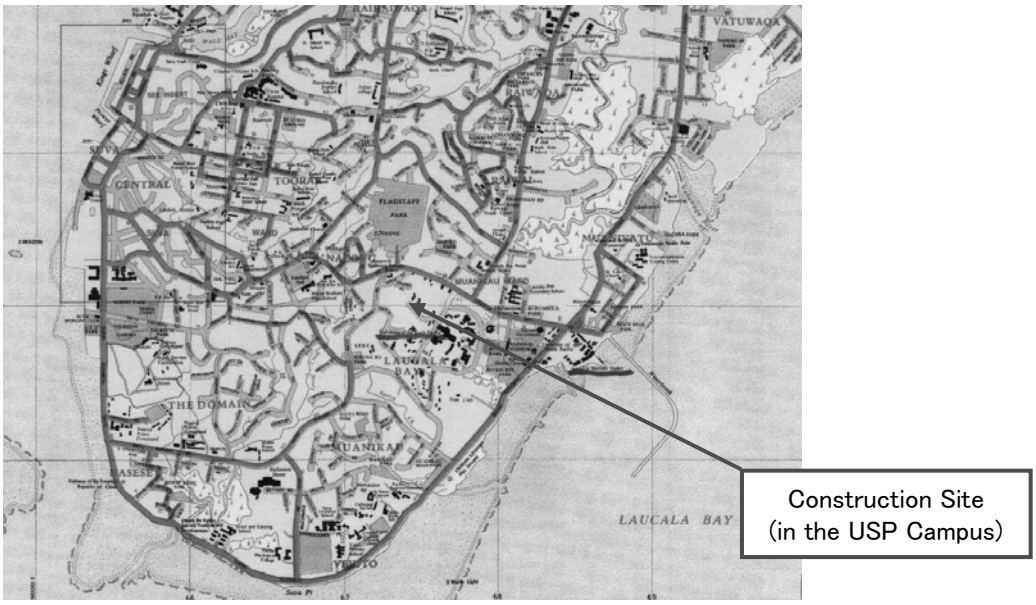

Figure 2-1 Site Location Map

2) Block Planning

The construction site is located in the western hillside of the upper campus. The existing buildings such as dormitories and storage structures should be dismantled and replaced with the new ICT centre.

The land configuration can be depicted as an easy slope from west to east, connecting the Laucala Bay ahead. The centre of USP is located 700 meters from the seashore.

Although the new building was supposed to be developed in the north-south direction on the site, the north edge in the USP campus master plan faces the trench and pond, while the south edge faces a steep valley. When considering the layout of the new building, the main axis of the structure should therefore match the natural gradation in the west-east direction.

① Policy of Block Planning

The layout plan should be basically considered as follows:

- Symbolic Space Configuration
- To emphasize the west-east axis from the Malae courtyard surrounded by the library and administration building in order to obtain the view toward the Bay from the Site.

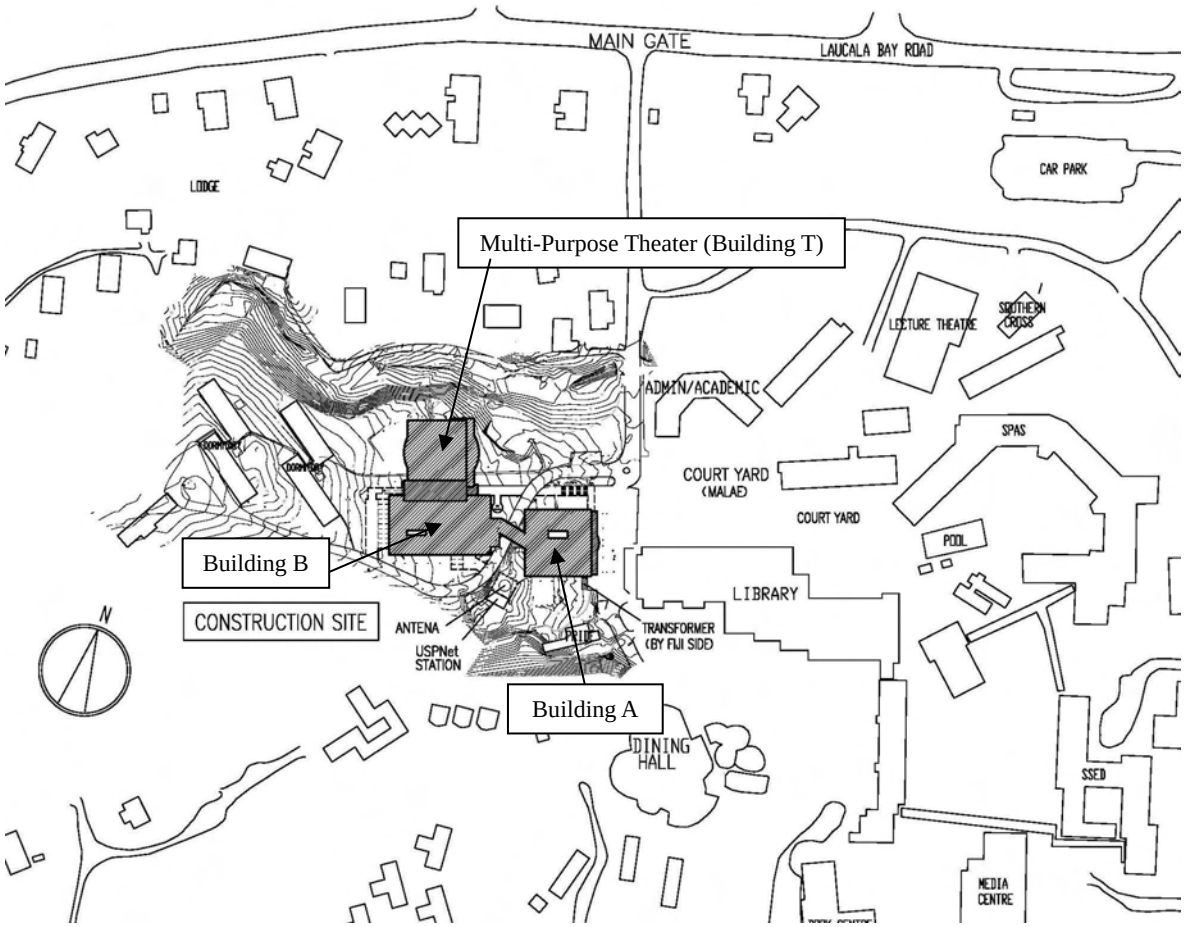

Figure 2-2 Block Planning

- To establish the front yard for the ICT Centre
- The front yard, utilizing the front open space and being united with the east courtyard, should be used as a motif to strengthen the existence of the ICT Centre as a symbol of Japanese Aid. The existing road (crossing the site) should be utilized as a route to the dormitories in the western edge and to the area behind the ICT Centre. Thus, the road should be maintained and re-utilized for the Project.
- The approach route for students should be from the library.
- Easy access routes for the disabled should be placed not only at the main entrance of the complex building, but at every entrance.

  As the building is multi-story, it should be equipped with an elevator.
- Building Zoning Plan with area efficiency:
- The building should reflect 'area efficiency,' e.g., by allocating, air-conditioned rooms on both sides of the inner corridor.

② Block Plan

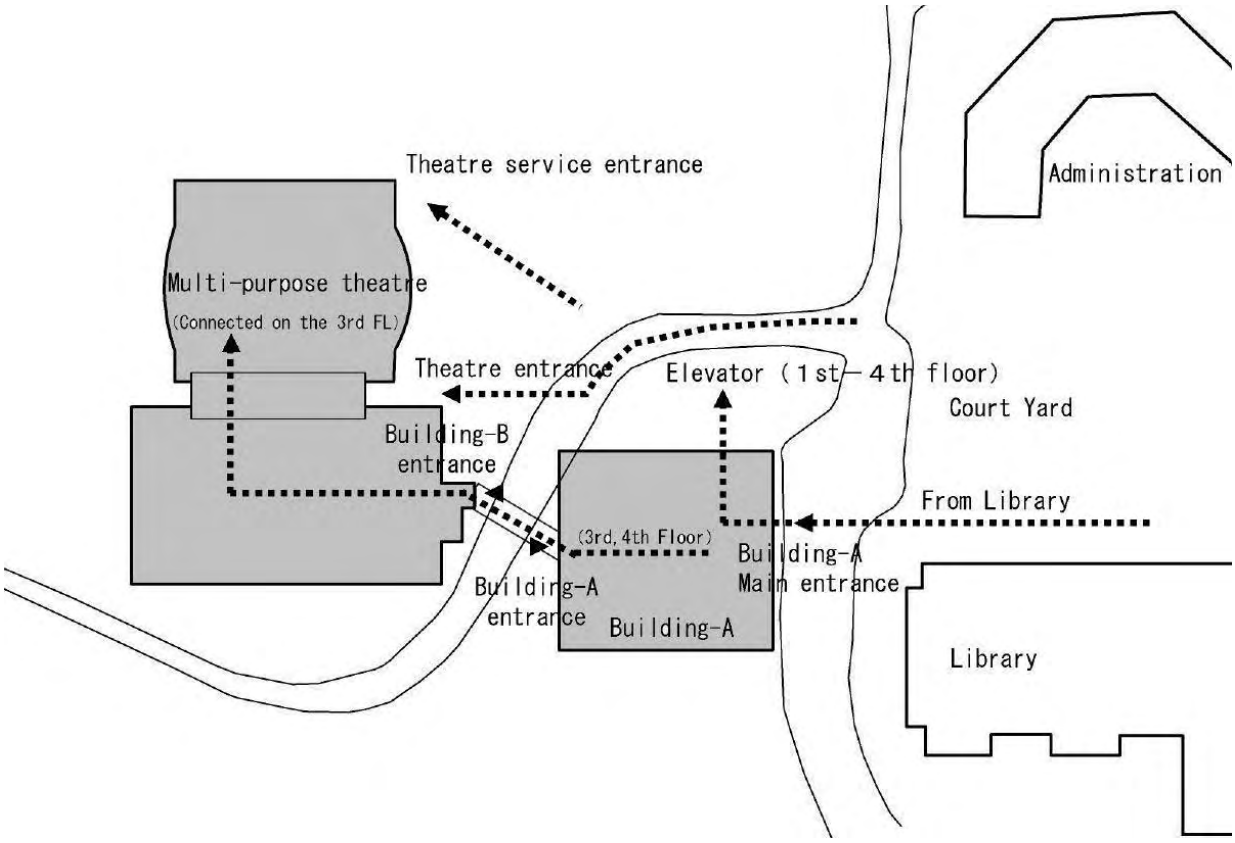

Figure 2-3 Zoning Plan

(2) Building Plan

1) Planning

The ICT Centre should consist of the Common Area, Department of Computer Science, IT Services, Department of Engineering and Research, and the communication service of the Department of Engineering. The area allocated to each department should be determined based on the curriculum scheme. The request for construction of facilities for GIS was excluded from the project on the ground that the existing facility is usable enough.

① Curriculum Scheme

The curriculum of USP is systematized so that each department gets the Programs that can be supplied with the existing capacity of the education staff, facility, and equipment, and so that the students take necessary programs among the courses available.

The educational staff, e.g., the department head, settles the program necessary to obtain the certificate of courses and puts it on the USP Calendar. Therefore, the status of the curriculum should be confirmed in the annual Calendar, as was done in the present survey, to ensure that the drafted courses are related to this Project and will be expandable in the future.

Each program generally consists of 'Lectures' and 'Tutorials.' 'Practice' and 'Experiments' are also implemented when needed.

The ratio of the general program is settled as 3 hours a week for lectures and 1 hour a week for tutorials. The 1-hour lecture and 3-hour tutorial program will be further deliberated in the future, however, as students have pointed out that “mass education” can sometimes hinder their comprehension. In any case, the draft of the new curriculum calls for a 1-hour lecture and 3-hour tutorial. For the moment, it remains physically difficult to deal with an ideal program.

The actual method for practice and experiments differs from course to course. The Department of Engineering fixes 3 hours/week for practice. The students are given a practice assignment on a designated theme to be completed using a personal computer or computer in the laboratory. This is what is defined as “self-study” or “practice.” Though variable among students with different ability, interviews indicate that the computer work time per assigned theme should be set at 8 hours.

② Research & Development / Incubation Program

Research & Development / Incubation Activities are advocated as one of the counterpart's basic concepts toward this Project. Under this program, the ICT centre will promote research, development, and industrialization jointly with outer organizations (business enterprises) by utilizing its equipment, facilities, and other properties.

Since these activities have not yet been carried out in USP, the feasibility of program implementation and requests related to the program were confirmed with the IT-related industries covered under the survey.

The responses from these organizations indicate that the program seems very effective and worthwhile, and the concrete theme is proposed as follows. However, six rooms were not recognized to be fully utilized from the beginning of the construction. Out of these six, several were requested for the use of the IT-related companies, assuming operational rates at around 50 percent.

Domestic IT enterprises are requesting utilization of the program and their research themes as follows;

- Telecom Fiji Limited
  Telecommunications, networking, communications, data engineering
- Fiji Electricity Activity
  Electric engineering, internet and networking, Power Live communications
- Amalgamated Telecommunications Holding Limited
  Special ICT Training, Open Source Software development
- ICT, land and Rural Farmers and Early Warning Systems
  Meteorology, Climate change, Creation of on-line markets, Marketing
- National Small and Micro Enterprises
  Cyber business incubator-web-based approach; provide services to small business.
- Bio-Genetics / Technology / Robotics
  Biotech companies

③ Facility Contents of the Division

〔Common Space〕

The common area is the combination of the 'administration Division,' the division responsible for operating and administrating the new ICT Centre, and the 'Common Space' commonly used by staff and students. The Green Room (a small video conference room) was excluded from the scope of the project on the ground that the Video Conference Room and the Conference Room will cover the need. In addition, the request for four 200-capacity hall, one 500-capacity hall, and one 1000-capacity hall was excluded from the scope of the project on the ground that the needs for them can be covered by using the existing facilities and a 300-capacity Multi-purpose Lecture Theatre. As a result, the Common Space will consist of the following rooms:

a. Multi-purpose Lecture Theatre (300 person)
b. Office- Director ICT
c. Office-Core Staff
d. Reception/Secretary
e. Visiting Staff Office
f. Video Conference Room
g. Conference Room
h. Common Room for Staff
i. ICT Resource Room / Digitization Room
j. Radio Pasifik' Room

〔Department of Computer Science〕

The Department of Computer Science, the department to form the core position of the ICT and to share venues with the Department of Mathematics, will be solely moved to the ICT Centre, due to the current lack of laboratories, computers, and air conditioning. Of the requested rooms, the construction of PC Laboratory will be excluded from the scope of the project and the PC Laboratory for ITS expected to be provided in this project will be also used for the Department of Computer Science to cover the need. The construction of the Small Server Room will be excluded from the scope of the project and the existing servers will be relocated to the Server Room for ITS. The construction of the Seminar Room will be excluded from the scope of this project and the need will be covered by existing facilities and the Multi-purpose Lecture Theatre. As a result, this department will consist of the following rooms:

a. Academic Staff Office
b. Technical Staff Office
c. Administration Staff Office
d. Tutor Office

Five types of computer laboratories will be provided to meet various usage and configuration requirements.

e. Research Laboratory
f. Dedicated Networking Teaching Laboratory
g. Dedicated Computer Teaching Laboratory
h. Postgraduate Laboratory
i. Technical Laboratory/Workshop

〔IT Services〕

IT services are an important division responsible for operating the computers and network of the USP campus. As it is currently scattered on every floor of the "Media Centre," its core facilities will be relocated to the ICT Centre in order to reduce inconvenience and solve the current shortage of space. The requested Telephony Communication Workshop will be excluded from the scope of this project and the existing facilities will be utilized to cover the needs. As a result, this division will consist of the following rooms:

a. Office- Director ICT
b. Office- Secretary
c. General office ICT
d. Meeting room

ITS will operate two types of computer laboratories, as follows:

e. Professional & Development Laboratories
f. General Access Laboratories

The following dedicated rooms will be provided exclusively for the IT Services in light of its function as the department in charge of maintenance and inspection of university computers and networks.

g. Computer Workshop
h. Server room
i. Storage (Equipment Warehouse)
j. Help Desk & Waiting Area
k. USPNet Control Room

〔Research and Development (Incubation) Department〕

The Research and Development Department is an educational-industrial complex where USP incubates researchers in coordination with IT-related companies within Fiji. As it is expected to play an important role in the creation of future job opportunities, it will be newly established within the ICT Centre. It will be composed of the following rooms:

a. Office- Research/Incubator

b. Test Bed/Incubator

〔Department of Engineering〕

This faculty specializes in education on hardware in the ICT field and is closely related with this project. The present Department of Engineering, a faculty which chiefly consists of two specialty disciplines, mechanical engineering and electrical/electronic engineering, is expected to be segmented into three specialty disciplines, viz., electrical/electronic engineering, information and communications, and mechatronics (with the aim of enhancing the information and communication and mechatronics fields).

To fulfill future plans, this project will develop laboratories intended for experiments and practice in the information and communications field and related facilities within this centre. The Engineering Department will be comprised of the following rooms.

a. Office - Engineering

b. Technical Staff Office

c. Postgraduate Room

d. Computer Laboratory

e. Information and Communication Engineering Laboratory

f. Storage/Research

④Volume of the facilities

a. Volume and background of the proposed plan

The Research and Development Department, the Department of Engineering, and the Geographic Information Services were not included in the plan requested in 2002. However, the Research and Development Department and the Geographic Information Course were added in the feasibility study and the Department of Engineering was further added in the B/D Study. The Geographic Information Services were finally excluded, assuming that the existing facilities could still be utilized.

Courses of the Department of Engineering not directly related to the ICT Centre were excluded from the plan in this project. The Lecture Hall and tutorial, spaces where individual students were not to practice on personal computers, were also omitted. In addition, the Personal Computer Laboratory (Computer Laboratory) for shared use was integrated into the IT Services for more efficient management.

As for the Common Area, the request made in 2002 included two lecture halls, and the preliminary study detailed these as a large lecture hall accommodating 1,000 people and a multi-purpose centre accommodating 500 people.

This Project finalized the specifications as a single multi-purpose lecture theatre with a smaller capacity of 300 people, which can be used for lectures and various other purposes, and excluded the large hall to be mainly used for ICT beginners' courses.

In this implementation review study, the volume required of the ICT Centre at its opening in February 2010 will be calculated in accordance with the curriculum received by the USP and the number of people who take the course. Basic units such as the individual Computer Laboratory and teachers' room will conform to the USP Facility Standard, except under special circumstances.

Table 2-2 Transition of the requested volume and details (Unit: m^2)

	Department	Requested plan (2002)	Feasibility study (2004)	B/D Study (2005)	Proposed plan
1	Common area	5,263.00	4,148.40	3,462.00	1,389.00
2	Computer Course	1,355.00	1,151.62	2,718.00	1,198.00
3	IT Services	1,770.00	1,145.62	3,405.00	1,037.00
4	Research and Development Department	0	876.00	332.00	156.00
5	Department of Engineering	0	0.00	1,036.00	310.00
6	Geographic information Services	0	454.82	448.00	0.00
7	Corridor, hall, machine room, etc.	1,678.00	1,555.29	4,290.40	2,328.00
	Grand total	10,066.00	9,331.75	15,691.40	6,418.00

b. Volume of the Multi-purpose Lecture Theatre

There are three large lecture halls in USP; halls for 242 students, for 280 students and for 400 students. The subjects taught in these halls with number of use as of 2006 are summarized as in the Table below.

Condition 1: Since the maximum capacity of the lecture halls except for the above lecture halls is 150, the courses for more than 150 students should be picked up.

Condition 2: The coursed exceeding the capacity of the lecture halls should be divided into small groups, but such cases should be kept in minimum in order to reduce the burden for the lecturers.

Table 2-3 Booking Data of Existing Large lecture halls

No	Course	Number of Students	Courses /week	2 Groups (person/ group)	3 Groups (person/ group)	Courses for 400 Lecture Hall	Courses for 280 Lecture Hall	Courses for 242 Lecture Hall
1	AF101	693	2		231		6	
2	AF108	478	3	239				6
3	AF203	432	2	216				4
4	AF302	415	2	208				4
5	AF308	193	3					3
6	AFF01	145	3					3
7	BF201	207	3					3
8	BI104	265	3				3	
9	BIF02	159	3					3
10	CH101	368	3			3		
11	CHF02	170	3					3
12	CS100	592	2	296		4		
13	CS111	280	3				3	
14	CS121	447	2	224				4

15	CS221	345	3			3		
16	CS222	341	2			2		
17	CS323	227	3					3
18	CSF21	213	3					3
19	EC102	534	3	267			6	
20	EC201	379	2			2		
21	EC203	381	3			3		
22	EC302	256	3				3	
23	EC304	175	3					3
24	ED153	159	2					2
25	EL001	238	2					2
26	EN106	152	4					4
27	GE101	243	3				3	
28	LL114	415	2	208				4
29	LLF11	387	3			3		
30	MA101	586	3	293		6		
31	MA102	251	3				3	
32	MA111	466	3	233			6	
33	MA130	202	3					3
34	MA211	183	3					3
35	MAF11	339	3			3		
36	MG101	576	3	288		6		
37	MG202	243	3				3	
38	MG204	277	3				3	
39	MG303	158	3					3
40	MG314	167	3					3
41	PH102	278	2				2	
42	PH106	220	3					3
43	PHF02	155	3					3
44	SE100	392	3			3		
45	SOF01	150	4					4
46	TS106	219	3					3
						38	41	79

Sources : USP Time Table of Lecture Halls

Assuming that the available time per week in a lecture hall is approximately 40 hours (10 hours/day × 5 days × 80%), the lecture halls for 280 and 400 students are said to be sufficient. However, the lecture hall for 242 students is extremely insufficient, considering the needs being double of its capacity.

Currently, USP is trying to take measures for these courses as below:

- To divide the students into smaller groups and use small lecture rooms.
- In addition to use the large lecture hall, the remaining students are required to view the ongoing lectures in small lecture rooms with the TV monitors.
- To conduct classes with some students overflow to corridor.
- To use the large lecture hall available located far away from the main campus.

However, as these unreasonable measurements cases heavy workload to the lecturers due to the increment of the number of same lectures, and lower the quality of lectures, dissatisfaction to

students is inevitable.

Under the circumstances, further deterioration is anticipated due to the increment of students in future and their inclination to the popular courses, thus the need to build one large lecture hall with capacity of 300 students is validated.

c. Volume of the computer laboratories and the information and communication engineering laboratories

The sizes required of the laboratories at the opening in 2010 will be calculated based on the curriculum received from the USP and the number of people to take courses which intensively utilize the computer laboratories and information and communication engineering laboratories.

The following table outlines the relationships among the existing facilities, requested volume, and planned volume of the Computer Laboratory:

Table 2-4 Volume of Computer Laboratories (ICT-related courses, Unit: number of personal computers)

	Name	Existing In 2005	Existing In 2007	Requested	Planned			
					Number of existing PCs to be used	Number of PCs to be procured		Number of PCs planned to be installed in each room
						Japan Side	USP Side	
Department of Computer Science	Research lab	—	—	50	12	—	13	25
	Dedicated Networking teaching Lab	—	12	40	—	40		40
	General Access Computer Lab	16	16	300	50	0		0
	Dedicated Computer Teaching Lab	34	34	160		110		160
	Postgraduate laboratory	24	24	40	24	—		24
IT Services	Laboratory A (Professional)	20	60	100	50	—		50
	Laboratory B (General Access)	276	392	400	—	120		120
	Laboratory C (R & D)	0	0	10	—	0		0
Research and Development Department	Computer Labs Research	0	0	20	—	0		0
Department of Engineering	Computer Lab	20	20	60	—	12		12
	Engineering Lab	12	12		12	3		15
Geographic Information Services	Geospatial Science Computer Learning Space	18	18	45	—	0		0
	25seat general access Laboratory	—	—	25	—	0		0
	Geospatial Database Server Simulation Lab	—	—	5	—	—		—
	10 'Seat' Research Laboratory	—	—	5	—	0		0
Total		420	588	1230	148	285	13	446

The shortfall of PCs in the Research lab and the Laboratory A (Professional) ― 55 units in total― will be newly procured by the USP side.

i) Department of Computer Science

・Research lab

While ten 5-person rooms were requested for the master's and doctoral courses by the USP, five 5-person rooms are considered appropriate from the following calculation.

In consideration of the ratio between the numbers of postgraduate students and numbers of students enrolled in master's and doctoral courses (2:1 ratio), the general statistics of the USP indicate that the appropriate number of master's and doctoral courses in 2010 will be approximately 25. This is about half of the number of postgraduate students currently enrolled (43) in 2006.

・Dedicated Networking Teaching Laboratory

One laboratory equipped with 40 computers is estimated to be necessary, based on the following calculation basis.

Assuming that the estimated number of students in fiscal 2006 using the relevant laboratories reported by the USP is taken as a cardinal number, that the annual rate of increase in student enrollment is 20% (Note 1), and that each student devotes eight hours a week of self-study and practice, the hour・unit of personal computers required per week during the first semester with a larger number of students is calculated as follows:

403 students × 8 hours / week = 3,224 hours・units / week

Assuming that the daily available time per personal computer in a laboratory is 14 hours (from 8:00 AM to 10:00 PM) and that the availability factor is 80% (Note 2), the weekly available time per personal computer in a laboratory will be 79 hours・unit/week (14 hours/day × 7 days / week × 80% ≒ 79 hours / week). Accordingly, the minimum quantity of personal computers required will be 40.8 units (3,224 hours / unit / week ÷ 79 hours / week ≒ 40.8 units).

Note 1: Since analysis of the past annual rates of increase in student enrollment by existing courses indicates dispersion on the order of 15% to 50%, the number of required personal computers was calculated based on the average rate of increase being 20%.

Note 2: An actual availability factor of usual university facilities is approximately 65%; however, 80%, which is regarded as an upper limit in operation theory, was adopted in this calculation.

Note 3: The data of CS312 of 2nd Semester adopted 20% of rise rate in 2006 because a/the total is not complete.

Table 2-5 Number of Students of Dedicated Networking Teaching Laboratory

1st Semester		2005	2006	2007	2008	2009	2010
CS215	Data Communications	-	-	-	280	336	403
Total							403

2nd Semester		2005	2006	2007	2008	2009	2010
CS312	Computer Networks	58	87	104	125	150	180
CS317	Security	-	-	-	120	144	158
Total							338

・Dedicated Computer Teaching Laboratory

The dedicated computer teaching laboratories are laboratories for students of the Department of Computer Science to practice more specialized curricula. From the following calculation, four dedicated computer teaching laboratories equipped with 40 computers are estimated to be required.

[Calculation condition]

- With regard to the number of students in courses using the laboratory in question, the time and number of personal computers required for courses using statistical data will be calculated based on a mean value of verifiable multi-year data.
- The time and number of personal computers required for courses not using statistical data will be calculated based on the estimated number of students in fiscal 2008 reported by the USP.
- The annual rate of increasing enrollment after the standard value will be taken as 20%.
- The self-study and practice time per student will be taken as eight hours a week.
- Number of hours available for self study: 79 hours/week (with the availability factor taken as 80%)

  14 hours/day × seven days × 80% ≒ 79 hours/week

The hour・unit / week of personal computers required:

Calculated on the basis of the first semester with a larger number of students

1420 students × 8 hours / week = 11,360 hours・units / week

The hour・unit of personal computers required per week

11,360 hours・units / week ÷ 79 hours/week = 144 units/week

Number of laboratories required

144 units ÷ 40 units/laboratory = 3.60 laboratories ≒ 4 laboratories

Table 2-6 Number of Students Using the Dedicated Computer Teaching Laboratories

	1st Semester		2005	2006	2007	2008	2009	2010
IS3	IS221	Distributed Information System Theory and Application	138	349	302	332	365	402
IS3	IS222	Database Management System	332	341	230	253	278	306
CS5	CS311	Computer Systems	70	66	112	134	161	194
CS5	CS3xx	Multimedia System	-	-		120	144	173
CS5	CS3xx	Digital Image Processing	-	-	-	120	144	173
IS5	IS328	Data Mining	-	-	-	120	144	173
	Total							1,420

	2nd Semester		2005	2006	2007	2008	2009	2010
IS4	IS224	Advanced Database Systems	121	301	259	311	373	448
IS6	IS332	Advanced Distributed System & Information Systems Networking	45	93	236	307	399	518
IS6	IS333	Internet Computing	-	-	83	100	120	143
CS6	CS392	Topics in Computer Science	164	193	45	54	65	78
	Total							1,187

・Postgraduate laboratory

The USP estimates the number of students in fiscal 2008 as 100, based on the result of a hearing survey conducted by the USP. However, this number becomes about 52 when the following basis is used for the calculation. If the calculation assumes the above as a precondition, the appropriate size for the postgraduate laboratory will be one laboratory equipped with 24 personal computers as follows.

[Calculation condition]

・Number of postgraduate students in fiscal 2005: 30

・(Estimated) increase in student enrollment: 20%/year

・Number of practice hours per student: 37 hours/week

(5 hours × 5 weekdays, 12 hours on weekends)

・The time taken for students in the course in question to access : 79 hours / week

Estimated number of students in the course in 2008:

30 students×1.2^3 ≒ 52 students

The hour・unit of personal computers required:

52 units×37 hours / week = 1,925 hours・units / week

Thus, the number of personal computers required a week is 24 units (1,925 hours・units / week ÷79 hours / week = 24.35 units).

ii) Information Technology Services (ITS)

A laboratory for providing adult professional training courses, including Cisco, Red Hat and ITU (International Telecommunication Union) Web design programs and Microsoft certificate programs. As of 2007, courses are provided in one dedicated laboratory with 20 computers, and one General laboratory with 40 computers is additionally reserved for Friday classes.

Although the request was to have 4 laboratories with 25 computers for each, the number should be corrected as 2 laboratories with 25 computers for each, considering that adult professional training courses (4 courses) in this laboratory are provided for a total of 8 hours per week and the room is available 4 hours per day (5 to 9PM because students are working people and extracurricular students.) During the time when the room is not used for these courses (8AM to 4PM), the room will be used for Microsoft Certificate Programs.

Hence, the number of necessary rooms shall be calculated based on the number of adult professional training courses.

[Number of laboratories required]

48 hours・laboratory / week ÷ (4 hours /day × 6 days / week) = 2.0 = 2 laboratories

・Available time per day: 4 hours (5:00 PM-9:00 PM)

・Seating capacity per laboratory: 25 persons

・Weekly hours laboratory for which laboratories are required: 48 hours・laboratory / week

Table 2-7 Practice Courses to be Conducted in the Laboratory A (Professional & Development Laboratory)

Course	Weekly hour of required laboratory work
Cisco Networking Academy 1	8
Cisco Networking Academy 2	8
Cisco Networking Academy Professional Course	8
Red Hat Linux	8
ITU Webdesign	8
Total	40

・Laboratory B (General Laboratory)

In reference to the preparation of a PC laboratory requested by the ITS and the Department of Computer Science, this project will provide two 60-person laboratories supplemented by the existing ITS's laboratory on the basis of the following calculation.

Number of laboratories required for Group Course No. 1

The practice hours of the course in question will be fixed by a timetable. The daily available time on personal computers for practicing purposes will be limited to school hours on weekdays, viz., eleven hours (8:00 AM-7:00 PM). If the number of required rooms is calculated based on the following conditions and the assumption that three hours per week will be required as practice hours for the respective courses, the result requires two 60-person laboratories. In the meantime, the free time for the two laboratories is estimated at 3,900 hours・units/week.

[Calculation method]

・Hour・room required for the practice per week: 78 hours・rooms/week (see the table)

Number of students ÷ 60 (students/room) × 3 hours/ week

・Available hours per room during the school hours on weekdays: 44 hours/week

11 hours/day 5 days / week × 0.8 = 44 hours/week

・Number of PC rooms required for the class: 2 rooms

93 hours・rooms/week ÷ 44 hours/week = 2.11 ≒ 2 rooms

・Number of hours / week available for self study: 79 hours/week・units (with the availability factor taken as 80%)

14 hours/day × seven days / week × 80% ≒ 79 hours/week・units

・Free time available for classes other than this class: 3,900 hours・units / week

79 hours・rooms/week × 60 units/laboratory × 2 rooms - 93 units/laboratory × 93 hours・rooms/week = 3,900 hours・units/week

The hour・unit of personal computers required for Group Course No. 2

The practice of the relevant course adopts a method where the students receive assignments from the course they are expected to be completed by self study.

While the time required for the students to complete their self study will vary with their abilities, the USP indicated that the average time required will be about eight hours per assignment. If calculated based on this assumption, the number of PCs required by the students of all the courses of this group per week becomes 30,008 hours・units/week. (See the table)

Calculation of the number of laboratories required for Group Courses No. 2.

Calculation based on the following conditions indicate that Group No. 2 and Group No. 3 can provide the practice in the existing ITS laboratory.

[Calculation method]

・Free time・units of Group No. 1: 3,900 hours・units/ week

・Hour・unit of personal computers required for Group No. 2: 29,840 hours・units/ week

・Hours・units/week of PCs necessary outside the Centre: 25,940 hours・unit / week

29,840 – 3,900 = 25,940 hours・unit / week

・Useful Hours for existing PCs

After completion of ICT Centre, General tutorial classroom (temporary) shall return to a general classroom. Use Possibility Time of computers will then become 32,088 hours/ week, and 80% utilization is considered acceptable.

Table 2-8 Available time of the established general computer lab. after ICT center completion

Lab Name	Unit	Use time zone	Arrangement	Use possibility time/week	Remark
IT Lab 1	40	Mon－Fri 8:00-10:00pm	General tutorial classroom (temporary)		It returns to a general classroom after ICT center completion
IT Lab 2	20	Ditto	Ditto		
IT Lab 3	30	Ditto	Ditto		
IT Lab 4	30	Ditto	Ditto		
IT Lab 5	30	Ditto	Ditto		
IT Lab 6	30	Ditto	Ditto		
IT Lab 7	96	24H	Prefabrication classroom	16,128	It uses it even after ICT center completion
IT Lab 8	20	24H	Repair of a woman dormitory	3,360	
IT Lab 9	20	24H	Ditto	3,360	
IT Lab 10	20	24H	Ditto	3,360	
IT Lab 11	20	24H	Ditto	3,360	
IT Lab 12	36	Mon－Fri 8:00-10:00pm	For old law school	2520	
392Unit (It takes it 212 units after ICT center completion)				32,088	

Table 2-9 Classes and assignments using Laboratory B (General Access Laboratory)

	1st Semester		Estimated number of students in 2010	Assessment
Group No.1	EC203	Economic Statistics	391	24 hours / week are required
	BI400	Research Methods in Biology	13	3 hours / week are required
	GE303	Geography and Development in the Pacific	66	6 hours / week are required
	GM202	Geomatics II	77	6 hours / week are required
	GM203	Survey Computations II	77	6 hours / week are required
	ST130	Basic Statistics	151	12 hours / week re required
	PS103	Research Methods in Behavioral Science	13	6 hours / week are required
	RE101	Real Estate Principles	80	6 hours / week are required
	EC100	Social Survey Methods and Data Analysis	274	21 hours / week s are required
	PD303	Business Demographics	17	3 hours / week are required
	Total for the above			93 hours / week /week
Group No.2	IS100	Computing Fundamentals	966	4,928 hours・units
	CS111	Introduction to Computing Science	400	1,568 hours・units
	IS121	Introduction to Information Technology	248	2,776 hours・units
	CS240	Software Engineering I	403	3,224 hours・units
	CS318	Artificial Intelligence	173	1,384 hours・units
	CS391	Topics in Computer Science	120	624 hours・units
	CS323	Information Systems Analysis & Design	680	2,280 hours・units
	IS222	Database Management System	581	3,176 hours・units
	CS311	Operating System		1,552 hours・units
	CS3xx	Multimedia System		1,384 hours・units
	CS3xx	Digital Image Processing		1,384 hours・units
	IS221	Distributed Information System Theory and Application		4,176 hours・units
	IS328	Data Mining		1,384 hours・units
	Total for the above			29,840 hours・units/week

iii) Department of Engineering

・Computer Lab for Engineering

The number of students in the 1st semester as of 2006 was about 160. When the ICT Centre is completed and the Information and Communication and Mechatronics Courses are newly established in 2010, the 1st year, the number of students is expected to total 200.

On the following calculation basis, it is estimated that the Department of Engineering will need one PC laboratory equipped with 12 computers loaded with dedicated software for the Information and Communication Course.

Table 2-10 Number of students in Department of Engineering

	2008	2009		2010			2011			
	First year	First year	Second year	First year	Second year	Third year	First year	Second year	Third year	Fourth year
Information and communications	60	60	45	60	45	35	60	45	35	35
Electrical/electronics	80	80	65	80	65	50	80	65	50	50
Mechatronics	60	60	45	60	45	35	60	45	35	35
Total	200	355		475			595			

[Calculation method]

・Courses held in the laboratory are summarized as follows with regard to the first semester in which more classes are held.

Table 2-11 Classes of the Department of Engineering to be held in computer laboratories

No.	Subject	Student level	No. of hours (/week)	No. of students	Total number of hours per semester
EN102	Engineering drawing	1st year of the Electricity and Electronics course 1st year of the Information and Communications course 1st year of the Mechatronics course	3	60 80 60	600
EN4xx	Graduation research	4th year of the Information and Communications course	3	35	105
EN4xx	Digital signal processing	4th year of the Information and Communications course	3	35	105
EN4xx	Satellite communications	4th year of the Information and Communications course	3	35	105
EN4xx	Elective subject (1 out of 6 optional subjects)	4th year of the Information and Communications course	3	35	105
Total					1,020

The above classes require a PC per student. Based on the table above, the total hours and number of units of PCs to be used in a week is calculated as 1,020 hour-unit/week

Next, assuming 80% as the operational rate, the number of hours per week for a PC to be used in a week can be calculated as 79 using the following equation.

14 hours/day × seven days × 80% ≒ 79 hours/week

Therefore, the total number of computers necessary is derived as follows, and it can be concluded that 12 units is sufficient for running the laboratories.

1,020÷79＝12.9≒12 units

・Information and Communication Engineering laboratory

This Engineering laboratory is used to conduct experimental subjects related to Information Communication. Of the curricula presented by the Department of Engineering, the following courses are applied to experimental subjects.

Incidentally, since the experiment is reportedly expected to be conducted with 30 students as a group, the numbers of groups in individual courses were calculated based on the assumption that there will be 30 students, provided that the information and communication engineering laboratory in question will be designed with a seating capacity for 30 persons.

Table 2-12 Specialized Engineering courses in Information and Communication

Code No.	Name of course	Semester	Estimated number of students to take the course (number of groups)	
			First semester	Second semester
EN2xx	Basic communication engineering	III	110 (4G)	
EN3xx	Communication network	IV		110 (4G)
EN4xx	Graduation research I	VII	35 (2G)	
EN4xx	Satellite communications	VII	35 (2G)	
EN4xx	Optional course	VII	35 (2G)	
EN4xx	Graduation research II	VIII		35 (2G)
EN4xx	Wireless communications	VIII		35 (2G)
EN4xx	Optional course	VIII		35 (2G)
Total			215 (10G)	215 (10G)

・Experiment implementation time: 30 hours

10 groups × three hours = 30 hours

・Weekly available hours per room: 36 hours

9 hours (class hours) × five days × 0.8 (utilization factor) = 36 hours

・Number of laboratories required: 1 rooms

30 hours (experiment implementation time) ÷ 36 hours (available hours) ≒ 0.83 = one room

d. Calculation of sizes for the Research and Development Department

This department will be provided with space and human resources by the centre for joint research and development with external organizations (such as corporations) mainly to promote the research, development, and commercialization of technologies related to the Information and Communication. In specific terms, six corporations have made requests so far. However, given

that all six of the laboratories will not be in use all of the time, the number of necessary laboratories is assumed to be three, provided that the availability factor will be 50%.

i) Laboratory (incubation)

・Number of rooms: 3

・Area per room: 12 m^2

Sufficient space for the stationing of up to two persons

・Interior: The laboratory will be equipped with laboratory functions enabling the installation of personal computers.

ii) Information and communication engineering laboratory (Test Bed)

・Number of rooms: 1

Sufficient space for division into two rooms

・Area per room: 160 m^2

This room can be divided into two rooms by providing removable walls. In addition, the interior will be dividable through the placement of booths.

・Interior: The information and communication engineering laboratory will be equipped with devices enabling the installation of personal computers and experimental equipment.

⑤Floor planning

[Common area]

The Common area will be a common space shared by the Administration Division, the division responsible for operating and managing the ICT Centre, staff, and students.

a. Multi-purpose Lecture Theatre (Building T)

The Multi-purpose Lecture Theatre will be a lecture hall with the capacity to seat 300 students, which will be usually used for a general lecture room for IT-related courses provided to a large number of students. In addition to regular lectures, the hall is expected to be used as an international conference hall for IT-related academic conference. Furthermore, the hall aims to play a role of a base for the transmission of information toward the objective of this project ― alleviation of the digital divide among islands ― by recording, storing, and distributing languages and cultures of 12 South Pacific islands, which participate in USP, to the respective countries in a form of digital video with IT technologies put into full use.

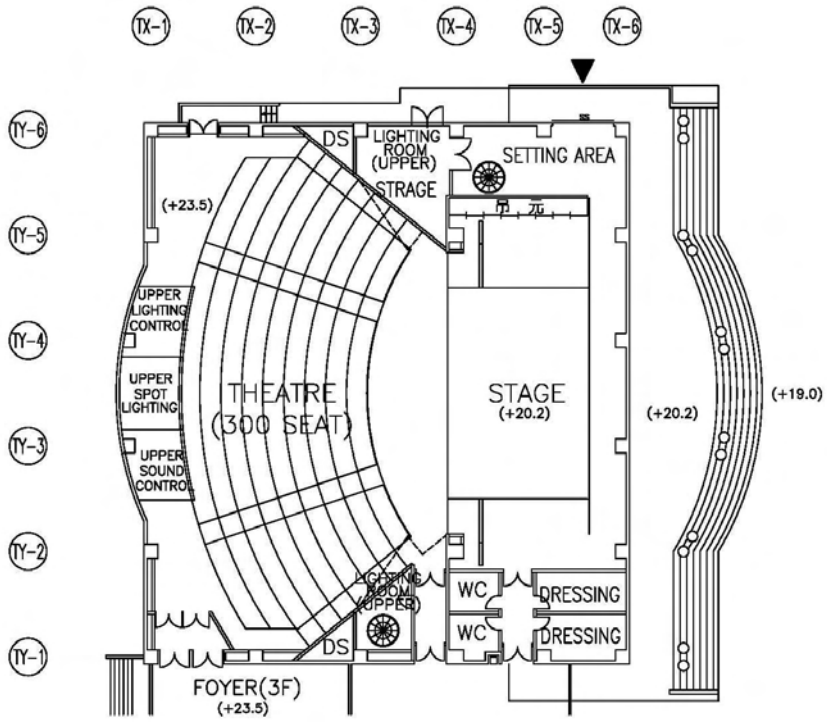

Figure 2-4 Multi-purpose Lecture Theatre Floor Plan

i. Audience (Building T Two-Third Floor)

- The audience will be seated in a semicircular-stadium-style configuration around the apron stage with shorter visual distance to the stage. This will enable the presentation of lectures with the travelers (house curtains) left closed.
- The number of seats to be secured for the audience will be around 300, a number suitable for the appreciation of dramas or lectures, with 0.72 m^2 (60 cm wide and 1.2 m deep) allocated per each member of the audience, in compliance with the USP Facility Standard.
- Spaces for the handicapped will be secured in the front row and rearmost row.

ii. Stage (Building T, Second Floor)

- The stage will be constructed in a “proscenium” style capable of accommodating and concealing curtains and lighting required for the presentation of lectures and drama performances.
- The space to be secured for the stage will be wide enough to use for small-scale dramas or dances performed by 10 to 20 people (12 m wide (space between the curtains) × 8 m deep). In addition, a rollup-type screen will be installed at approximately the centre of the stage as an aide to lectures, taking the projection angle and distance.
- The front of the audience will be used as an apron stage for various purposes, including lectures, dramas, and use as a transfer space for camera photographers without installing a step between the stage and audience.
- The digital video recorded by the camera will be distributed to USP-participant countries and so on through the USPNet.
- The specifications for the stage settings will be as follows.

Table 2-13 Stage Settings Specifications

No	Name	Intended use	Stage Settings Specifications	Construction category
1	Traveler / House draw curtain (gold background)	Used to open and close the stage (lectures will be presented with the stage left closed)	22 m wide, approximately 7.5 m high, gold background, electrical motor-driven type	Included in the scope of this project
2	Traveler / House draw curtain (black background)	Used to open and close the stage (and as a scene-change curtain for dramas)	22 m wide, approximately 7.5 m high, black background, electrical motor-driven type	To be constructed separately from this project
3	Borders / Teasers	Curtains hung from the upper part of the stage to cover the stage flyings from the sight of the audience.	22 m wide, approximately 1.5 high, black background, hand-driven type	Included in the scope of this project
4	Side Legs / Curtains at the wings	Curtains hung from the right and the left sides of the stage to cover broadcasters and tools on the stage from the sight of the audience.	3 m wide, approximately 8 high, black background, hand-driven type	Included in the scope of this project
5	Suspension light	Hung from the pipe batten, chiefly to provide lighting effects on the stage.	650W Fresnel lens spotlight, hand-driven type	To be constructed separately from this project (only installation of three pipe battens will be included in the scope of this project)
6	Border light	Equipped directly behind the teasers to illuminate the stage.	200W nine-light halogen lamp, hand-driven type	To be constructed separately from this project (Three batten included.)
7	Draw curtain	Used to switch stage scenes.	20 m wide, approximately 6.5 m high, black background, electrical motor-driven type	To be constructed separately from this project
8	Projection screen	A curtain on which an images are projected during lectures.	300-inch white background curtain exclusively for image projection, electrical motor-driven type	Included in the scope of this project
9	Cyclorama	An effect curtain fixed at the innermost section of the stage to project images such as backgrounds	20 m wide, approximately 6.5 high, white background, electrical motor-driven type	Included in the scope of this project
10	Horizon light	A light to illuminate the cyclorama	200W nine-light halogen lamp, hand-driven type	To be constructed separately from this project
11	Ceiling light	Lighting effect equipment illuminating the stage from the upper part of the audience	1KW plane-convex lens spotlight	Included in the scope of this project
12	Gridiron	A work platform to hang curtains, lightings, and so on over the stage	Pulleys and cables will be placed on H-section steels arranged in the shape of lattice	Included in the scope of this project

Note: The above mentioned stage system will include pipe battens, cables, pulleys, and up-and-down/opening/closing mechanism for hanging stage settings.

iii. Backstage rooms (dressing room, anteroom) (Building T, Second Floor)

・Although backstage rooms are basically required for the area (on per broadcaster), the plan calls for the provision of only one backstage-cum-dressing room for female students and one backstage-cum-anteroom for professors and lecturers, based on the premise that male students will use vacant classrooms, etc. for dressing and resting.

iv. Spotlight booth, light control room, acoustic control room (Building T, Fourth Floor)

.・Space will provided for a pin spot to illuminate stage characters.

.・Space will be provided for the installation of a light control desk for the collective control of the illuminations for the stage and audience.

・Space will be provided for the installation of a mixer to control the acoustics on the stage.

v. Lobby, foyer, rehearsal space

・The staircase between the Building B and the Building T and the corridor on the Third Floor of the Building B will also be used as a foyer. (The lobby and foyer are two very important public spaces for use mainly before performances, after performances, and during breaks).

・The Conference Room on the Third Floor of the Building B will be used as a rehearsal room, as needed.

b. Office- Director ICT (Building A, Third Floor)

It has been decided that the “assistant director” of USP will also serve as the Director ICT. A private room is to be provided to the Director ICT.

・The standard area for USP director level personnel, 20 m^2 or more, will be secured according to the USP Facility Standard.

c. Office- Core Staff (Building A, Third Floor)

Offices (private rooms) will be provided for the three staff (one staff from each department) to be involved in the operation and management of the ICT Centre.

・The area to be secured for each office will be at least 12 m^2, the standard area for lecturer level personnel according to the USP Facility Standard.

d. Reception/Secretary (Building A, Third Floor)

A Reception and Secretary's Counter (two personnel) will be provided at the entrance of the Administration Division for visitors. This counter will be equipped with a fax machine and copy machine.

・The area to be secured will be at least 8 m^2 × 2 = 16 m^2, the standard area for administrative staff level personnel according to the USP Facility Standard.

・A reception counter for visitors, a fax machine, a copy machine, and the like will be placed in this space.

e. Visiting Staff Office (Building A, Third Floor)

In light of the nature of the ICT Centre—an academic institute comprised of multiple departments, where professionals in various fields are to be invited both from within Fiji and the rest of the world—three rooms will be provided to accommodate three invited staff members (one for each of the three departments).

・ The area to be secured will be at least 12 m^2, the standard area for senior lecturer level personnel in each office according to the USP Facility Standard.

f. Video Conference Room (Building B, Third Floor)

The Video Conference Room will be a conference room equipped for use as a stage for distance learning programs for the 12 participant nations and video conferences over USPNet. This room will have the capacity to seat 50 personnel, about the same level accommodated now.

・ A conference space for 50 personnel will be secured.

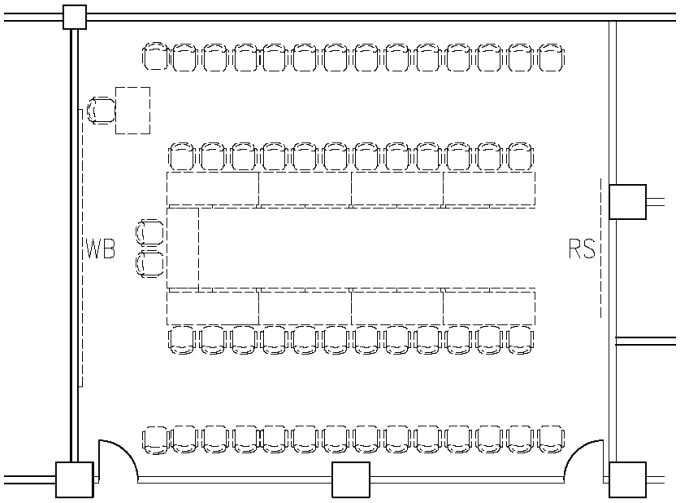

Figure 2-5 Video Conference Room Floor Plan

g. Conference Room (50 parson) (Building B, Third Floor)

This facility will be designed as a large conference room where administrative staff of the ICT Centre and the heads and administrative staff of individual departments can gather together under one roof (capacity to seat 50).

- Conference space for 50 personnel will be secured.
- The room will be soundproofed to enable use as a rehearsal room for the Multi-purpose Lecture Theatre.

h. Common Room for Staff (Building A, Third and Fourth Floors)

A lounge will be provided for small meetings, information exchanges, etc., among professors, academic staff, administrative staff, and so on.

- A space will be secured for small conferences of approximately five personnel.
- The lounge will be equipped with a sink cabinet for preparing and serving tea.

i. ICT- Resource Room/Digitization Room (Building A, Second Floor)

A small data room (digitization room) where visitors can read and compile ICT-related books, theses, reference materials, will be provided.

Digitization function will be organized by Library, so this room will be provided equipment that visitors can browse and compile Library-owned media.

j. Radio Pasifik' Room (Building B, Second Floor)

This radio station is operated by students as part of the practice. The radio programs broadcast from the station play an important role as a communication linking USP with isolated neighboring islands. As the present broadcasting station within the Media Centre is far too small, it will be transferred to a larger space in the ICT Centre.

i. Reception, waiting hall

・A reception counter and waiting space for broadcasters, inquirers, and observers will be provided.

ii. Studio

・ Storage space will be secured for six personnel (including a broadcaster, timekeeper, and program director) and installation space will be secured for part of the broadcasting equipment. Sound-absorbing and soundproofing material will be equipped in the room interior.

iii. Audio-tuning studio

・ Space will be secured to accommodate two recording and editing engineers and to install a mixer, program-recording equipment, etc.

iv. Staff Office

・ Space will be secured to accommodate three program production staff. (The space to be secured will be at least 6 m^2 × 3 = 18 m^2, the standard per capita area for the rank-and-file administrative staff level personnel according to the USP Facility Standard.)

v. Manager Office

・ The area to be secured will be at least 12 m^2, the standard area for administrative manager level personnel.

[Department of Computer Science]

a. Academic Staff Office (Building A, Second, Third and Fourth Floor; Building B; Fourth Floors)

There are 12 academic staff at present, including professors, assistant professor, and lecturers. In preparation for the planned staff increase in the new departmental scheme in 2008, private rooms will be provided for 18 staff out of the request for 20 staff.

・ The area to be secured for each office will be at least 12 m^2, the standard area for senior lecturer level personnel according to the USP Facility Standard.

b. Technical Staff Office (Building B, Fourth Floor)

With regard to the Staff Office for technical staff engaged in the maintenance and inspection of computers and software, a room for two personnel will be provided (similar to the case as it is now).

・ The area to be secured for the room will be at least (8 m^2+equipment space 4 m^2) × 2 = 24 m^2, the standard area per room for senior engineer level personnel according to the USP Facility Standard.

c. Administrative Staff Office (Building A, Fourth Floor)

A space for two personnel will be provided as an office for secretaries (for administrative staff) in this course (similar to the case as it is now). This space will be equipped with a fax machine and copy machine.

・ The area to be secured will be at least 8 m^2 × 2 = 16 m^2, standard area for administrative staff level personnel according to the USP Facility Standard.

・ Space will be provided to install a fax machine, a copy machine, etc.

d. Tutor Office (Building A, Second Floor)

There are now 12 instructors providing tutorial (tutors). In preparation for the planned staff increase in the new departmental scheme in 2008, private rooms will be provided for 16 staff out of the request for 20 staff.

- The one room will be used by two personnel.
- The area to be secured for the room will be at least 6 m^2 × 2 = 12 m^2, the standard area per room for tutor level personnel according to the USP Facility Standard.

As laboratories using computers, the following five types of laboratories will be provided according to the intended use and pattern of use.

e. Research Laboratory (Building A, Fourth Floor)

A research laboratory intended for use by students enrolled in the Master's, Doctoral, and Post-Degree Courses (five rooms with the capacity for 5 persons each)

- In consideration of the research conducted by individual teams, one of the five rooms will be used by five students.
- The area to be secured for the room will be at least 6 m^2 × 5 = 30 m^2 , the standard area per room for tutor level personnel according to the USP Facility Standard.

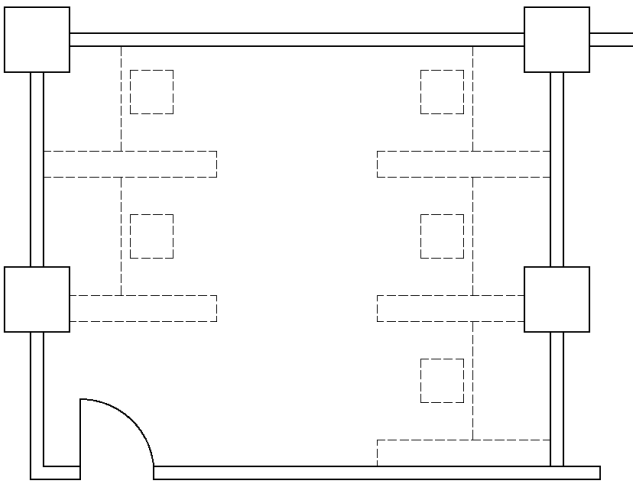

Figure 2-6 Research Laboratory Floor Plan

f. Dedicated Networking Teaching Laboratory (Building B, Fourth Floor)

A laboratory intended for use for experiment and practice related to the PC network of the Department of Computer Science and the Department of Engineering (One room with the capacity to accommodate 40 persons)

- The area to be secured for the room will be at least 3 m^2/person × 40 = 120 m^2, the standard area per room for students according to the USP Facility Standard.

(Note: 3 m^2/person is the standard area for a room with a capacity to accommodate 21 persons or more)

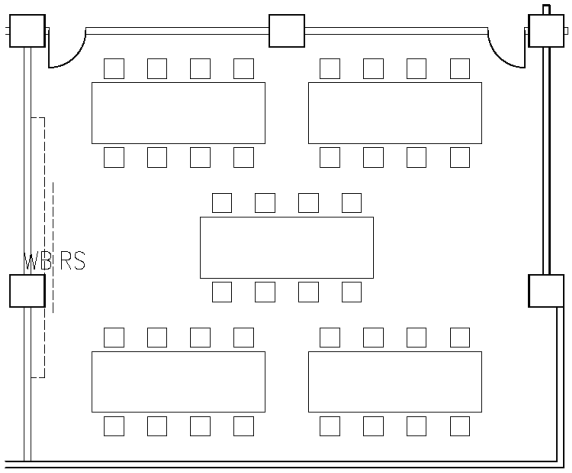

Figure 2-7 Dedicated Networking Teaching Laboratory Floor Plan

g. Dedicated Computer Teaching Laboratory (Building B; Fourth Floor)

A special laboratory exclusively for practice in more specialized subjects in the Department of Computer Science (four rooms with the capacity to accommodate 40 persons each)

- The area to be secured for the room will be at least 3 m^2 × 40 students = 120 m^2, the standard area per room according to the USP Facility Standard.

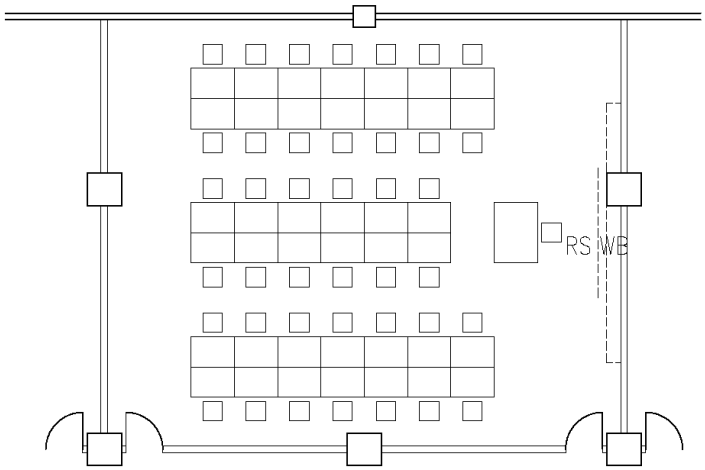

Figure 2-8 Dedicated Computer Teaching Laboratory Floor Plan

h. Postgraduate Laboratory (Building B, Fourth Floor)

A special practice laboratory exclusively for use of Certificate / Diploma students (one room with the capacity to accommodate 24 persons)

- Although the USP Facility Standard specifies the standard area per student as 3 m^2, the space to be secured for this laboratory will be at least 2.5 m^2 × 24 persons = 60 m^2.

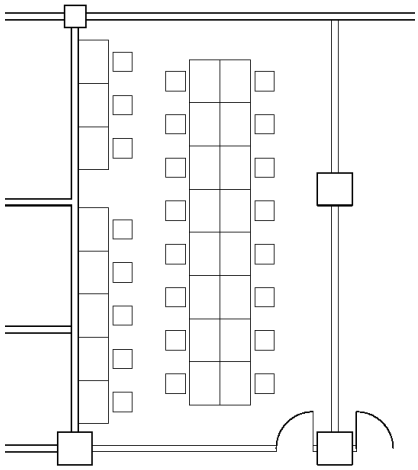

Figure 2-9 Postgraduate Laboratory Floor Plan

i. Technical Laboratory/Workshop (Building B, Fourth Floor)

This room will be used as a workshop for the maintenance and inspection of computers and as a storage area for equipment.

・A space will be secured for the installation of racks to accommodate personal computers and parts under maintenance or inspection.

[IT Services (Information Technology Services)]

This important division, which manages computers and the network installed within the USP Campus, is presently divided and dispersed over several different floors of the Media Centre. In order to eliminate inconvenience and expand the present lack of space, the division will be transferred to a single location within the ICT Centre.

a. Office- Director ITS (Building A, Second Floor)

The Office- Director (private room) for the IT Service Division will be provided

・ The area to be secured will be at least 20 m^2, the standard area for a director according to the USP Facility Standard.

b. Office- Secretary (Building A, Second Floor)

Space will be provided for a secretary belonging to the IT Services. This space will be equipped with a fax machine and copy machine.

・ The area to be secured will be at least 8 m^2, the standard area for administrative staff level personnel according to the USP Facility Standard.

・ Space will be provided to install a fax machine, copy machine, etc.

c. General Office ITS (Building A, Second Floor)

At the moment there are 50 administrative staff stationed in the IT Services, a large room for only 20 staff will be provided, and the shortage of spaces to be covered by the existing facilities.

・ The area to be secured for the room will be at least 6 m^2 × 20 persons = 120 m^2, the standard area for rank-and-file administrative staff according to the USP Facility Standard.

d. Meeting Room (Building A, Second Floor)

A small room will be provided for group meetings of the staff.

・A space will be provided for meetings of approximately six persons.

The IT Services will manage the following two types of computer laboratories:

e. Laboratory A (Professional & Development Laboratory) (Building A, Fourth Floor)

A training laboratory chiefly intended for adult education courses provided by the IT Services such as Red Hat and CISCO Academy (two rooms with the capacity to accommodate 25 persons each)

・ The area to be secured for the room will be at least 3 m^2 × 25 students = 75 m^2, the standard area per room according to the USP Facility Standard.

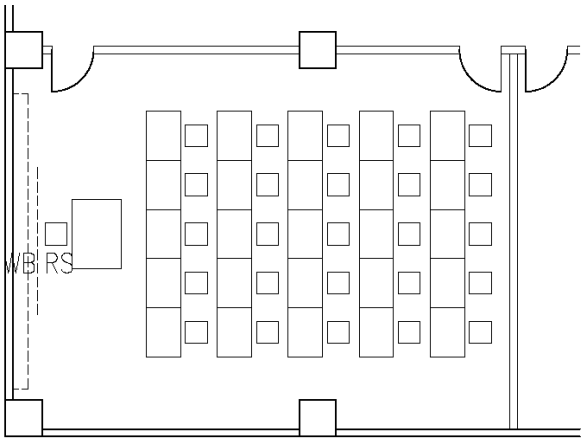

Figure 2-10 Laboratory A (Professional & Development Laboratory) Floor Plan

f. Laboratory B (General Access Laboratory) (Building A, Third Floor)

The laboratory will be freely available to students for PC practice in the computer-related subjects taught in all of the university's course programs, as well as for functions such as self-study on PC, Internet browsing, writing of theses, etc. (two rooms with the capacity to accommodate 60 persons each)

In addition, the Professional and Development Laboratories and the General Access Laboratories need to be secured in the minimum quantities to satisfy respective demands. In other words, it is difficult to share a room for both purposes or integrate the functions into a room.

・ Although the standard area stipulated by the USP Facility Standard is at least 3 m^2 × 60 persons = 180 m^2, an area of only 162 m^2 or more (per capita area of 2.7 m^2) will be secured due to constraints imposed by the desk layout and other factors.

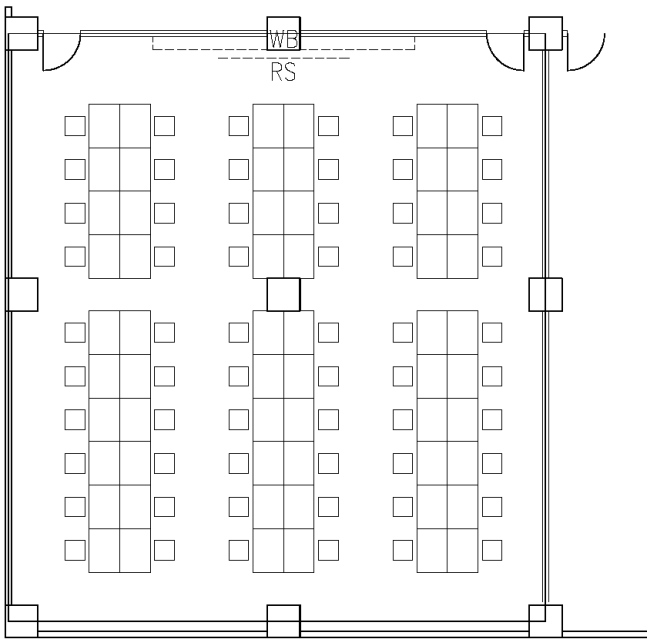

Figure 2-11 Laboratory B (General Access Laboratory) Floor Plan

In consideration of the function of the division involving the maintenance and inspection of computers and the network, the IT Services will be provided with the following.

g. Computer Workshop (Building A, Second Floor)

Warehouse and repair room for computer equipment

・ Space will be secured to install a rack for the temporary storage of computer equipment under repair.

h. Server Room (Building A, Second Floor)

The Server Room is a space for installing and managing the main server with which the IT Service Division administers the protocols throughout the country. In accordance with the transfer of the IT Service Division, the room is relocated inside the ICT Centre. For the security sake, one single room will be allocated for this purpose.

While there are 32 server machines in the existing server room at present, space to place ten 19-inch racks to accommodate server machines, network system equipment, and electrical transmission equipment for the USPNet will be secured in the server room within the new centre in order to prepare for the USPNet improvement plan for the near future. The floor of the server room will be constructed as a free access floor where Ethernet cables, optical fiber cables, and power cables can be easily laid.

・ Twenty servers will be installed by integrating the requested 34 units, including the ITS server machines, network equipment, and electrical transmission equipment for the USPNet (all requiring installation work). Space will also be provided for sixteen 19-inch racks, including ten units for

immediate use and six for future expansion.

- Space will be secured to install one rack for the exclusive use of the Department of Computer Science.
- Space will be secured to install a desk, bookshelf, etc. for the server manager.
- The entrance door will be provided with a electric lock system for security.

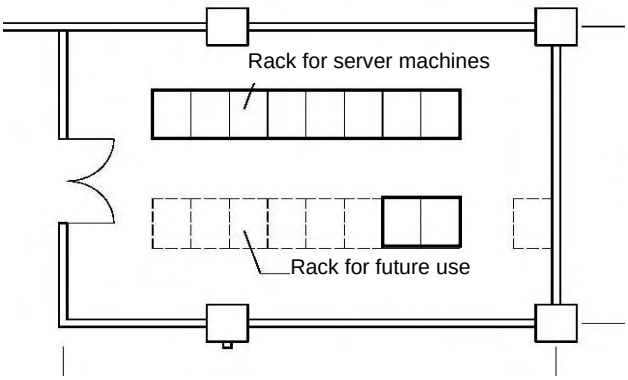

Figure 2-12 Server Room Floor Plan

i. Storage (Equipment Warehouse) (Building A, Second Floor)

Storage space for the network equipment and parts will be provided.

- Space will be secured to install a rack for the storage of personal computers and parts for the network.

j. Help Desk & Waiting Area (Building A, First Floor)

A section will be established to respond to requests for repair and technical inquiries from other departments and students.

- The area to be secured for the administrative staff will be at least 8 m^2 × 6 persons = 48 m^2, the standard area =according to the USP Facility Standard.
- In addition to the office, a waiting space wide enough to install a counter and chairs will be secured.

k. USPNet Control Room (Building B, Third Floor)

The USPNet Control Room is a nucleus facility intended to distribute distance learning programs to the 12 participant countries via satellite communications. The facility engages in the recording, distribution and recordkeeping of classes. It will be transferred from the current location in the Media Centre to the ICT Centre in parallel with the relocation of the IT Services, a division to which it has close technical ties.

i. Reception, Waiting Space

- A reception counter and waiting space for broadcasters, inquirers, and observers will be provided.

ii. Main Control Room

・ An area of at least the current 42 m^2 will be secured as space for the placement of the console (the existing equipment will be transferred) for recording and distributing programs. Sound absorbing and soundproofing devices will be installed in the room interior.

iii. Device Rack Room

・An area of at least the current 16 m^2 will be secured as space to install the recording devices (the existing equipment will be transferred).

iv. Workshop

・An area of at least the current 36 m^2 will be secured as a space to place, repair, and store recording devices such as monitors and amplifiers.

v. Staff Office

・A space for four program production staff will be secured. (The per capita space for rank-and-file administrative staff will be 6 m^2 or more according to the USP Facility Standard.)

vi. Manager Office

・The space to be secured will be at least 12 m^2, the standard area for the administrative manager level according to the USP Facility Standard.

[Research and Development (Incubation) Department]

a. Office- Research/Incubator (Building B, Second Floor)

Requests for establishing laboratories have been received from six top-ranking IT-related companies in Fiji (Telecom Fiji Ltd., Fiji Electric Authority, Amalgamated Telecommunications Holdings Ltd., ICT Land & Rural Farmers, National Small & Micro Enterprises, Bio-genetics). Notwithstanding, partnerships with these companies and agreements for shared use of the laboratories are not expected to commence immediately after the opening of the ICT Centre. Thus, the number of laboratories to be established has been set as three in total, or half the number of laboratories requested so far.

・The area to be secured will be at least 12 m^2 per room, the standard area for the lecturer level according to the USP Facility Standard.

b. Test Bed/Incubator (Building B, Second Floor)

Given that the laboratory may require various types of measuring equipment and test centres in addition to computers, a large room that can be flexibly partitioned with removable walls, etc., will be provided. In addition, future expansions of the room will be taken into consideration in the layout plan.

・The area to be secured will be 40 m^2 × 3 companies = 120 m^2 or more on the assumption that each company will use approximately 40 m^2.

・Each room will be dividable into two rooms with the usage of removable walls.

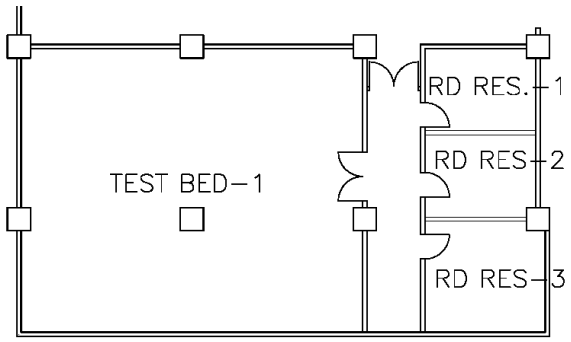

Figure 2-13 Office- Research/Incubator/ Test Bed/Incubator Floor Plan

[Department of Engineering]

a. Office- Engineering (Building B, Third Floor)

A private room will be prepared as the office for the head of the Department of Engineering in the ICT Centre.

・The area to be secured will be 18 m^2 or more, the standard area for the professor level according to the USP Facility Standard.

b. Technical Staff Office (Building B, Third Floor)

A room will be provided for three technical staff personnel engaged in the maintenance and inspection of computers and software in the Staff Office (similar to the case as it is now).

・The area to be secured for the room will be at least 6 m^2 × 2 persons = 12 m^2, the standard area per room for engineer level personnel according to the USP Facility Standard.

c. Postgraduate Room (Building B, Third Floor)

A room will be prepared for postgraduate students from the Department of Engineering (one room with the capacity to accommodate 4 persons).

・Although the standard area stipulated by the USP Facility Standard is at least 3.5 m^2 × 4 persons = 14 m^2, the area to be secured will be only 12 m^2 or more (per capita area of 3.0 m^2) due to constraints composed by the desk layout and other factors.

d. Computer Laboratory (Building B, Third Floor)

One computer laboratory will be provided for exclusive use of the Department of Engineering (one room with the capacity to accommodate 12 persons).

・The area to be secured for the room will be at least 3.75 m^2 × 12 persons = 45 m^2, based on the per capita standard area per student according to the USP Facility Standard.

(Note: 3.75 m^2/person is the standard area for a room with a capacity to accommodate 20 persons or less)

e. Information and Communication Engineering Laboratory (Building B, Third Floor)

The original request from USP called for four types of laboratories (course exercises in the fields of Electrical Engineering, Electronic Engineering, Communications, and Mechatronics). In light of

the purpose of this centre, however, the plan provides for only one engineering laboratory for experiments and practice in subjects closely associated with ICT in the related three courses (electrical/electronic engineering, information and communications, and mechatronics). The laboratory will accommodate 30 persons and will be well equipped for practice and training in groups of three.

・ While the standard area stipulated by the USP Facility Standard is at least 3.0 m^2 × 30 persons = 90 m^2, a space will be secured to install experimental desks (1.2m × 1.2m) in the laboratory and a window-side space will be placed to install shelves for storage of the equipment for experiments.

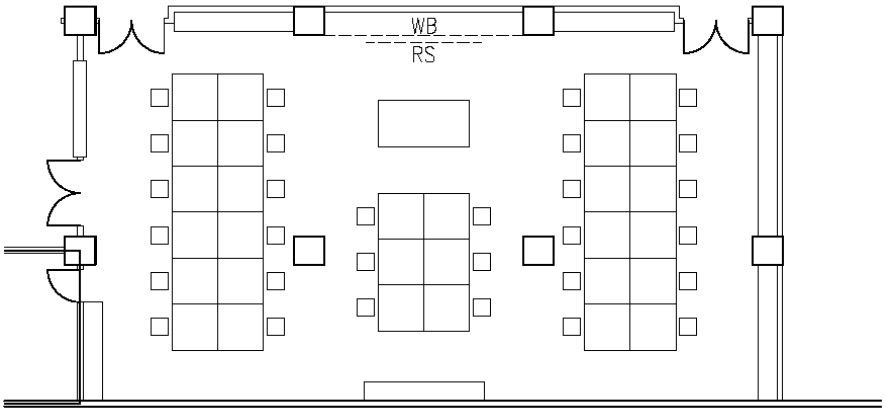

Figure 2-14 Informal and Communication Engineering Laboratory Floor Plan

f. Storage/Research (Building B, Third Floor)

One room will be provided as an annex to the Engineering Laboratory for use for activities such as practice wiring and assembly, as well as maintenance and storage of the various equipment used for the aforementioned laboratories.

・ Space will be secured to install personal computers for practice and racks for the storage of parts necessary for assembly.

⑥ Table of the Calculated Area Plan

Table 2-14 Area Table by Building

(m^2)	Area by floor	Building A	Connection bridge	Building B	Multi-purpose Lecture Theatre building		Remarks
					Foyer	Multi-purpose Lecture Theatre	
Building roof	36	18		18		104	Rooftop elevator machine room etc.
Fourth Floor	2,059	774	59	1,122		445	
Third Floor	2,059	774	59	1,102	129	450	
Second Floor	1,752	733		450	119		
First Floor	303	303				999	
Sub Total							
Total	6,659	2,602	118	2,692	1,247		

Table 2-15 Table of Calculated Areas

Name of department	Building	Floor	Name of room	Existing area			Requested area			Planned area			Nbr of users		Remarks (USP Facility Standard)
				Number of rooms	Area	Total	Number of rooms	Area	Total	Number of rooms	Area	Total	Student	Staff	
Common Area (COMM)	T	2,3	Multi-purpose Lecture Theater	-			1	750.0	750.0	1	869.0	869.0	300		2.0㎡/person
			Lecture Hall	-			4	300.0	1200.0	0		0.0			
	A	3	Office- Director ICT	-			1	24.0	24.0	1	22.0	22.0		1	24㎡/person
	A	3	Office- Core Staff	-			10	12.0	120.0	3	12.0	36.0		3	12㎡/person
			Office- Senior Staff	-			24	12.0	288.0	0		0.0			
	A	3	Reception/Secretary	-			1	40.0	40.0	1	24.0	24.0		2	12㎡/person
	A	3	Visiting Staff Office	-			6	12.0	72.0	3	12.0	36.0		3	12㎡/person
			Lecture Room	-			4	53.0	212.0	0		0.0			
	B	3	Video conference Room	-			1	200.0	200.0	1	120.0	120.0	50		2.5㎡/person
			Green Room	-			1	50.0	50.0	0		0.0			2.0㎡/person
	B	3	Conference Room (50 Parson)	-			1	100.0	100.0	1	90.0	90.0			2.0㎡/person
			Interaction Room	-			2	15.0	30.0	0		0.0			
	A	3,4	Common Room for Staff	-			0	0.0	0.0	2	24.0	48.0			
	A	2	ICT-Resource Room	-			1	30.0	30.0	1	24.0	24.0			Combined use
			Digitization Room	1		12.0	1	56.0	56.0						
	B	2	Radio Pasifik' Room	1		29.9	1	290.0	290.0	1	120.0	120.0	17		
			COMM Sub Total						**3462.0**			**1389.0**	**367**	**9**	
Computer Course (CS)	A,B	2,3,4	Academic Staff Office	9		99.9	20	12.0	240.0	18	12.0	216.0		18	12㎡/person
	B	4	Technical Staff Office	1		10.5	1	48.0	48.0	1	24.0	24.0		2	12㎡/person
	A	4	Administrative Staff Office	3		35.1	1	48.0	48.0	1	24.0	24.0		2	12㎡/person
	A	2,3	Tutor Office	5		53.6	20	12.0	240.0	8	12.0	96.0		16	6㎡/person
	A	4	Research Laboratory	-			10	60.0	600.0	5	30.0	157.0	5 each		6㎡/person
	B	3	Dedicated Networking Teaching Laboratory	-			1	100.0	100.0	1	120.0	120.0	40		3.0㎡/person
			General Access Laboratory	1		62.9	5	120.0	600.0			0.0			
	B	4	Dedicated Computer Teaching Laboratory	-			4	80.0	320.0	4	120.0	480.0	160		3.0㎡/person
	B	3	Postgraduate Laboratory	1		7.4	1	80.0	80.0	1	60.0	60.0	24		3.0㎡/person
			Seminar Room	1		37.4	6	45.0	270.0			0.0			
	B	4	Technical Laboratory/Workshop	-			1	160.0	160.0	1	21.0	21.0		2	
			Small Server Room	-			1	12.0	12.0			0.0			
			CS Sub Total						**2718.0**			**1198.0**	**249**	**40**	
IT Services (ITS)	A	2	Office- Director ITS	1		18.8	1	24.0	24.0	1	24.0	24.0		1	
	A	2	Office- Secretary	1		16.1	1	12.0	12.0	1	12.0	12.0		1	
	A	2	General Office	1		104.3	1	720.0	720.0	1	126.0	126.0		20	6㎡/person
	A	2	Meeting Room	1		76.6	1	25.0	25.0	1	24.0	24.0			
	A	4	Laboratory A（Professional & Development Laboratory）	1		107.7	4	81.0	324.0	2	75.0	150.0	50		3.0㎡/person
	A	3	Laboratory B（General Access Laboratory）	7		974.9	8	160.0	1280.0	2	162.0	324.0	120		3.0㎡/person
			Laboratory C (R&D)	-			1	50.0	50.0			0.0			
			Telephony Workshop	-			1	160.0	160.0			0.0			
	A	2	Computer Workshop	1		40.9	1	160.0	160.0	1	35.0	35.0		2	
			Communication Workshop				1	160.0	160.0			0.0			
	A	2	Server Room	1		34.4	1	156.0	156.0	1	54.0	54.0			
	A	2	Storage (Equipment Warehouse)	1		11.2	1	50.0	50.0	1	36.0	36.0			
	A	1	Help Desk & Waiting Area	1		70.6	1	60.0	60.0	1	72.0	72.0		3	
			Hub Earth Station Staff Room	-			1	24.0	24.0			0.0			
	B	3	USPNet Control Room	1		67.3	1	200.0	200.0	1	180.0	180.0			
			ITS Sub Total						**3405.0**			**1037.0**	**170**	**27**	
Research and Development Department (RD)	B	2	Office- Research/Incubator	-			6	12.0	72.0	3	12.0	36.0			12㎡/person
	B	2	Test Bed/Incubation	-			1	160.0	160.0	1	120.0	120.0			12㎡/person
			Test Bed -2/Incubation				1	100.0	100.0						
			RD Sub Total						**332.0**			**156.0**			

Department of Engineering (ENG)	B	3	Office- Engineering	1		12.5	1	24.0	24.0	1	24.0	24.0		1	24㎡/person
	B	3	Technical Staff Office	2		23.6	1	27.0	27.0	1	12.0	12.0		2	9.0㎡/person
	B	3	Postgraduate Room	1		6.1	1	90.0	90.0	1	12.0	12.0	4		3.0㎡/person
	B	3	Computer Laboratory	1		80.5	1	45.0	45.0	1	51.0	36.0	12		3.0㎡/person
	B	3	Information and communication Engineering Laboratory	1		143.6	1	250.0	250.0	1	196.0	196.0	30		8.3㎡/person
			Engineering Laboratory-2	1		190.9	1	250.0	250.0			0.0			8.3㎡/person
			Engineering Laboratory-3	1		181.5	1	250.0	250.0			0.0			
	B	3	Storage/Research	1		143.6	1	100.0	100.0	1	30.0	30.0			
			Storage/Research-2	1			1	50.0	50.0			0.0			
			ENG Sub Total						**1036.0**			**310.0**	**46**	**3**	
Geographic Information Course (GIS)			Office- Director	1		12.0	1	30.0	30.0						30㎡/person
			Office- Lecturers & Officers	6		72.0	1	100.0	100.0						15㎡/person
			Postgraduate Room	1		12.0	1	30.0	30.0						5.0㎡/person
			Geospatial Science Computer Learning Space	1		90.0	1	118.0	118.0						4.5㎡/person
			Geospatial Database Server Simulation Lab	-			1	30.0	30.0						
			10 Seat Research Laboratory	-			1	30.0	30.0						6.0㎡/PC
			Equipment Room	1		57.0	1	70.0	70.0						
			Data Warehouse	-			1	40.0	40.0						
							1								
			GIS Sub Total						**448.0**			**0.0**			
Other Common area			**Shared toilet and corridor**						**11401.0**			**4090.0**			
			Machine Room						**3990.4**			**1985.0**			
			Total Floor Area									**217.0**			
			Foyer						**300.0**			**126.0**			
			Total						**15691.4**			**6659.0**			

Note 1: The shaded region indicates requested rooms that were excluded from the scope of this project after examination.

2) Sectional and Elevation Plan

① Sectional Plan

a. The construction site is on sloped land with a mostly uniform gradient of 1 in 13, forming a height difference of about 18 m from east to west. A pond and an irrigation canal are located at the northern side of the site, and the southern side of the site leads to a cliff. In view of the somewhat narrow width of the site of 60 m to 80 m, the buildings will basically be laid out in an east-west direction in a stepped formation.

b. The construction site is a hard bedrock with an N value of 50 or higher at a depth of 1 m to 2 m below the ground surface. Accordingly, the foundation work will be adopt a spread foundation method without pile driving.

c. The building will be divided into the three wings in consideration of the shape and height difference of the site, the locations of the on-the-premise roads, and the major purposes of the buildings: the Building A (consisting chiefly of the Administration Division), the Building B (consisting of various laboratories), and the Building T (the building for the Multi-purpose Lecture Theatre). The Building A and Building B will be connected by a connection bridge, and the Building B and the Building T will be individually connected by the foyer and stairways.

d. The floor height of the Building A will be determined based on the following conditions:

First Floor : Determined by the height difference of the site (5.5 m).

Second Floor : Determined by the ceiling height of the living space (3.5 m) (required ceiling height (2.8 m) + height of the ceiling fans, etc. (0.7 m)).

The floor height of the third floor will be determined by the required height from the road surface of the connection bridge, 3.8 m.

Third Floor, Fourth Floor: Determined by the ceiling height of the various laboratories, offices, etc. (3.5 m) (same as above).

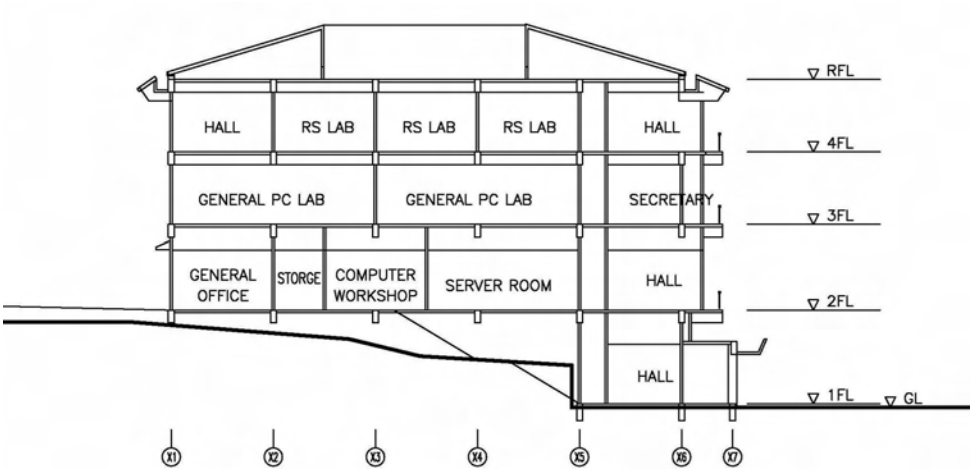

Figure 2-15 Cross Section of the Building A

e. The floor height of the Building B will be determined based on the following conditions:

Second Floor: Determined by the ceiling height of living space (required ceiling height (3.0 m) + the height of the ceiling fans, etc. (0.5m)).

Third Floor, Fourth Floor: Determined by the ceiling height of various laboratories, offices, and so on (3.5 m) (same as above).

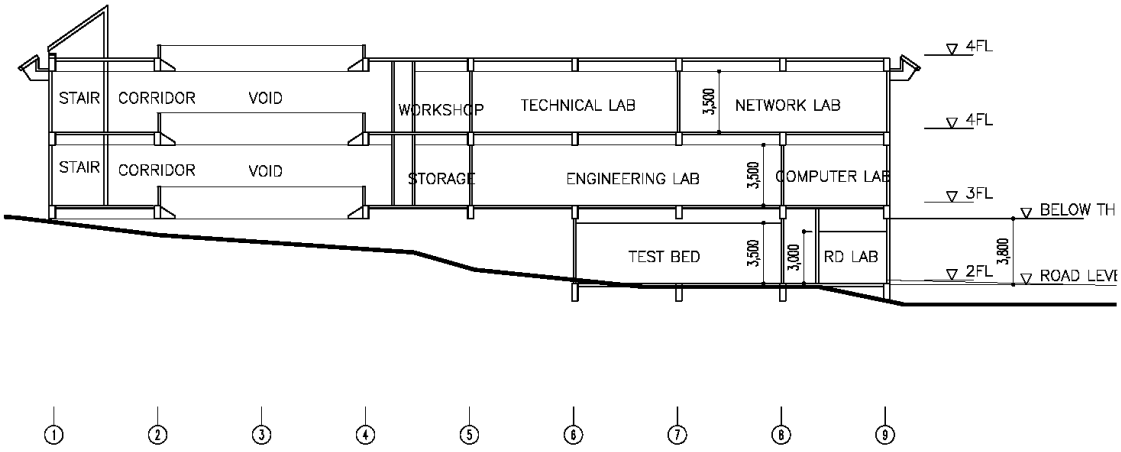

Figure 2-16 Cross Section of the Building B

f. The floor height of the Building T will be determined based on the following conditions:

Determined by the total of the ceiling height of the Multi-purpose Lecture Theatre (9 m), the

ceiling (maintenance space) (3m), and the height of the smoke exhaust system space in the upper part of the stage (approximately 4m). With the height difference of the construction site put into full use, the stage will be located on the east side with low elevation and the audience will be seated in a stepped formation from the second floor to third floor, in accordance with the elevation of the land.

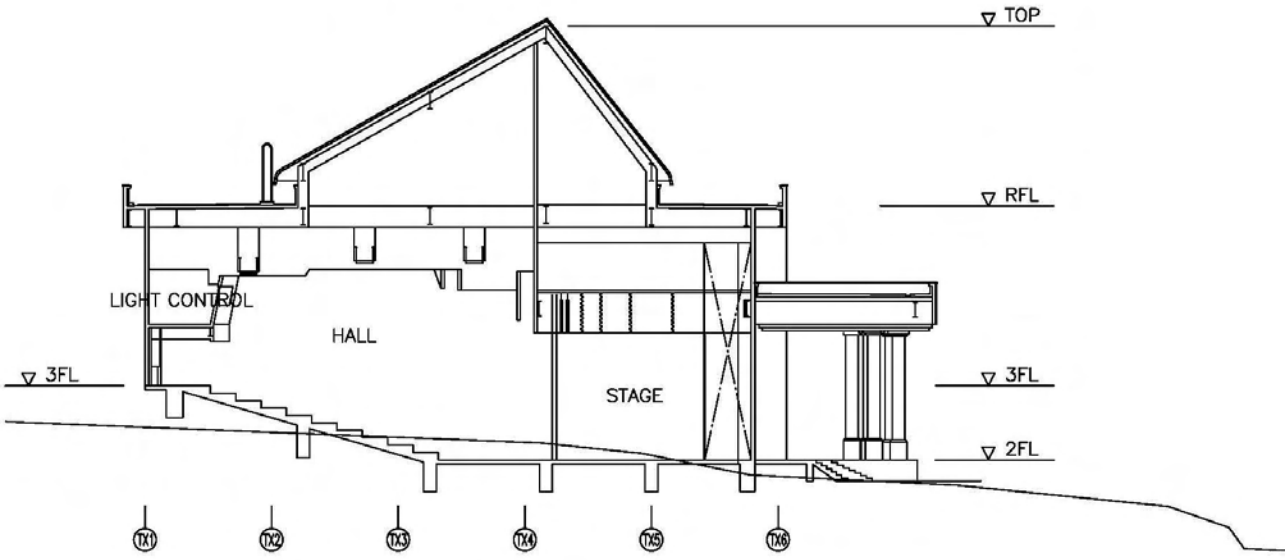

Figure 2-17 Cross Section of the Building T

g. Each Building will be provided with deep eaves and balconies to prevent direct sunlight from intruding into the rooms insofar as possible.

h. Canopy roofs will be placed over flat roofs in the Building A and Building B to secure air space and thereby insulate the structures from heat.

i. The ridge will be a flat roof in principle, and a canopy roof will be constructed on top of it using a steel frame structure at points requiring higher heights, such as the maintenance space and smoke exhaust system space.

② Elevation Plan

a. Building A: As the east side and north side structures are located in the most visible position from the courtyard in the front, they will be designed with round columns and balconies of the type often used to produce an academic atmosphere.

b. Building B: Although located away from the frontal courtyard on the east side, it will be designed uniformly with round columns and balconies of a type similar to those used in the Building A.

c. Building T: The east side will be designed in a functional and academic mode using various motives. For example, it will be provided with a platform running to the courtyard (a gathering place for the students), together with a slightly curved eave covering supported by a double-paired column for rain and sun cover.

d. Skyline: Designed in a rhythmic mode by making the most of the layout of the building complex. The ridges of the pitched roofs of the Building A and Building B will run East-West, while the pitched roof of the Building T will run North-South. This will give the skyline a dynamic appearance (as opposed to a monotonous one) when viewed from the courtyard on the east side of the campus.

3) Structural Planning

① Planning Standard and Load Conditions

The earthquake load and the wind load will follow the Fiji Standard (national Building Code of Fiji 1990). The earthquake load will be designed based on NZS4203, the wind load will be based on AS1170, and the live load will be based on the Japanese Standard.

② Foundation Plan

According to the report on the latest geological survey, the earth of the construction site is made up of a layer of residual soil to the depth of 1 m and Suva Marl underneath. The upper part of the Suva Marl is weathered. The building will be supported by a spread foundation over the Suva Marl underneath the residual soil layer as the supporting layer.

③ Structure Classification

The structure classification will be a reinforced concrete (RC) structure. However, a steel-frame (S) construction will be adopted for the roof of the Multi-purpose Lecture Theatre for functional reasons. As the corridor connecting the Building A and Building B will be constructed over a road, a steel-frame (S) construction will be adopted in consideration of the use of the road and the construction method.

④ Framing Plan

The framing plan will be a reinforced-concrete rigid-frame structure with earthquake-resisting walls in both the X-direction and the Y-direction. The steel frame columns and beams for the roof of the Multi-purpose Lecture Theatre will be Japan-made H-shape steel. The floors over floors in contact with the ground will be constructed with structural slabs to protect the structure from the disturbances to the ground resulting from the demolition of the existing building and the probable need for earth filling due to the height difference.

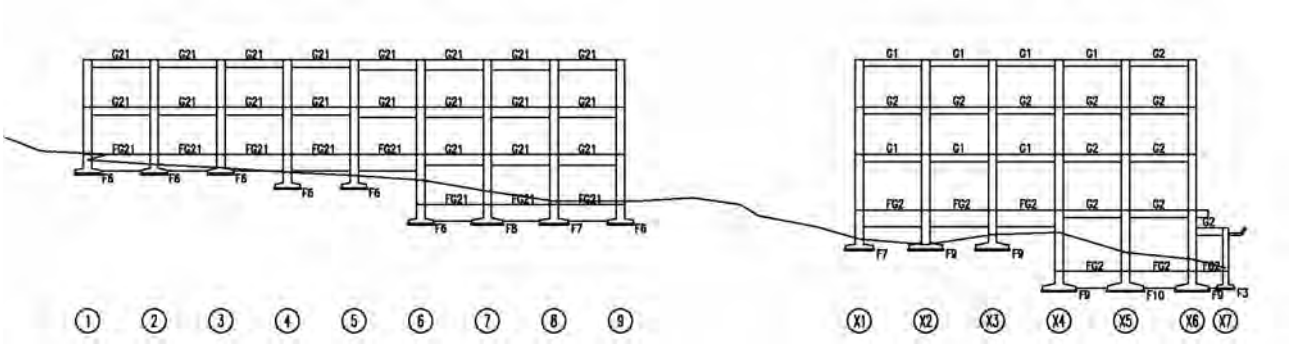

Figure 2-18 Framing Elevation

⑤ Design Load and Calculation Policy

The earthquake load will be calculated with safety coefficient against the earthquake taken into consideration based on the Fiji Standard. The wind load will be also calculated based on the Fiji Standard in order to reflect the circumstances of Fiji. The live load and the calculation formula will be based upon the Japanese Building Standard.

a. Earthquake Load (NZS4203)

The base sheer coefficient for the primary design will be calculated based on the Fiji Standard.

Lateral force coefficient C = Cb (T,1)・R・Z・Ls

Cb (T,1) = 0.80: Basic seismic hazard acceleration coefficient

(T = 0.3 sec, Intermediate soil sites)

R = 1.3: Risk factor (safety coefficient against earthquakes. The largest value in the Fiji Standard)

Z = 0.6: Zone factor

Ls = 1/6: Limit state factor (for Serviceability)

Figure C will be calculated as 0.104 and rounded of to C = 0.1.

This base sheer coefficient is equivalent to 50% of the Tokyo Standard.

b. Wind Load (AS1170)

The wind load will be calculated based on the Fiji Standard.

Design wind speed Vz = V・M (z,cat)・Msh・Mt・Ms

V = 57 m/s: Basic wind speed (for permissible limit state)

M (z,cat) = 1.00: Terrain and structure height multiplier

(Terrain category 2, Height = 10 m, Region C)

Msh = 1.0: Shielding multiplier (no shielding)

Mt = 1.0: Topographic multiplier (Flat site)

Ms = 1.1: Structure importance multiplier (maximum figure)

The figure Vz will be calculated as 62.7 m/s, therefore,

Wind pressure Qz = 0.6・Vz 2 = 2360 N/㎡

This wind load is equivalent to 1.5 times that adopted in Tokyo.

c. Live Load

The live load will be set in reference to the Japanese Building Standard.

Table 2-16 Live Loads Plan

Floor	Room	Live load (N/㎡)			Remarks
		Floor	Frame	Earthquake	
	Various Laboratories, Classrooms	2900	2100	1100	
	Offices, Conference Rooms, Restrooms	2900	1800	800	
	Multi-purpose Lecture Theatre, Stage	3500	3200	2100	
	Test Bed	4900	3900	2500	Equivalent to Physical Experimental Laboratory
	Storage	3900	2900	2000	

Note) The live load for machine rooms and outdoor equipment storage will be planned separately in consideration of the layout plan.

⑥ Structural material

Concrete: Ordinary concrete or ready mixed concrete procurable near the site.

Steel Bar: Imported from Japan

Steel Frame: The H-shape steel will be imported from Japan and the roof purlin materials will be imported from Australia or Japan.

Floor slab: A reinforced concrete floor slab (shingle board) will be adopted.

4) Plan for Air-Conditioning and Ventilation Facilities

① Air Conditioning and Ventilation Facilities

The air-conditioned area will be kept to a minimum in order to keep maintenance costs low. The most effective air-conditioning system will be adopted.

a. Cooling conditions

Given that the site is located in a high-temperature, high-humidity tropical zone, the air-cooling system will be required to remain in operation throughout the year. Measures to eliminate the high humidity will also be required.

b. Air-Conditioning System

A natural ventilation will be designed in principle, and a minimum number of rooms will be equipped with air-cooling machines. The air-conditioning system installed in the Server Room will have a 200% capacity above the normally required level, as an emergency safeguard in the event of equipment failures. In addition, a floor-blowing-type air-conditioning system will be installed in the server room to ensure that the room can be air-conditioned efficiently.

The light control room, sound control room, and spotlighting rooms will be of an indoor floor-standing type, in consideration of their impacts on the equipment. The light controls, sound controls, and spotlights installed in other rooms will be ceiling types requiring less installation space.

With the exception of the Server room and places where high heat or the like is generated, the air conditioners installed will be part of a building multi-air-conditioning system with smaller installation area required. The outdoor units will be installed intensively on the rooftop for easier maintenance, and they will be resistant to heavy salt damage in consideration of the close proximity to the sea.

Rooms with large areas will be provided with ceiling fans to ensure that they can be efficiently air-conditioned. The following rooms will require air-conditioners:

Table 2-17 Air-Conditioned Rooms List

Floor	Department	Room	Air Conditioning System
B-2F	CMN	Radio Pacifik	Ceiling Type Building Multi Air-Conditioning system
B-3F	CMN	Video Conference Room	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-3F	CMN	Green Room	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-3F	CMN	Storage	Ceiling Type Building Multi Air-Conditioning system
B-3F	CMN	Conference Room	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
A-4F	CS	Research Laboratory	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-3F	CS	Dedicated Networking Teaching Lab	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-3F	CS	Postgraduate Laboratory	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-3F	CS	Technical Laboratory (Workshop)	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-4F	CS	Dedicated Computer Teaching Lab	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-4F	ENG	Computer Lab	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-4F	ENG	Engineering Lab	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-4F	ENG	Storage 1 / Research	Ceiling Type Building Multi Air-Conditioning system
A-2F	ITS	Workshop (Computer)	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
A-2F	ITS	Server Room	Floorstanding Floor Blowing Type Air Conditioning System
A-2F	ITS	Storage Room	Ceiling Type Building Multi Air-Conditioning system
A-3F	ITS	Laboratory B (General Access)	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
A-4F	ITS	Professional Laboratory	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
A-4F	ITS	Development Laboratory	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
B-3F	ITS	USPNet Control Room	Ceiling Type Building Multi Air-Conditioning system
B-2F	RDI	Office - Research / Incubator	Ceiling Type Building Multi Air-Conditioning system
B-2F	RDI	Test Bed	Ceiling Type Building Multi Air-Conditioning system＋Ceiling fan
T-2F	THR	Stage	Floorstanding Duct-Type Air Conditioning System
T-2F	THR	Apron Stage	Floorstanding Duct-Type Air Conditioning System
T-2F	THR	Green Room (Dressing Room)	Ceiling Type Building Multi Air-Conditioning system
T-2-3F	THR	Multi-purpose Lecture Theatre	Floorstanding Duct-Type Air Conditioning System
T-2F	THR	Light Control	Floorstanding Air Conditioning System
T-2F	THR	Sound Control	Floorstanding Air Conditioning System
T-2F	THR	Spot Light	Floorstanding Air Conditioning System

② Ventilation Facilities

A natural ventilation will be designed in principle, and the spaces and rooms not equipped with air-conditioners will be equipped with ceiling fans (600 - 900 mm in diameter).

a. Ventilation System

The following outlines the ventilation systems to be used for the respective rooms:

Table 2-18 Ventilation Plan

Room	Ventilation Times (Times/Hour)	Ventilation System	Remarks
Power room	-	Mechanical Air-Supply, Mechanical Air-Exhaust	Calculated based on the heat generation
Generator Room	-	Mechanical Air-Supply, Mechanical Air-Exhaust	Calculated based on the firing rate
Machine Room	5	Mechanical Air-Supply, Mechanical Air-Exhaust	
Restrooms	15	Natural Air-Supply, Mechanical Air-Exhaust	
Air-conditioned rooms (classrooms, Conference Room, video Conference room, etc.)	-	Natural Air-Supply, Mechanical Air-Exhaust	Calculated based on the number of personnel ($30m^3$/>/person)
Storage	5	Natural Air-Supply, Mechanical Air-Exhaust	
Elevator Motor Room		Mechanical Air-Supply, Mechanical Air-Exhaust	Calculated based on the heat generation
Sink Room	10	Natural Air-Supply, Mechanical Air-Exhaust	

③ Smoke Exhaust System

The smoke exhaust system for the Building A and Building B will be a natural ventilation system. The smoke exhaust system for the Stage Section of the theater will be a mechanical ventilation system in accordance with the laws of Fiji.

④ Piping Materials

a. Refrigerant pipe･･･Coated copper pipe for refrigerants

b. Drainpipe･･･PVC

5) Water Supply, Drainage and Sanitary Facilities Plan

① Water Supply Facilities

A main pipe of 150 mm in diameter is buried under the front road. The water pressure is reportedly 15-50 m/head (approx. 1.5-5kgf/cm^2), but this may decline as time passes and the water supply decreases. Accordingly, a water receiver tank will be adopted to maintain the required water pressure.

In addition, clean water and low-quality water will be separated for sanitary reasons. The clean water will be stored in a water-receiver tank installed within the machine room. The low-quality water will be stored with the use of an underground pit.

The existing water receiver tank located within the site will be relocated by the work implemented by the Fiji Government.

a. Branch from the main pipe

A water pipe of 40-50 mm in diameter will be provided for the building. This pipe will run from the main pipe (150 mm in diameter) buried in the front road. The water supplied from the pipe will be passed through a water meter. However, the work required for the branching from the main pipe and piping to the water meter will be provided by the Fiji Government, while the work from this point will be included in the scope of this Project.

b. Water Supply System

Due to the fluctuation of water pressure, a pressure pump will be adopted in addition to the water receiver tank for clean water and the underground water tank for the low-quality water, in order to keep the pressure and the amount of water stable.

c. Assumed Water Volume

853 personnel (expected number of students) × 55 (Liters / person･day) = 46,915 L/day (daily water consumption)

89 personnel (expected number of instructors) × 120 (Liters / person･day) = 10,680 L/day (daily water consumption)

Daily water consumption 46,915 +10,680 = 57,595

57,595 (L/D) ÷ 10 (H/D) = 5,760 L/H (Assumed Average Amount of Supply Water per Hour)

5.7 (m^3)× 2 = 11.4 m^3/H (Assumed Maximum Amount of Supply Water per Hour)

If the utilization ratio between the clean water and low-quality water is taken as approximately 4:6, the assumed water volumes are estimated as follows:

Water receiver tank for clean water 11.4 m^3/H × 4/10 × 3 H = 13.68 m^3→ 14m^3

Water tank for low-quality water 11.4 m^3/H × 6/10 × 3 H = 20.52 m^3→ 21m^3

② Drainage Facilities

The sewage water and wastewater will be divided in the building, flow together in the outdoor water drain box, and connect to the sewer main (150 mm in diameter) on the premises. In the meantime, the storm sewer will be included in this construction project.

③ Fire-Extinguishing Equipment

As no Standard for Fire Equipment has been established in Suva City, the Fire-Extinguishing Equipment provided will conform to the Japanese Fire Code. However, the hydrant for fire-fighting (100 mm in diameter) will be directly connected from the main pipe.

The following Fire-Extinguishing Equipment will be proposed:

a. Portable Fire Extinguisher (installation of a box for the portable fire extinguisher will be included in this construction project)

b. Indoor Fire Hydrant (Type 2 Fire Hydrant)

The water tank for fire-fighting will be also used as the low-quality water tank.

④ Sanitary Facilities

Water-saving equipment will be introduced for effective use of water resources, as well as in consideration of the convenience of the facility users.

Closet bowl	･･･Low tank
Closet bowl for the handicapped	･･･Low tank (touch switch type)
Urinal	･･･Stool type, with removable trap
Washbasin	･･･Wall type. Single faucet, equipped with a liquid soap container
Washbasin for the handicapped	･･･Wall type. Automatic faucet, equipped with a liquid soap container
Sink for cleaning	･･･Deep-rim sink for cleaning
Handrail	･･･L-form handrail, movable handrail
Mirror	･･･Corrosion-resistance type

⑤ Piping materials

a. Water supply pipe･･･PVC

b. Drainpipe･･･PVC

c. Fire-fighting pipe･･･Carbon steel pipe for piping (white)

6) Electrical Equipment Plan

① Main Power Equipment

a. Power Receiving

The electricity will be distributed to the low-voltage distribution panel for users from FEA of Fiji after the electricity is received through the high-voltage distribution panel provided by FEA in the rented transformer room at the site of the high-voltage line (3 way x 3 wire, 11KV x 50 Hz) buried under the front road and stepped down by the indoor dry-type transformer to 3 way x 4 wire, 415V/240V.

The distributed voltage: 3 way x 4 wire, 415V/240V, 50 Hz

b. Power Receiving Facilities

The total load-carrying capacity of this building is estimated at approximately 860 KW, including the load of the lighting fixture & receptacles (300 KW), the server-related load (53 KW), and the power load (500 KW). (Equivalent to effective electric power of approximately 1080 KVA)

If the load demand factor is taken as 0.7 and the safety margin as 1.1, the electric capacity will stand at approximately 830 KVA, which will require the selection of a transformer with a 1000 KVA capacity.

As the voltage fluctuation is anticipated to be somewhat moderate, in the range of about 6% (not a level expected to influence the equipment), an automatic transformer will not be provided.

c. Emergency Generator

An in-house generator will be provided in consideration of approx. 30 minutes of black light due to 20-30 times lightning per annum. The driving time of the in-house generator will be designed for 8 hours so that power can be additionally supplied during scheduled outages.
The generator specifications are as follows:

Predicted voltage: 270KVA

Type	:	Diesel engine (fuel: diesel oil)
Cooling System	:	Radiator System
Main Load	:	Fire-Extinguishing Pump, Emergency Light, load of the server room (including the air conditioner), load of equipment for USPNet, Disaster Equipment

② General Electricity

a. Power Distribution Facilities Plan

The Power Board & the Distribution Board will be located by dividing the circuit to avoid operational problems, and the electricity will be distributed to each required load.
One lighting distribution board will be installed on each floor of the Building A and Building B, and one power board for air conditioners will be installed on the roof level.
In addition, distribution boards for receptacles will be installed in the classrooms of areas where individual desks are expected to be provided with personal computers. This will allow the provision of numerous receptacle circuits and facilitate maintenance.

The Building T (Multi-Purpose Theatre) will be provided with one lighting distribution board and one power board. The alarm from the power equipment will be displayed on the monitor in the Security Room on the first floor. The contents of the alarm will be designed as follows.
Abnormality in Emergency Generator, Abnormality in Fire-Extinguishing Pump, High Water Alarm for Water Tanks, Abnormality in Air Conditioner in the Server Room.

b. Lighting Fixtures & Outlets

The Lighting Fixtures and the receptacles will be provided at necessary locations. The lighting fixtures of main rooms will be fluorescent lights with better efficiency than incandescent lamps. The average intensity of illumination will be designed as follows:

Table 2-19 Lighting Intensity Plan

Room	Design illumination (lx)	Type of lighting fixtures
Offices	300	Pipe Pendant Type FL40Wx2
Meeting Room	300	Pipe Pendant Type FL40Wx2
Information and communication engineering laboratory	300	Pipe Pendant Type FL40Wx2
Classrooms	300	Pipe Pendant Type FL40Wx2
Multi-purpose theatre	300	Recessed metal halide lighting fixture MH 250Wx1
Machine Room	200	Lighting fixture with light reflector FL40Wx2 (raceway mounted)
Stores	100	Pipe Pendant Type FL40Wx2
Corridor	100	Recessed open bottom lighting fixture FL40Wx2 (average illumination)

・The following switching systems will be adopted:

: Rooms - Tumbler switch

: Outdoor light - Photo Switch + timer

: Metal halide lighting fixture - ON/OFF switch by MCCB

・Emergency lighting fixtures will be battery-integrated 10 W halogen types and battery-integrated fluorescent lighting fixtures.

・The lighting fixtures for the Multi-purpose Lecture Theatre will be classified in the equipment category.

・The number of receptacles (outlets) installed in each room will be decided with the following as a guideline.

: General stores - One per approximately 200-300 m^2

Offices - One per approximately 15 m^2 (one per approximately 25 m^2 in case of a floor receptacle, one per approximately 9 m^2 in case of a floor receptacle)

: Meeting Room - One per approximately 25 m^2

: Information and communication engineering Laboratory- One per two computers (a table tap with six cable entry points)

: Classrooms - One per two computers (table tap with six cable entry points)

: Multi-purpose Lecture Theatre - One per approximately 150 m^2

: Server Room - One per 25 m^2 for cleaning and maintenance + two per rack for equipment operation

: Corridor - One per approximately 25-30 m of walking distance

③ Telephone & Communication Facilities

a. Communication

・ With regard to the contents of the equipment for the telephone exchange and the telephone sets, as the system varies according to the needs of the Fiji Government (such as the IP telephone exchange,

etc.), the scope of construction by Japanese Grant will cover work up to the withdrawal of the telephone line from outside of the site and construction of house cable and wiring to the main rooms (the living space where the university staff work). The installation of the equipment will be left to the construction by the Fiji Government.

- The work to withdraw the outside line involved in the scope of construction by Japanese Grant will entail the withdrawal of only two empty PVC conduits of 100 mm in diameter.
- With regard to the demarcation of the construction for the metal telephone, the withdrawal of the telephone line from outside of the site to the facilities will be done by the Fiji Government, and the wiring of the telephone line after the main distribution frame and installation of the equipment will be included in the scope of construction by Japanese Grant.

b. Public Address System

The amplifier will be provided in the ITS General Office on the second floor to enable announcements on the public address system on the premises. The amplifier will be a wall-suspended type.

c. Interphone Equipment

The interphones will be provided for security reasons in the rooms below:

The main phones will be installed in the Reception / Secretary on the third floor, in the ITS General office on the second floor, and in the Security Room on the first floor of the Building A. A small phone will be installed in the Entrance of the Building A.

d. Television Community Antenna Equipment

TV equipment will be installed in managers' rooms, directors' rooms, and the video Conference room.

Receivable video signals will be VHF and UHF.

e. Automatic Fire Alarm System Equipment

The automatic fire alarm system will be provided in this building. The system will connect to the fire station through the telephone lines.

The receiver will be installed in the Security Room on the First Floor of the Building A. The sensors will be selected in consideration of the purpose, ceiling height, and interior environment of each room.

f. LAN System

With regard to the demarcation of the construction for the LAN System, wiring and equipment installation works will be done by the Fiji Government and installation of conduit and cable racks will be involved in the scope of construction by the Japanese Grant.

g. Security System

With the aim of preventing the theft of equipment and protecting information within the Server Room, a card-reader-type electric lock system will be provided with the door of the Server Room to transfer alarm signals to the Security Room in the event of incidents.

h. Toilet Call System

Toilets for the handicapped will be provided with an alarm paging system for emergency.

i. Lightning Rod Equipment

The lightning equipment will be installed since this area is frequently struck by thunder.

7) Construction material Plan

Major exterior and interior finishes are shown below:

Table 2-20 Exterior Finish Schedule

Section		Finish
Exterior	Roof	Pitched roof: Aluminum galvanized sheet iron plate fluorine baking finish shingle board, flat roof: Thermoplastic Polyolefin Sheet, Insulation Poly Isocyanurate Board
	Outer wall	Colored Aluminum composite panel, Mortar VP Painting, Heat Insulation Material (Cable Side)
	Fittings	Colored Aluminum sash, partly steel fittings

Table 2-21 Interior Finish Schedule

Name of department	Room	Finish		
		Floor	Wall	Ceiling
Common Area	Multi-purpose Lecture Theatre	Long vinyl sheet on wood flooring	Fancy plywood, punched plaster board	Calcium silicate board. Rock wool acoustic board
	Office- Director ICT	Unit Carpet	Painting	Rock wool acoustic board
	Office- Core Staff Office	Vinyl Flooring	Ditto	Ditto
	Office- Senior Staff	Ditto	Ditto	Ditto
	Video Conference Room (*)	Unit Carpet	Punched plaster board	Ditto
(*) Rooms in need of soundproofing measures	Conference Room (*)	Ditto	Fancy plywood	Ditto
	ICT-Resource Room / Digitization Room	Vinyl Flooring	Painting	Ditto
	Radio Pacifik' Room (*)	Unit Carpet, Vinyl Flooring	Punched plaster board (sound absorbing and soundproofing)	Punched plaster board (sound absorbing and soundproofing)
Department of Computer Science	Academic Staff Office	Vinyl Flooring	Painting	Rock wool acoustic board
	Technical Staff Office	Ditto	Ditto	Ditto
	Administrative Staff Office	Ditto	Ditto	Ditto
	Tutor Office	Ditto	Ditto	Ditto
	Research Laboratory	Ditto	Ditto	Ditto
	Dedicated Networking Teaching Laboratory	Ditto (partially OA floor)	Ditto	Ditto
	Dedicated Computer Teaching Laboratory	Ditto (partially OA floor)	Ditto	Ditto
	Postgraduate Laboratory	Ditto	Ditto	Ditto
	Technical Laboratory/Workshop	Ditto (partially OA floor)	Ditto	Ditto
IT Services	Office- Director	Unit Carpet	Painting	Rock wool acoustic board
	Office- Secretary	Vinyl Flooring	Ditto	Ditto
	General Office	Ditto	Ditto	Ditto
	Laboratory A (Professional & Development Laboratory)	Ditto (partially OA floor)	Ditto	Ditto
	Laboratory B (General Access Laboratory)	Ditto (partially OA floor)	Ditto	Ditto
	Computer Workshop	Ditto	Ditto	Ditto
	Server Room	Vinyl Flooring (OA floor)	Ditto	Ditto
	Help Desk	Vinyl Flooring	Ditto	Ditto

	USPNet Control Room	Unit Carpet (partially OA floor)	Punched plaster board (sound absorbing and soundproofing)	Punched plaster board (sound absorbing and soundproofing)
Research and Development Department	Office- Research / Incubator	Vinyl Flooring	Painting	Rock wool acoustic board
	Test Bed / Incubation	Ditto	Ditto	Ditto
Department of Engineering	Office- Engineering	Vinyl Flooring	Painting	Rock wool acoustic board
	Technical Staff Office	Ditto	Ditto	Ditto
	Postgraduate Room	Ditto	Ditto	Ditto
	Computer Laboratory	Ditto (partially OA floor)	Ditto	Ditto
	Information and Communication Engineering Laboratory	Ditto	Ditto	Ditto
Other Common area	Toilets	Porcelain tile	Porcelain tile	Calcium silicate board
	Corridors	Ditto	Ditto	Ditto
	Machine room	Dust paint	Repair of reinforced concrete	No ceiling

(3) Basic Plan for Equipment

1) Consideration of Requested Equipment

The contents of the final requests summarized as a result of the field survey are categorized into the following six fields. Our view on those requested equipment is as follows:

① Equipment for the shared area

Of the equipment requested in this field, equipment needed for the Multi-purpose Lecture Theater, Video Conference Room, Green Room, Conference Room, and ICT Library will be involved in the scope of construction by Japanese Grant.

The equipment requested for this field are intended for use in the Multi-purpose Lecture Theatre, Office-Director ICT, Office- Senior Staff, Video Conference Room, Green Room, Conference Rooms, ICT Library, Information Digitization Room and 'Radio Pacifik' Room. Of those equipment, the equipment intended to be installed in Green Room and Information Digitization Room, which were excluded from the scope of the facilities plan, and the equipment intended for Office-Director ICT, Office- Senior Staff, and 'Radio Pacifik' Room, which do not directly benefit the students, will be excluded from the scope of this project because those equipment will benefit only specific people.

Of other requested equipment, the equipment closely related to facilities such as stage lighting equipment and curtains will be excluded from the scope of the equipment plan and will be examined in the facilities plan. The equipment other than those excluded from the equipment plan are basically categorized into the audiovisual equipment for supporting education, the equipment for the video Conference room, and the furniture for education purposes. The furniture for education purposes was excluded from the scope of the equipment plan on the ground that it should be procured at the expense of the Fiji Government for such reasons as their easy availability within Fiji.

In the meantime, with regard to the audiovisual equipment and the equipment for Video Conference Room that were list up individually, as many of them do not fulfill their functions without being integrated as a system, they were organized and integrated into system equipment including required components (such as the audiovisual system for Multi-Purpose Lecture Theater).

② Equipment for the Department of Computer Science

The equipment needed for the PC Information and communication engineering Laboratory, Dedicated Networking Teaching Laboratory, and Postgraduate Laboratory, all of which are for the exclusive use of this department, will be included in the scope of construction by Japanese Grant.

The equipment requested in relation to this department are intended for use in the Staff Offices, Tutor Office, Research Laboratory, Laboratory Exclusively for Computer Course, Dedicated Networking Teaching Laboratory, and Postgraduate Laboratory of this department. Of those equipment, the equipment for staff were excluded from the scope of the equipment plan on the ground that they do not directly benefit the students. In addition, the requested equipment for the Research Laboratory, Tutor Office and the Postgraduate Laboratory will be excluded from the scope of the equipment plan in consideration of the contents of the request being based on the future plan and forecast, probable usability of existing equipment and the equipment of the General Access PC Laboratory, and the contents of the requested equipment including personal computers being easily available within Fiji. As for the requested equipment for the Dedicated Networking Teaching Laboratory and Laboratory Exclusively for Computer Course, which are within the scope of the equipment plan, the equipment will be procured in the estimated minimum quantities required on condition that the existing equipment and the General Common PC Laboratory will be efficiently used.

③ Equipment for ITS

The equipment requested for this field are intended for use in the Staff Offices and the Laboratory Exclusively for ITS, General Common PC Laboratory, Workshop, Server Room, Help Desk, and USPNet Control Room, which are managed by this department. Of those requested equipment, the equipment for the Common Area like the Staff Offices, Workshop, Help Desk, and the Professional Laboratory for the courses for general public will be excluded from the scope of the equipment plan on the ground that they do not directly benefit the students. As a result, the equipment included in the scope of the equipment plan will be those equipment to be installed in the Server Room, General Common PC Laboratory, USPNet Control Room that will play a central role in the information system in this university. As for the equipment within the scope of the equipment plan, the equipment will be procured in the minimum quantities required. It would be recommended to continuously use the existing equipment or procure other necessary equipment at the expense of USP in accordance with altered circumstances. On the other hand, the individually requested equipment for use in the USPNet Control Room were organized and integrated into system equipment as in the case of the above equipment for the shared area.

④ Equipment for Research and Development

Given that the need for the requested equipment will be difficult to evaluate without first determining the specific theme for the research and development, the equipment in question will be excluded from the scope of the equipment plan

⑤ Equipment for the Department of Engineering

Equipment was requested for the laboratory in relation to the Information and Communication Engineering Laboratory for Electric / Electronic Engineering Courses, the said Laboratory for the Information and Communications Course, and the said for the Mechatronics Course. Of this requested equipment, that for the Electric/Electronic Engineering Laboratory and Information and communication engineering Laboratory for Mechatronics were excluded from the scope of the construction plan. Therefore, only the equipment for the Information and communication engineering Laboratory for the Information and Communications will be included in the scope of the equipment plan.

The procurement quantities were planned in consideration that the equipment are intended for use in experiments conducted in 10 groups per department. The quantities of basic general-purpose equipment (such as measuring instruments) were planned in 10 units (sets) in principle. On the other hand, the quantities of the experimental system units were all planned in one set assuming that each task will be performed in rotation.

⑥ Equipment for the GIS Department

Given that the department in question was not included in the construction plan, the requested equipment required for the relevant department will be excluded from the scope of the equipment plan.

2) Master plan

In principle, the equipment to be included in the plan will be limited to equipment which directly benefits the students. Of the equipment requested in the above target fields, therefore, administrative equipment, the equipment used by the staff, and the equipment to be used for services provided to students for a fee will be excluded from the scope of the equipment plan. However, basic infrastructure equipment such as audiovisual equipment for classes, the video conference system for distance learning programs, and server machines will be included in the plan even when they are not anticipated to directly benefit the students.

3) Requested Equipment

In this Implementation Review study, it was confirmed that component of requested equipment from USP has no change from it in Basic Design Study in 2005. As a result of discussion, each equipment of number, specification and system configuration are shown below table.

Table 2-22 Survey list of Requested Equipment

	Item number of Planned Equipment	Number Modification	Specification of No Modification	Specification Update	Deletion
CS(Computer Sciences)	9	None	1	8	None
ITS(IT Service)	15	None	5	10	None
ENG(Engineering)	20	None	16	4	None
COM (Common Use, Media Center, USP net)	18	None	3	15	None
Total	62	None	25	37	None

Comparing Basic Design study in 2005, there are some equipment, which needs the specifications update, mainly PC / server and its related equipment and AV equipment. These equipment specification changes are common; specifications are updated in the manufacturer side every three to six months. The requests of USP are not excessively street-credibility demand. Equipment plan should be considered of specification change at the time of completion of ICT center in 2010.

See Appendix 1 "Table of the Examination of Requested Equipment" for the classification of individual equipment items.

4) Equipment Plan

The details of the planned equipment are as follows, and the contrast chart of the requested equipment and the planned equipment list is shown in Appendices 10.

Table 2-23 Planned Equipment List

Code No.	Description	Q'ty
COM-1	DLP Projector (L)	1 unit
COM-2	LCD Projector (S) /w Screen	2 sets
COM-5-1	PC (Desktop type)	1 unit
COM-5-2	Desk & Chair for PC	1 set
COM-5-3	PC (Rack mount type)	3 units
COM-11	Presenter	3 units
COM-13	DVD Player	1 unit
COM-14	HDD/DVD recorder	2 units
COM-15	White Board	3 units
COM-16	TV	1 unit
COM-20	Remote Camera (w/Control System)	1 set
COM-26	Audio Speaker	2 sets
COM-100	Audio Control System for Multipurpose Theater	1 set
COM-101	Video Control System for Multipurpose Theater	1 set
COM-102	A/V Control System for Video Conference Room	1 set
COM-104	A/V Control System for Conference Room	1 set
CSC-1	Midrange Server w/Rack	1 set
CSC-4	Switching Hub	1 unit
CSC-6	Patch Panel	1 unit
CSC-10	Ethernet Card	40 pcs
CSC-15-1	PC (Desktop type)	150 units
CSC-15-2	Desk & Chair for PC	150 sets
CSC-16	Embedded System Board	4 sets
CSC-17	Oscilloscope	2 units
CSC-24	Printer	2 units
ITS-1	High End Server	6 units
ITS-3	Midrange Server	14 units
ITS-4	Tape Backup Archive	1 unit
ITS-6	Switching Hub	1 set
ITS-7	UPS	1 set
ITS-15-1	PC (Desktop type)	120 units
ITS-15-2	Desk & Chair for PC	120 sets
ITS-20	Printer	2 units
ITS-22	LCD Projector (S) /w Screen	2 sets
ITS-30	Equipment Rack	1 set

ITS-32-1	PC (Desktop type for Scheduler)	1 unit
ITS-32-2	Desk & Chair for PC	1 set
ITS-33	Workbench w/Chair	1 set
ITS-35	HDD/DVD recorder	2 units
ITS-60	A/V System for USPNet Control Room	1 set
ENG-5	Analog Communications	1 set
ENG-6	Analog Communications Training System	1 set
ENG-7	Fiber Optic Communications	1 set
ENG-8	Antenna Training and Measuring System	1 set
ENG-9	Microwave Technology Training System	1 set
ENG-11	Digital Communications 1	1 set
ENG-12	Digital Communications 2	1 set
ENG-13	Digital Communications Training System	1 set
ENG-17	Oscilloscope	10 units
ENG-18	Power Supply	10 units
ENG-19	Signal Generator	10 units
ENG-20	Multimeter	10 units
ENG-21	Soldering Station	10 sets
ENG-22	Tool kits	10 sets
ENG-29	Bread Board Set	10 sets
ENG-33-1	PC (Desktop type)	15 units
ENG-33-2	Desk & Chair for PC	15 sets
ENG-34	Midrange Server w/Rack	1 set
ENG-45	Workbench w/Chair	10 sets
ENG-46	LCD Projector (S) /w Screen	2 sets
ADD-1	Microfilm Scanner	1 unit
ADD-2	Flat-bed Scanner	1 unit