No.

BASIC DESIGN STUDY REPORT

ON

THE PROJECT FOR UPGRADING AND EXTENSION

OF

SAMOA POLYTECHNIC

IN

THE INDEPENDENT STATE OF SAMOA

APRIL, 2004

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

YAMASHITA SEKKEI INC.

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PREFACE

In response to a request from the Government of Samoa, the Government of Japan decided to conduct a basic design study on the Project for Upgrading and Extension of Samoa Polytechnic in the Independent State of Samoa and entrusted to the Japan International Cooperation Agency (JICA)

.

JICA sent to Samoa a study team from November 24 to December 22, 2003.

The team held discussions with the officials concerned of the Government of Samoa, and conducted field studies at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Samoa 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 Samoa for their close cooperation extended to the team.

April, 2004

Yasuo Matsui
Vice President
Japan International Cooperation Agency

April, 2004

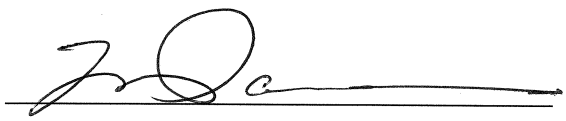
Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Upgrading and Extension of Samoa Polytechnic in the Independent State of Samoa.

This study was conducted by Yamashita Sekkei, Inc. under a contract to JICA, during the period from November, 2003 to May, 2004. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Samoa and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

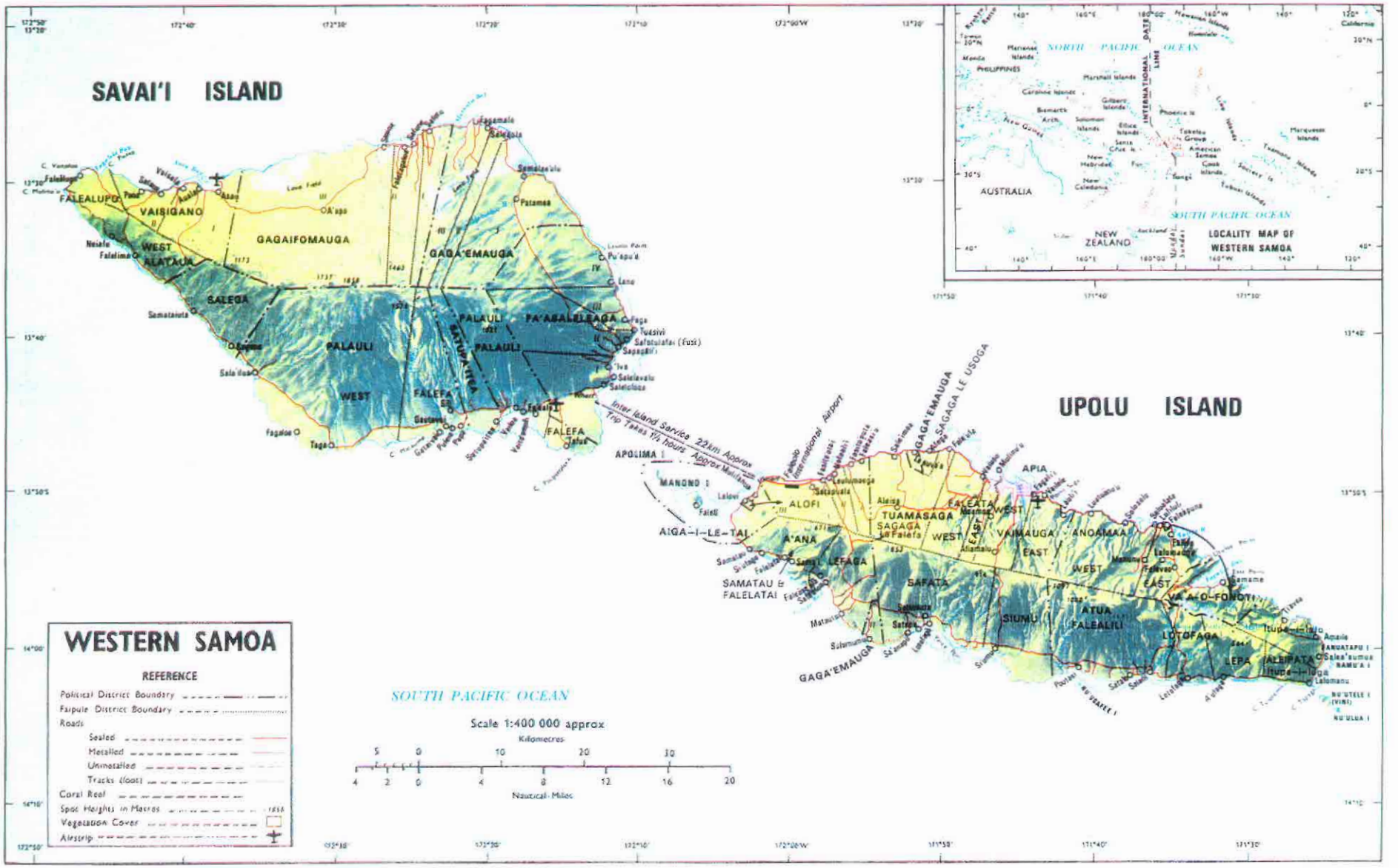
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



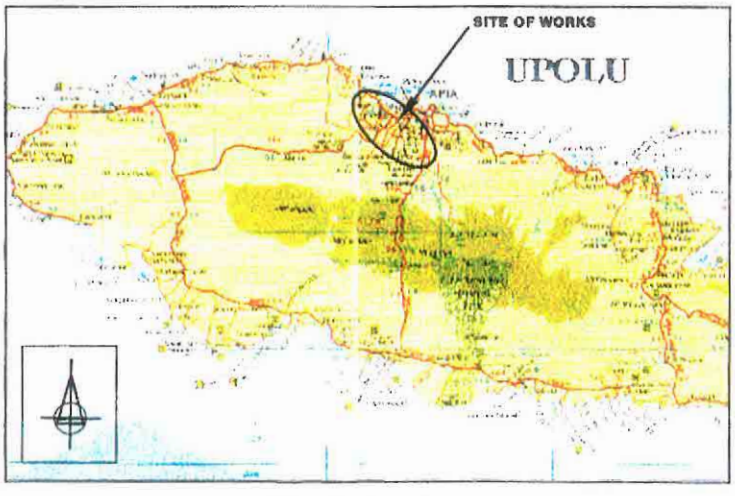
Minoru Tanaka
Project Manager,
Basic Design Study Team on
The Project for Upgrading and
Extension of Samoa Polytechnic
in the Independent State of Samoa
Yamashita Sekkei, Inc.

LOCATION MAP (1)

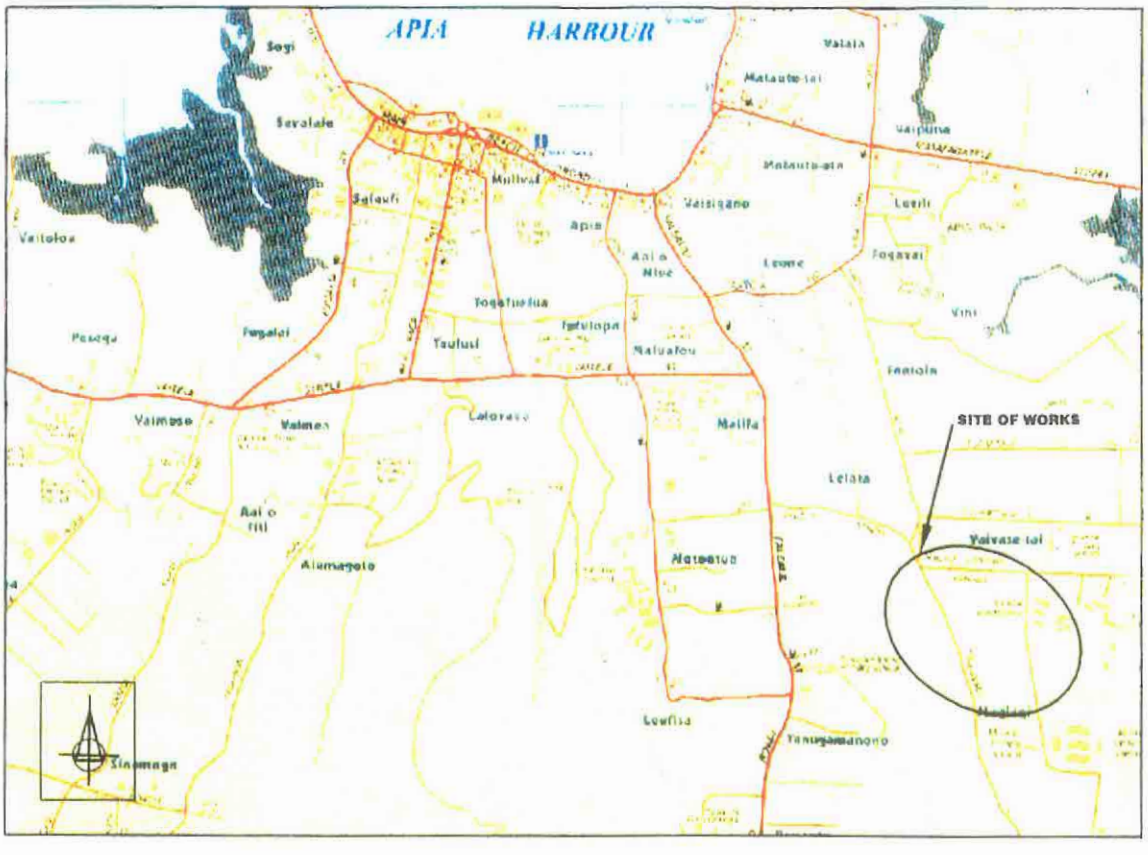


SITE LOCATION MAP (LOCATION OF APIA)

LOCATION MAP (2)



LARGE SCALE LOCATION PLAN



LOCATION PLAN

Proposed Construction Site

South of Project Site (towards NUS)

North of Project Site (towards existing SP)

PERSPECTIVE DRAWING

LIST OF FIGURES & TABLES

ABBREVIATIONS

(Alphabetical Order)

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
DOE	Department of Education
ECE	Early Childhood Education
ICT	Information Communication Technology
ILO	International Labour Organization
JICA	Japan International Cooperation Agency
LAN	Local Area Network
LL	Language Laboratory
NUS	National University of Samoa
NZODA	New Zealand Officical Development Assistance (replaced by 'nzaid' July 2002)
PEMP	Primary Education Materials Project
PSSC	Pacific Senior Secondary Certificate
SDS	Strategy for the Development of Samoa
SNE	Special Need Education
SP	Samoa Polytechnic
UNDP	United Nations Development Programme
UPS	Uninterrupted Power Supply
USP	University of South Pacific
VAGST	Value-Added Goods and Service Tax

Summary

Summary

In its Strategy for the Development of Samoa 2002-2004 which exhibits the basic strategies for development of the nation, the Government of Samoa has set a goal of the improvement of the standards of primary and higher educations under the theme of "Opportunities for All", focusing on the human resource development through technical education and training as an important role.
At the same time, the Government of Samoa established a steering committee under the initiative of the Ministry of Education, Sports & Culture in 2002 in order to restructure and merge higher educational institutions in the country. As a part of this movement, the government is pursuing a merger of the National University of Samoa (NUS) and the Samoa Polytechnic (SP) for the purpose of streamlining and strengthening the country's higher educational institutions, establishment of effective educational environments, and collaborating with country's industrial sector. The merger is scheduled to have completed by 2006.

SP, which is the object of the project has approximately 500 students enrolled and consists of three schools - School of Technology, School of Commerce & General Studies and School of Maritime. Each department under the schools provides education that matches the demand from the local industry, and there are about 260 graduates every year that serves as professionals or engineers in the public and private sectors within the country. However, it is now difficult to provide effective education and training since most part of the institution is more than 30 years old, and both the facility and the equipment are decayed and lacking.

Under such circumstances, the Government of Samoa has requested the Government of Japan for a grant aid on the upgrading and expansion of SP, the sole higher educational and vocational training institution in Samoa.

Following the request from the Government of Samoa, the Government of Japan dispatched project formulation coordinator to Samoa in August 2001 in order to conduct information collection and analysis concerning the request and the needs for technical cooperation. Also, a preliminary survey was conducted in February 2003, which confirmed the necessity of the cooperation and the implementation structure of the Samoan side. As a result, it has been confirmed that the implementation of Japan's grant aid will be of great significance for SP.
With this context, the Government of Japan conducted a Basic Design Study from November 24 to December 22, 2003. After preparation of the basic design on the building and equipment plan, based

on the field survey result and analysis in Japan, explanation of the Draft Report was made from March 29 to April 7, 2004, then the Basic Design Study Team prepared this Basic Design Report.

This Project, with the ongoing merger plan of the National University of Samoa (NUS) and the Samoa Polytechnic (SP) in mind, is intended to assist strengthening areas related to vocational training and education at Vaivase Campus of SP.

The facility plan will be determined after thorough examination of vocational training and educational activities of SP and common sections that will be shared after the merger, such as administration sections in NUS and SP.

In selecting equipment to be covered under the Project, based on the basic concept of this Project, equipment suitable for the facilities will be selected. Here, consideration will be given comprehensively to the contents of activity; technical standard; ability in maintenance and management; and necessity, usability and beneficiary for equipment.

In determining the whole scale of the facilities, consideration should be given to specific local circumstances, the contents of activities such as training curriculums, arrangement of training equipment and furniture in order to decide area space for individual rooms. Also, the renovation of the existing buildings is taken into account.

The important issue for maintenance of facilities and equipment is to prevent breakdown of the systems by means of establishing rational maintenance organization for periodical inspection and trouble shooting etc.

For this purpose technical assistance by the consultant is planned under the framework of soft component of this project.

The following is the summary of the facilities and equipment plans of this project made in accordance with the above policies.

Main facility	Purpose, scale, etc.
Building of School of Technology	3,513m^2
Technical training rooms (8 departments: 8 units)	One unit consists of a workshop for practical training, a lecture room, and a lecturer's room. And two units form one building. The lecture room is designed to hold 25 persons at a maximum. While the first year students are having a lecture, for example, the second year students are working on practical training. Thus, one lecture room is allocated to each department.
Building of School of Commerce & General Studies	1,567 m^2
Lecture rooms	Lecture rooms for general subjects (English and mathematics) for trainees, and lectures for the School of Commerce & General Studies. The maximum capacity is to be set at 30 persons.

Special room • Computer laboratory	For the purpose of computer training for the Department of Computer and the Department of Radio and Electronics, three laboratories with one unit having capacity of 20 persons at a maximum will be planned, to whom one instructor can give guidance at one time.
• Drawing rooms	For the purpose of practical training for the construction and engineering drawing, two rooms with a capacity of 25 persons at a maximum will be planned. One room will be equipped with drafters and parallel rulers, the other with T-squares.
• Language laboratory	For the purpose of language (English) practices, 20 booth L.L. room will be planned. A general lecture room for 10 person capacity will also be built next to the laboratory so that both facilities will simultaneously be used.
Administration Building	840 m^2
Office rooms	Individual rooms will be prepared for vice chancellor, deputy vice chancellor, heads of departments, and heads of sections. Space for offices of personnel at the Bureau of General Affairs (Personnel Section, Student Section, and Instruction Section) and the Bureau of Accounting (Accounts Section, Purchase Section, and Property-Accounting Section) will be provided in accordance with the number of staffs.
Meeting room	A room will be provided for staff meetings and briefings (capacity of 14 persons).
Counseling room	A room for counseling students will be provided.
Document preparation room	A room will be provided for preparation of business and management documents, teaching materials, and documents for advertisements, etc, and the storage for them.
Subtotal	5,920 m^2
Renovation work for the existing buildings	1,627 m^2
School of Technology (Electrical and Electronics courses)	The building is to be repaired and reused for the Panel Beating & Spray Painting Course, and the Maintenance Course.
Library	Roof, walls and furniture will be repaired.
Building for general classrooms	Roof, walls and furniture will be repaired.
Total	7,547 m^2

Facility	Main equipment	
Building of School of Technology	• Brake speedometer tester • MIG/MAG welder • Electrical power plainer • Wood lathe • Electronic block system • Kit cool/freeze room • Tractor &Trailer	• Lathe machine • Universal milling machine • Profile cutting machine • Cut off machine • Logic analyzer • Digital oscilloscope
Building of School of Commerce & General Studies	• Desktop computer • Laptop computer • Desks and chairs for training • Electric typewriter	• Drawing board set with drafter • L.L. control station • Overhead Projector • Iron press machine
Administration Building	• Photocopier machine • Shredder • Desktop computer • Filling cabinet	• Conference desks & chairs • Guillotine • Binding machine

Judging from the contents and scale of the work, the actual situation of the local construction industry and the budgetary systems of both the governments, it takes 24 months to implement the construction of facilities together with the supply and installation of equipment. Thus, it seems reasonable to split the term into two phases (12 months for each). The estimated project cost is 1,641 million yen (1,609 million yen to be borne by the government Japan; 32 million yen to be borne by the government of Samoa).

When the project is implemented, the decrepit facilities and the training equipment of SP will be upgraded and the training environment will be improved. Thus, the training will be implemented smoothly and effectively.

Moreover, the provision of barrier-free facilities will create environments where the persons with disabilities can participate in vocational training courses and use the facilities. This will meet the theme of national basic strategy for improvement of primary and higher educations, “Opportunities for All”.

Approximately 400 professionals and engineers with Certificate or Diploma will be trained and graduates every year and will contribute to the development of industries in the country.

This project is expected to bring considerable effects, as stated above, to support the encouragement of effects of vocational training education in Samoa, and to subsequently contribute to the human resource and social development. Thus, the implementation of the project under the Japan’s grant aid will be of great significance.

For effective execution of the project, the implementation agency of the project will be required to budget the renewal costs of each training equipment accrued in accordance with its life-span, as well as the annual maintenance costs. In order to improve the quality of training, it will also be required to secure technical assistance consistently in the form of, for example, the acceptance of experts and senior volunteers, for the purpose of the improvement in quality of teaching staff members.

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Chapter 1 Background of the Project

CHAPTER 1. BACKGROUND OF THE PROJECT

The school enrollment rates in Samoan primary (first – eighth year students) and junior high (ninth – thirteen year students) schools are as high as 82.5 percent and 57.6 percent respectively. The country also enjoys a high literacy rate, 98 percent. (The Ministry of Education, Samoa 2002)

Among higher educational institutions in Samoa are the National University of Samoa (NUS), the sole national university in the country; the Faculty of Agriculture of the University of the South Pacific (USP), Samoa campus of the inter-regional University; and the Samoa Polytechnic (SP), a higher vocational training and educational institution. All of these play an essential role in the training of specialists and engineering professionals in the official and private industrial circles.

The basic policy of the Samoan National Development Plan is laid down under the "Strategy for the Development of Samoa (SDS) 2002 – 2004" released in January 2002 by the Ministry of Finance, which advocates "the improvement of the educational standards", and sets the human resource development as an urgent task of the country, aiming at the improvement of technological education and training in terms of quantity and quality. In the meantime, as part of reshuffling and mergers of higher educational institutions at a national level, the merger of SP and NUS was planned and discussed; the plan is currently in progress for the actual implementation in 2006.

SP, which is the object of the project has approximately 500 students enrolled and consists of three schools - School of Technology, School of Commerce & General Studies and School of Maritime. Each department under the schools provides education that matches the demand from the local industry, and there are about 260 graduates every year that serves as professionals or engineers in the public and private sectors within the country. However, it is now difficult to provide effective education and training since most part of the institution is more than 30 years old, and both the facility and the equipment is decayed and lacking.

Under such circumstances, in view of the merger plan, the Government of Samoa has requested the Government of Japan for grant aid to the upgrading and extension of SP, the sole higher educational and training institution of the country. The summary of the request is as follows:

① Facilities

- Construction and renovation of building for practical training rooms of 9 departments of the School of Technology (workshops, lecture rooms, etc.)

- Construction and renovation of building for classrooms and practical training rooms of 7 departments of the School of Commerce & General Studies (general classrooms, special classrooms, computer laboratories, etc.)
- Construction of Administration Building
- Construction of ICTC (Information & Communication Technology Center)
- Construction of Library Resource Center
- Construction of Multipurpose Hall
- Construction of Student/Conference Accommodation

② Equipment

- Technical training equipment
- Computers for training, and related equipment
- L.L. equipment, and AV equipment
- Furniture for training and meetings (tables, desks, chairs, cupboards, etc.)

Following the request from the Government of Samoa, the Government of Japan dispatched project formulation coordinator to Samoa in August 2001 in order to conduct information collection and analysis concerning the request and the needs for technical cooperation. Also, a preliminary survey was conducted in February 2003, which confirmed the necessity of the cooperation and the implementation structure of the Samoan side. As a result, it has been confirmed that the implementation of Japan's grant aid will be of great significance for SP.

Chapter 2 Contents of the Project

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Basic Concept of the Project

(1) Overall Goal and Project Objectives

In its Strategy for the Development of Samoa 2002-2004 which exhibits the basic strategies for development of the nation, the Government of Samoa has set a goal of the improvement of the standards of primary and higher educations under the theme of "Opportunities for All", focusing on the human resource development through technical education and training as an important role.

At the same time, the Government of Samoa established a steering committee under the initiative of the Ministry of Education, Sports & Culture in 2002 in order to restructure and merge higher educational institutions in the country. As a part of this movement, the government is pursuing a merger of the National University of Samoa (NUS) and the Samoa Polytechnic (SP) for the purpose of streamlining and strengthening the country's higher educational institutions, establishment of effective educational environments, and collaborating with country's industrial sector. The merger is scheduled to be completed by 2006.

While taking the merger into account, this Project is aimed at contributing to human resource development being promoted under the National Basic Policy by improving and strengthening both the qualitative and quantitative aspects of SP.

(2) Project Outline

This Project is aimed at upgrading SP's decrepit facilities and equipment to help achieving the objective described above, and constructing new facilities complying with the present training activities, and providing training equipment. This will make it possible to conduct efficient education and training, and approximately 400 engineers are expected to be trained per year. The Project specifically covers training facilities for nine departments of the School of Technology, seven departments of the School of Commerce & General Studies in SP, and administration facilities necessary after the merger of SP and NUS, and equipment necessary for these facilities.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Design Criteria

(1) Scope of the Project

This Project, with the ongoing merger plan of the National University of Samoa (NUS) and the Samoa Polytechnic (SP) in mind, is intended to assist strengthening areas related to vocational training and education at Vaivase Campus of SP. The scope of the Project will be determined after thorough examination of vocational training and educational activities of SP and common sections that will be shared after the merger, such as administration sections in NUS and SP.

Items requested by the Government of Samoa include facilities exclusive to SP and those to be used as common facilities after the merger of SP and NUS. The task force for the merger of SP and NUS indicated priorities on the requested items in respect of necessity and urgency. The scope shall be adequately defined in light of these priorities as important conditions for the implementation of the Project.

The prioritized requested items are as follows:

1. Buildings for the School of Technology and for the School of Commerce & General Studies (SP facilities)
2. Administration Building（common facility）
3. ICT Center (Information & Communication Technology Center)（common facility）
4. Library (common facility)
5. Multipurpose Hall (common facility)
6. Student Accommodation (common facility)

It is required that the expansion and renovation of SP facilities to be implemented without interfering ongoing lectures and other activities.

1) Current Situations of the Existing Facilities of SP

The lectures currently conducted and their course durations of individual schools of SP are as follows:

Table 2-1 Current situations of lectures and their course durations in each school

Degree and titles conferred upon the completion of course		Certificate			Diploma
Course name		Beginner (Fundamental)	Intermediate	Competency	
Course term		1 year (and other short-term courses)	2 years	Intermediate course plus 1 year	2 years
Requirements for admission	New graduates	• Grade 5 or above in English, Science, and Mathematics of PSSC (National examination after the completion of secondary education). Required subjects vary in accordance with the type of courses. (Maritime training is separately required.)		• Level B or above of academic record after completion of secondary education	• Grade 5 or above in English and Mathematics of PSSC. Science is required, too, for the Radio/ Electronic course.
	Persons with work experience	• Selection is based on interviews for applicants in this field.			
Course names in individual schools	School of Technology	• Tropical Horticulture	• Automotive Engineering • Electrical • Carpentry& Joinery • Fitting& Machining • Plumbing& Sheet Metal • Refrigeration& Air-conditioning • Welding& Metal Fabrication	• Plumbing	• Radio & Electronics • (Electric) Planned • (Automotive) planned • (Carpentry/Fittings) planned
	School of Commerce & General Studies	• Computer operation • Tourism/Hospitality • Mathematics/Drafting • Journalism			• Business • Secretary • Tourism • (Journalism) Planned
	School of Maritime	• Seamen (3 courses: basic course (1 yr); voyage on duty course (3 months); course for grade 6 navigators) • Ships engineering (basic course (same as "seamen" course;); course for grade 5 engineers on duty (3months)) – there are in practice two courses. • Marine deckhands (course for marine deckhands (6 months); course for captains of coastal fishing (3 weeks); basic safety course for coastal fishing (3 days))			

At present, existing facilities are located in the northern half of the campus of SP, having a total floor area of approximately 5,900m^2. The details of the facilities are as follows.

Table 2-2 Floor Area of Existing Facilities

School of Commerce & General Studies	Area (m^2)	Total (m^2)
Bldg. A: Computer rms., Drafting rms., Lecture rms., Lecturers' rms., Corridors, etc.	724	
Bldg. B: Computer rms., Library, Preparation rms., Corridors, etc.	317	
Bldg. C: Lecture rms., Lecturers' rms., Corridors, etc.	697	
Tourism & Hospitality Bldg.: Restaurant, Kitchen, Guest rms., Toilets, etc.	367	
Storage & Toilet:	135	2,240
School of Technology		
Bldg. A: Wood work/fitting, Plumbing/Metal sheet, Welding/Metal fabrication	1,105	
Bldg. B: Automobile technology, Finishing/Machine processing, Maintenance, etc.	952	
Bldg. C: Electric Tech., Radio & Electronics, Refrigeration / Air-conditioning, etc.	615	

School of Commerce & General Studies	Area (m^2)	Total (m^2)
Bldg. D: Tropical Horticulture, Open lecture rm. Lecturers' rm. Storage, etc.	332	
Toilet:	50	3,054
Administration & Office Work		
Office Bldg.: Vice Chancellor's rm., Deputy Vice Chancellor's rm., Office of General Affairs, Guards' rm., Storage, etc.	295	
Conference Hall: Conference rms., Counselor's rm., Equipment storage, Toilet, etc.	190	
Administration Bldg.: Rooms for Heads of Depts., Secretaries' rm., Toilets & Shower rms.	126	611
Unusable facilities: Prohibited to use due to deteriorated structures	(135)	
Grand Total		5,905

- School of Commerce & General Studies

Building A: Computer room, drafting room, lecture rooms, lecturers' rooms, corridor, etc.

Main structure: Pipe-lattice beam and column

Walls: Concrete block (CB)

Roof: Corrugated steel sheet roofing

The building was constructed in 1963. Some pipe-lattice columns, the main structure, are deformed, and some anchor bolts for plinths are fractured. Thus, it is in a hazardous condition.

Building B: Computer room, library, preparation room, corridor, etc.

Main structure: CB bearing wall

Roof: Corrugated steel sheet roofing

The structure of the building is in good shape, and the building can still usable if the ceiling boards are replaced, the walls repainted, and other parts, if required, are repaired and refurbished.

Building C: Lecture rooms, lecturers' room, corridor, etc.

Main structure: CB bearing wall

Roof: Corrugated steel sheet roofing

The structure of the building is in good shape, and the building can still usable if the ceiling boards are replaced, the walls repainted, and other parts, if required, are repaired and refurbished. (6 general classrooms)

Lavatory: Main structure: CB bearing wall

Roof: Corrugated steel sheet roofing

It is decrepit and in an extremely unhygienic condition.

Building of Tourism & Hospitality:

Main structure: CB bearing wall

Roof: Corrugated steel sheet roofing

Former residential buildings are converted after renovation. They are inappropriate in size and usability and thus disrupting the training programs. Similar problems are observed in the administration building and the conference building, which are also converted from residential buildings. Daily operations are hindered because of inefficient use of usable floor and a bad flow due to the former function of the buildings.

- School of Technology

Buildings A & B: Workshops for Carpentry/Joinery Department, Welding and Metal Fabrication Department, Automotive Technology Department, Fitting/ Machining Department, and Maintenance Section, etc.

Main structure: Steal column and beam

Walls: CB

Roof: Corrugated steel sheet roofing

It was built towards the end of the 1960s, and about 35 years have passed. It is an old ramshackle structure with a number of extensions and renovations being made over the years. The originally planned natural ventilation no longer works properly, and hence providing quite poor environment for the training and education. The main steel structures also have been damaged.

Building C: Electrical, Radio & Electronics, Refrigeration & Air Conditioning

Main structure: Steal column and beam

Walls: CB

Roof: Corrugated steel sheet roofing

Built in the 1980s, the building is relatively new. Any extension or renovation has been done and the steel structure of the building is relatively in good shape. Hence, it can still be used if the interior lighting, and the partition of the room are remodeled, and the walls are repainted.

- Administration Building:

Main structure: CB bearing wall

Roof: Corrugated steel sheet roofing

Residential buildings were remodeled and converted to the Administration Buildings. The poor utilization of floors and the bad flow planning cause problems for operations.

2) Examination of the Contents of the Requested Facilities

- Buildings for the School of Technology

  Requests from the Samoan side are new construction of buildings for lecture rooms and practical training rooms for eight departments: Carpentry/Joinery Department, Welding/Metal Fabrication Department, Automotive Technology Department, Fitting/ Machining Department, Electric Technology Department, Radio/Electronics Department, Plumbing/Sheet Metal Department and Refrigeration/Air Conditioning Department. The two existing buildings as training facilities for the Carpentry /Joinery Department, Welding/Metal Fabrication Department, Automotive Technology Department, and Fitting/Machining Department were built towards the end of the 1960s, about 35 years ago, and are in extremely bad shape with a number of extensions and renovations have been repeatedly made. Hence, each department is obliged to put up with small practical training rooms and lecture rooms, which are badly ventilated and in poor shape. On top of all this, some steel beams for the main structure are damaged, and thus it is deemed necessary that the buildings should urgently be dismantled, removed, and replaced with new buildings.

- Buildings for the School of Commerce & General Studies

  Requests from the Samoan side are new construction of the Department of Tourism & Hospitality, four computer laboratories, six general classrooms, two drawing rooms, a language laboratory, a typing room and lecturers' room. Among existing facilities, drawing rooms and computer laboratories were built in the 1960s, and the structures of the facilities are decrepit: in particular, steal pipe trusses are deformed, and anchor bolts are fractured, making the main structures of the facilities in hazardous conditions.

  The buildings for the Department of Tourism & Hospitality were initially built for residences, and are currently used for the department. The poor utilization of spaces and the bad flow planning make it difficult to conduct training and practical education.

  It is, therefore, considered necessary to dismantle and remove these existing old facilities, and construct new ones.

  Also, the necessity for provision of general classrooms, language laboratories, and typing rooms is deemed very high. For these facilities, renovating the existing buildings of the department is the first choice, however, if necessity arises to meet the requirements, new construction could also be the alternative.

- Administration Building

Due to the merger of NUS and SP, the physical resources such as the facilities and equipment, and the human resources including lecturers will be shared by the new organization. It is an absolute requirement that the administration bodies responsible for the shared resources must be unified in order to make the service efficient. The unification of administration bodies is highly needed.

It will not be possible to accommodate all the planned administrative staff after the merger in either of the present administration facilities at NUS or SP. With regard to the administration facilities at SP, the present buildings were converted from residential buildings and thus the staff flow is not suitable for administrative activities and the space is inadequate, etc., all of these factors are hindering everyday services. In order to smoothly operate and manage after the merger, it is evident that there is an urgent need to construct new facilities for the administration purposes.

According to a summary report for the merger plan submitted by the task force of the Steering Committee, the personnel structure of the administration section of the merged organization is as follows. The plan is aimed at maintaining, for the time being, the current level of personnel from NUS and SP for the purpose of avoiding conflicts between staff members from the two parties, and at revising the structure at the time the merge plan has settled.

Table 2-3 Number of Administration Staff

Vice Chancellor & President	1		
Executive Secretary	1		
Deputy Vice Chancellor	2		
Registrar/Executive Deans	3		
Academic Director VET	1		
Administration		Finance/Accounting	
Corporate Services Director	1	Finance Registrar	1
Deputy Director	1	Accountant	4
Manager International Student Affairs	1	Account	5
Public Relation Marketing Manager	1	Purchasing Officer	2
Secretary / Adm. Officer	12	Asset Officer	1
Asst. Registrar Personnel	3		
Students Records Administrator	2	Student Affairs	
Academic	2	Student Counsellor	2
Receptionist	2	Physical Facility	
Telephone Operator	2	Director Physical Facility	1
Driver	2		
Total		(Persons)	53

- Building for ICT Center

  The aim of establishing ICT Center is to efficiently manage the whole organization after merger by streamlining the electronic information network (PC management) through an integrated management system. Thus, ICT Center will be responsible for PC network information control, with the main five sections under the center – total system control, hardware maintenance management, user service at terminal level, training for lecturers and staff members, and multimedia. All the equipment and personnel necessary for the Center are planned to be transferred from NUS.

  Though some activities of the sections are not yet clearly defined, considering the prerequisite objectives, which are to strengthen the areas related to vocational training and education at Vivase Campus of SP, scale of whole project and priorities, it is decided that ICT Center will be omitted from the Project, however, the space for the future construction of the ICT Center will be secured in the project master plan.

- Library

  The construction of a library is excluded from the Project this time on the grounds that the existing ones of SP and NUS still have extra room, and that the priority is low compared to other facilities for the merged organization. However, a space for the future construction of a new library will be secured in the project master plan.

- Multipurpose Hall

  Currently, there is neither facility nor outdoor sport facility at SP or NUS, which can hold all the students for, for example, graduation and enrollment ceremonies. Moreover, although it is a sole advanced educational organization in Samoa, there is no facility to hold international academic seminars and conferences. Hence, the necessity for a multipurpose hall is understandable. However, because the construction of such a large-scale building should be carried out as an individual project, it is excluded from the Project. Nevertheless, a space for the future construction of a new hall will be secured in the project master plan.

- Students Dormitory

  This facility is to provide accommodation to overseas students from neighbor island countries (Niue, Tokelau, Tuvalu, etc), whose populations are too small to have their own higher educational institutions, and those from remote places such as Savaii Island. The necessity for such facilities are understandable, however, the priority is low within the framework of the

whole Project. It is, therefore, excluded from the Project. However, a space for the future construction of a new dormitory will be secured in the Project master plan.

3) Departments and courses to be newly established

- Fabric design & Sewing (scheduled capacity: 20 – 25 persons)

  This is a bran-new department for a new field because unlike other new departments that are planned to be set up, there has been no similar existing department to this one at SP. The apparel-manufacturing sector of Samoa consists of two parts: tailors to meet the domestic demand, and sewing plants for the international market. Sewing plants targeting the global market are still in an early stage and expected to develop further in future. However, the scale of and detailed needs for the industry have not been clearly grasped. Under such circumstances, it is considered to be too early to include this department in this grant aid cooperation Project.

- Media Art (scheduled capacity: 20 – 25 persons)

  The literacy rate in Samoa is high, and a number of Samoan and English newspapers are widely read across the country. Since the commencement of TV broadcasting in 1993, TV sets became one of the most popular electric appliances and have spread across the country and programs like rugby games and traditional performing arts have been enjoyed by many. The governmental advertisements, which particularly focused on environmental and health-related issues, as well as media advertisements reflecting steady development of industries, are well recognized among the citizens. However, the quality levels of the production technologies of these contents are, generally speaking, very low due to the lack of training institutions within the country. Thus, demands for officially trained media-art engineers are quite high at the moment.

  In the meantime, the Government of Japan has been providing technical cooperation to the Ministry of Health of Samoa (Health Education Unit) and the Ministry of Education, Sports and Culture, through which personnel specializing in audiovisual technologies were dispatched on a voluntary basis, and audiovisual machines were provided on the basis of grant aid cooperation.

  At the same time, personal computer has been widely used in Samoa, and the number of homepages created in Samoa is sharply increasing, which demonstrates a rapid increase in demand for media-art technologies through computers.

Under such circumstances, this sector is expected to be in high demand in Samoa where the industry is steadily expanding and developing. However, there is no detailed plan provided from the Samoan side concerning this course, and thus this Project will only take into account for providing enough space to accept trainees in this new department in the future by remodeling the existing workshop after shifting to new facilities completes. As for training equipment, this Project will not provide anything assuming that the personal computers and drafting boards to be provided under this Project can also be used for this department.

- Arts & Culture and Sports Study (scheduled capacity: 20 – 25 persons)

  The awareness of the Polynesian culture is quite high among people in Samoa, who continue to promote the heritage of the traditional Polynesian culture and performing arts. Even today, people engage in such activities not only at home but also abroad for both on friendship base and commercial base activities. As for sports, there are a number of top level athletes in the field of rugby and boxing. In Japan, not only rugby players but also Sumo wrestlers and other martial arts players are performing well.

  In line with this, in Samoa, traditional culture and sports are considered to be one of the foreign currency earning industries, so that it is considered appropriate for SP to set up a new department which facilitates the human resource cultivation in this field.

  However, the requests from SP directed for these two departments are the use of the Multipurpose Hall. Hence, this will not be included in this Project.

(2) Selection of the Site

The proposed Project site (the Project site) is located approximately 3.5 km from the center of Apia City (Apia Harbor), its northern boundary, approximately 200m, facing Vaivase Road, a main road of about 7 m in width, and its western boundary facing Kolisi Road of about 5.5 m in width. NUS campus is adjacent to its south and Samoa High School to its east.

The Project site is a roughly rectangular shape plot, stretching approximately 430m from north to south, and 125m – 200m from east to west. The ground slopes down from the south to the north at an average of 1/20 gradient. The southern half of the plot, which is to be used for the construction under the Project, is currently covered by trees, shrubs, and grasses.

According to a geological survey implemented as part of this study, the Project site has more or less the constant characteristic across the area. Under the sedimentary layer of organic surface soil approximately 20cm thick, gravel layer of igneous rock is laid about 50cm – 150cm depth, followed by

a layer of igneous rock. The Project site has no particular problem in its dimension, shape, and infrastructures, and thus is determined to be appropriate for the construction work of the Project.

(3) Promotion of Barrier-free Facilities

Since the facilities are of public use, attention should be paid for physically disabled persons in drawing up the design of the facilities under the Project. Particular attention shall be given to the following points:

- Not only resorting to the installation of apparatuses such as lifts and slopes to cope with barriers within the facilities, by drawing up a design with no barrier from the beginning
- As for the designing of exits, corridors, flooring, handles and switches in particular, special attention will be given for the use of disabled persons.

(4) Functions as a School and Required Facilities

This Project is to expand and strengthen the vocational training section, formerly a part of SP, of the sole advanced educational institution in Samoa, after the merger of NUS and SP. The main components of the facilities covered in this Project are as follows:

Table 2-4 Main Component of the Facilities

Main facility	Purpose, scale, and other details
School of Technology	
Technical training rooms (8 departments: 8 units)	One unit consists of a workshop for practical training, a lecture room, and a lecturer's room. And two units form one building. The lecture room is designed to hold 25 persons at a maximum. While the first year students are having a lecture, for example, the second year students are working on practical training. Thus, one lecture room is allocated to each department.
School of Commerce & General Studies	
Lecture rooms	Lecture rooms for general subjects (English and mathematics) for trainees, and lectures for the School of Commerce & General Studies. The maximum capacity is to be set at 30 persons.
Special room • Computer laboratory	For the purpose of computer training for the Department of Computer and the Department of Radio and Electronics, three laboratories with one unit having capacity of 20 persons at a maximum will be planned, to whom one instructor can give guidance at one time.
• Drawing rooms	For the purpose of practical training for the construction and engineering drawing, two rooms with a capacity of 25 persons at a maximum will be planned. One room will be equipped with drafters and parallel rulers, the other with T-squares.
• Language laboratory	For the purpose of language (English) practices, 20 booth L.L. room will be planned. A general lecture room for 10 person capacity will also be built next to the laboratory so that both facilities will simultaneously be used.
Administration Building	
Office rooms	Individual rooms will be prepared for vice chancellor, deputy vice chancellor, heads of departments, and heads of sections. Space for offices of personnel at the Bureau of General Affairs (Personnel Section, Student Section, and Instruction Section) and the Bureau of Accounting (Accounts Section, Purchase Section, and Property-Accounting Section) will be provided in accordance with the number of staffs.

Main facility	Purpose, scale, and other details
Meeting room	A room will be provided for staff meetings and briefings (capacity of 14 persons).
Counseling room	A room for counseling students will be provided.
Document preparation room	A room will be provided for preparation of business and management documents, teaching materials, and documents for advertisements, etc, and the storage for them.

2-2-1-2 Policy on Facility Design

(1) Policy Involved in Setting of Facility Size

In determining the size of facilities, consideration should be given to specific local circumstances, the contents of activities such as training curriculums, arrangement of training equipment and furniture in order to decide area space for individual rooms. The following policies, too, should be taken into account:

- The number of trainees and the hours of use of the rooms are taken into account for general and special classrooms.
- The number of trainees and the arrangement of necessary training equipment, etc. are taken into account for workshops.
- The plan for personnel structure and the arrangement of necessary furniture, etc. are taken into account for executive rooms.

(2) Policy Concerning Site Conditions

The Project site is located approximately 3.5 km from the center of Apia City (Apia Harbor), its northern boundary, approximately 200m, facing Vaivase Road, a main road of about 7 m in width, and its western boundary facing Kolisi Road of about 5.5 m in width. The Project site is a roughly rectangular shape plot, stretching approximately 430m north to south, and 125m – 200m east to west. The ground slopes down from the south to the north at an average of 1/20 gradient. The gradient will be taken full advantage of for the construction of the facilities, so as to minimize cut and fill of the land. For this, it is necessary to plan drainage sufficient enough to deal with rainy seasons.

(3) Policy Concerning Natural Conditions

In Apia City, where the Project site is located, the sunshine is strong, the temperature and the humidity are high throughout the year, so that the facilities will need measures against the blistering climate. Thus, walls and roofs will be designed to have high insulation efficiency, and the eaves will be

designed to be deep enough to reduce the incoming of sunlight through the windows, helping reduce the heat load for air conditioning. In order to maintain comfortable room environment, care will be taken for the setting of floor height, adjustment of incoming sunlight, and ventilation.

In addition, termite problems are quite common in the locality and many cases of damages caused by termites have been reported. It is therefore necessary to apply anti-termite measures where timber/wood are used.

Also, measures should be taken for influx of rainwater, which could happen due to concentrated heavy rain or inadequate drainage systems. Also, finishing materials for the exterior of buildings will be selected, by taking into account possible deterioration and dirt due to rain, temperature, humidity, and sunlight.

(4) Policy concerning the use of local contractors

In Samoa, there are only few contractors, which can manage and control whole construction work. Thus, most of the large-scale construction projects are carried out by foreign construction contractors from New Zealand and other countries. General construction workers, however, are available locally. These circumstances should be taken into account in selecting subcontractors.

(5) Policy concerning the decision of facility grade

The grade of facilities in this Project will be determined with reference to that of the existing facilities of SP, as well as NUS facilities that were built under the Japanese grant aid cooperation. The priority is given to the easiness of maintenance.

Most of incidental equipment and finishing materials will be imported from New Zealand and Australia. Either way, materials, which are commonly used in the local area will be selected.

(6) Policy concerning construction schedule

The climate of Apia City can be divided into two: rainy season and dry season. The rainy season is between November and March, and the amount of rainfall in December and January, in particular, reaches as much as 500mm. Thus, it is necessary to pay attention to the effect of rainfall in determining construction schedule. It is desirable to avoid the rainy season as much as possible for earthwork and painting work for the exterior of buildings. Since Christians account for almost 100 percent of the country's population, Sunday work should be refrained. Also, the period between mid-December and early January is Christmas holiday, making it difficult to ensure workforce: this

should also be taken into account in setting the actual construction schedule.

2-2-1-3 Policy on Equipment Plan

(1) Policy Concerning the Selection of Equipment

In selecting equipment to be covered under the Project, based on the basic concept of this Project, equipment suitable for the facilities will be selected. Here, consideration will be given comprehensively to the contents of activity; technical standard; ability in maintenance and management; and necessity, usability and beneficiary for equipment.

(2) Policy Concerning the Specification of Equipment

Equipment to be selected for the Project shall be easy to operate and maintain. The specification of such equipment is to be, as a policy of the Project, equivalent to that of equipment commonly used in Samoa and equipment currently used in SP. The specifications for the equipment shall be such that the conditions of the infrastructure around the site, such as possibility of power failure and voltage fluctuation are taken into consideration.

(3) Policy Concerning Spare Parts and Consumable Goods

The purchasing ability of the Samoan side will be taken into account to some extent when providing spare parts. However, it is considered that the Samoan side is capable of purchasing consumables, and thus the Project will only cover consumables for initial period, which come with the main body of the equipment or necessary amount for initial operation.

(4) Policy Concerning the Quantity of Equipment

The quantity of equipment to be covered under the Project will be determined in accordance with the necessary quantity for the contents of activities at the training and educational facilities, which include the curriculum, the actual situation of training (the number of groups, the number of students, etc). Also, the conditions of existing equipment and the quantity will be investigated and confirmed, so as to fully utilize such existing equipment.

(5) Policy Concerning Operation and Maintenance

In order for the Samoan side to appropriately use and maintain the equipment, which are to be procured, the supplier will carry out the following training upon the supply of the equipment. Technical documents, materials, list of local supply agents, and so on required for maintenance will be organized and compiled for easy use in the future. All documents are prepared in English.

- Operating method (description of equipment, operational procedure, check list, etc.)
- Regular maintenance method (cleaning, servicing, repair for minor failures, etc.)

(6) Policy Concerning Schedule

The schedule of equipment procurement will be determined in connection with the construction work schedule. However, wiring work involving computers has to be done prior to the interior finishing work, and has to be taken into account when making the construction schedule. Also, attention should be paid to the transfer of existing equipment from the existing facilities so that the transfer should not disturb the lectures and training in progress.

2-2-2 Basic Design

2-2-2-1 Construction Plan

(1) Architectural Plan

① Site Layout Plan

- Preserve existing trees and other natural resources as much as possible.
- Minimize impact of the site development to the environment and cost of land cut and fill by making use of the natural south-north gradient of the site.
- Take devising measures against the influx of rainwater to the facilities due to the gradient of the land.
- Barrier-free arrangement shall be considered in accordance with the codes and standards of Samoa.
- Avoid disturbance to ongoing lectures and other activities in the existing facilities, while construction work is in progress.
- Enable future expansion by bearing in mind the development master plan for the future.

For the above reasons, the plan for the facilities under this Project will avoid new construction in the part where the existing buildings are, and make use of the southern part of the premises. The construction of new buildings will be arranged along contour lines and to take advantage of natural ventilation the structures will be placed east to west.

② Shape of Buildings

- To minimize the incoming heat from sunshine, the building will take rectangular, east-west shape.
- The height of the building will be limited as much as possible for the sake of the surrounding trees in the site.

For the above reasons, one story or two story buildings are considered to be the most efficient and harmonious with the environment. The number of stories will be determined in accordance with the purpose of individual buildings.

③ Floor Planning

It is hot and humid throughout the year in Apia City. However, since the project site is located on a hill facing the seashore, a comfortable environment can be ensured, apart from the rainy season, so long as the direct sunshine is effectively shut and natural ventilation is assured.

- Building for practical training of the School of Technology

  A lecture room for theoretical study will be arranged in between two workshops. Two sides of each workshop will face the outdoors so as to take full advantage of natural lighting and ventilation and openings will be made at the ceiling top for added natural ventilation. At the same time, the building plan will be flexible enough to deal with changes in arrangements due to change in training course programs in the future. The facilities for each course will be made independently confined within the course so that there will be no interference of equipment among different courses for management and security purposes.

- Building for lectures of the School of Commerce

  The lecture rooms will have corridors on both the northern and southern sides, so that the structure will ensure sufficient natural air ventilation while blocking direct sunlight.

- Administration Building

  Administration rooms that directly deal with students will be placed near the main entrance

on the ground floor. A separate staff entrance will be provided on the western parking lot side. The students' counseling room will be near the staff entrance, away from the main entrance where there is heavy students' traffic. The personnel structure of the Administration Section is as follows:

Table 2-5 Administration Staff

Vice Chancellor	1		
Executive Secretary	1		
Deputy Vice Chancellor	2		
Registrar/Executive Deans	3		
Academic Director VET	1		
Administration		Finance/Accounting	
Corporate Services Director	1	Finance Registrar	1
Deputy Director	1	Accountant	4
Manager International Student Affairs	1	Account	5
Public Relation Marketing Manager	1	Purchasing Officer	2
Secretary / Adm. Officer	12	Asset Officer	1
Asst. Registrar Personnel	3		
Students Records Administrator	2	Student Affairs	
Academic	2	Student Counsellor	2
Receptionist	2	Physical Facility	
Telephone Operator	2	Director Physical Facility	1
Driver	2		
Total		(Persons)	53

④ Size of necessary rooms

The number of required rooms in the facilities will be determined on the basis of the contents of training and the hours of use of the rooms. The size of the rooms, on the other hand, will be determined on the basis of the contents of training and the number of attendants, and with reference to the standards applied in Australia and Japan, and the sizes of the existing rooms in NUS facilities.

- Examination of the number of rooms

  The number of required rooms will be decided in accordance with the number of enrolled students (20 – 30 persons) in each course: general classrooms with the capacity of 30 persons; a drafting room with the capacity of 25 persons; practice rooms with the capacity of 20 persons and language laboratories. Required number of the rooms will be determined in accordance with the hours of their use.

  The following table shows required number of each kind of room calculated by summing up hours of the use of each room per week in each course. Usable hours of each kind of room per week are set at 35 hours (= 7 hrs./day x 5 days).

Table 2-6 Required Number of Rooms

Room Name (Capacity)	Actual Used Hrs. /Week (Planned)	Required No. of Rooms	No. of Students	Net Occupancy Rate of Rooms
Lecture Room (30)	216Hrs.	7	30	88%
Basic Drafting Room (25)	21Hrs.	1	25	60%
Advanced Drafting Room (25)	24Hrs.	1	25	69%
Language Lab.	(24Hrs.)	1	20	69%
Computer Practice Room (20+1)	90Hrs.	3	20	85%

- General classrooms

  Judging from the actual used hours per week of the lecture rooms, seven lecture rooms for 30 students are required. Five existing lecture rooms will be renovated and two room will be newly constructed for this purpose.

- Special rooms

  Judging from the actual used hours per week of the special rooms and the facts that the they will be used for carrying out supplementary lessons and/or assignments during idle hours or after regular hour, as well as for regular lessons, one number each of basic drafting room and advanced drafting room will be built.

- Computer practicing rooms

  The total number of hours the computer practicing rooms will be used per week is 90. Thus the operation rate of the room will be 85% if three rooms were built for this purpose. Beside the regular computer training course, these rooms can be used for preparations and reviews, report making etc. by students during the spare time of the rooms.

  At least three computer practicing rooms will be required, since the operation rate of the rooms, in general, needs to be set lower than that of general classrooms because it takes time for preparation and clean up before and after use.

- Examination of unit areas per person

  Standards for determining unit areas per person according to function of each kind of room are laid down as follows, with reference to the standards of NUS, Australian standards, and those applied to similar existing facilities in Japan.

Table 2-7 Unit Area per Person

	Applied	NUS	Australia Standards	Japanese Standards
Lecture Room	2.0～2.5 ㎡/Person	1.8～2.8 ㎡/Person	1.5 ㎡/Person	2.0 ㎡/Person
Language Lab.	4.0 ㎡/Person	4.0 ㎡/Person	2.5 ㎡/Person	
Computer Practice Room	4.0 ㎡/Person	4.0 ㎡/Person	2.5 ㎡/Person	
Drafting Room	4.0 ㎡/Person	Assuming to use A1 size (700×1,000) drafting board		
Tech. Practical Room	According to equipment layout 200m^{2}or 300 m^2 is being set as an target unit area for planning.			
Study Room (Hd. of Dept.)	20.0 ㎡/Person	20.0 ㎡/Person	20.0 ㎡/Person	
Lecturers' Room	5.0 ㎡/Person	6.0 ㎡/Person	5.0～10.0 ㎡/Person	
Computer Prep. Room	5.0 ㎡/Person	5.0 ㎡/Person	5.0～10.0 ㎡/Person	
Seminar / Meeting Room	3.0 ㎡/Person		2.4～3.0 ㎡/Person	2.5 ㎡/Person
Office (Vice Chancellor)	20.0 ㎡/Person	20.0 ㎡/Person	20.0 ㎡/Person	
Office (Dty.V.C./Exct. Deans)	20.0 ㎡/Person	20.0 ㎡/Person	20.0 ㎡/Person	
General Office	6.0 ㎡/Person	6.0 ㎡/Person	5.0～10.0 ㎡/Person	5.0 ㎡/Person

The following are descriptions of necessary rooms and their floor dimensions determined on the basis of the above mentioned unit area.

Table 2-8 Floor Area of Each Section

Room Name	Particulars	Standard Unit ㎡/Room	Basis for Floor Area	No. of Rooms	Applied Room Area (㎡)	Total (㎡)
School of Technology Bldg. (3,513m^2)						
Lecture Room	25Person	2.5 ㎡/Person	25Person×2.5 ㎡/Person＝62.5 ㎡	8	60	480
Head of Dept.'s Room	Private Room	20 ㎡/Room		8	25	200
Lecturers' Room	Open space	25 ㎡		8	25	200
Preparation/Lounge	Open space	25 ㎡		8	25	200
Workshop A	(Fitting/Machining)		According to equipment layout	1	267	267
Workshop B	(Carpentry/Joinery)		According to equipment layout	1	282	282
Workshop C	(Welding/Metal Fabrication)		According to equipment layout	1	303	303
Workshop D	(Automotive Technology)		According to equipment layout	1	297	297
Workshop E	(Electric)		According to equipment layout	1	198	198
Workshop F	Radio/Electronics)		According to equipment layout	1	183	183
Workshop G	Refrigeration/Air-conditioning)		According to equipment layout	1	198	198
Workshop H	Plumbing/Sheet Metal)		According to equipment layout	1	168	168
Locker/Shower Room	100Person	75 ㎡/Room		4	75	300
Electric Room		60 ㎡/Room		1	60	60
Pump Room		18 ㎡/Room		1	18	18
Manifold Room		23 ㎡/Room		1	23	23
Sub Total						3,377
Others	Corridor, Storage					136
Total						3,513
School of Commerce & General Studies Bldg. (1,080m^2)						
Lecture Room	30 persons	2.0 ㎡/Person	30Person×2.0 ㎡＝60 ㎡	2	60	120
Drafting Room	25 Persons	4.0 ㎡/Person	25Person×4.0 ㎡/Person=100 ㎡	2	96	192
Drafting Prep. Room		36 ㎡		1	36	36
Language Lab.	20Booths+10Persons		20Person×4.0 ㎡＋10Person×2.0 ㎡＝100 ㎡	1	96	96
Computer Room	20Persons	4.0 ㎡	20Person×4.0 ㎡＝80 ㎡	3	84	252
Computer Prep. Room		12.5 ㎡		1	12.5	12.5
Head of School	Private Room incl.	20 ㎡/Room		3	20	60
Head of Dept. include space for Secretary		15 ㎡/Room	5Person×15 ㎡+10m^2＝85 ㎡	1	84	84
Lecturers' Room	20Person	5.0 ㎡	20Person×5.0 ㎡＝100 ㎡	1	96	96
Material Making Room		12.5 ㎡		1	12.5	12.5
Sub Total						961

Room Name	Particulars	Standard Unit ㎡/Room	Basis for Floor Area	No. of Rooms	Applied Room Area (㎡)	Total (㎡)
Others	Toilet, Storage, etc.					119
Total						1,080
Hospitality & Tourism Bldg. (487m²)						
Restaurant, Kitchen Practical Room						
Kitchen			According to equipment layout	1	84	84
Refrigerator Room, Storage			According to equipment layout	1	21	21
Dish Washing			According to equipment layout	1	27	27
Restaurant	Including Stand Bar 4 Person table x 10	88 ㎡/Room	According to table layout	1	88	88
Head of Dept. and Lecturer Room	2 Heads icl. 4 Lectur	15 ㎡ /Room ＋5 ㎡/Person	15 ㎡＋5.0 ㎡/Person×4＝35 ㎡	1	36	36
Practical Room for Hotel						
Reception, Lobby		40 ㎡/Room		1	40	40
Lecture Room		2.0 ㎡/Person	20Person×2.0 ㎡/Person＝40 ㎡	1	40	40
Guest Room 1	Double	24 ㎡/Room		1	24	24
Guest Room 2	Single	16 ㎡/Room		1	16	16
Laundry		19 ㎡/Room	According to equipment layout	1	19	19
Sub Total						395
Others	Toilet, Storage, etc.					92
Total						487
Administration Building (840m²)						
Entrance, Lobby		50 ㎡/Room		1	48	48
V.C Room	Private Room incl. Secretary's Room	30 ㎡+15 ㎡		1	45	45
Deputy V.C. Room	Private Room incl. Secretary's Room	20 ㎡+10 ㎡		2	30	60
Director Room (2F)	Private Room incl.	15 ㎡		7	15	105
Secretary Open Space				1	96	96
Director Room (1F)	Icl. Secretary Room	15m²+5m²	20m²	1	18	18
Control Room		20m²		1	22	22
Accountant	Private Room	10 ㎡/Room		2	9	18
Finance & Accounting Office	10Person	6 ㎡/Person	10Person×6.0 ㎡/Person＝60 ㎡	1	54	54
General Affairs Office	9Person+4Person	4 ㎡/Person	13Person×4.0 ㎡/Person＝52 ㎡	1	54	54
Students Counsellor	Counseling	20 ㎡/Room	20 ㎡	2	18	36
Material Making Room		36 ㎡/Room	36.0 ㎡	1	36	36
Meeting Room	15Person	3 ㎡/Person	15Person×3.0 ㎡/Person＝45 ㎡	1	45	45
Storage		6 ㎡/Room		1	6	6
Sub Total						643
Others	Corridor, WC					197
Total						840
Renovation of Existing Facilities (1,627m²)						
School of Technology (Electric & Electronic Bldg.)						615
School of Commerce & General Studies (Library Bldg.)						316
School of Commerce & General Studies (Lecture Room Bldg.)						696
Total						1,627

⑤ Sectional plan

Required heights and shapes are different among facilities under the Project in accordance with

the functions and conditions of individual rooms. The workshops in the technical practicing building require high ceilings, so that the height is secured with a straight ceiling for the sake of heat insulation, and the opening for natural ventilation will be set on the ceilings. The lecture rooms located in between workshops will be two-storied: a lecture room and storage for tools are on the 1st floor; a lecturer's room is built on the 2nd floor. The heights of main rooms are as follows:

Table 2-9 Ceiling Height of Major Rooms

Room Name	Floor Height	Ceiling Height
School of Tech. Workshops	6.0m～7.5m	Exposed Ceiling
School of Tech. Lecture Rooms	3.5m	3.0m
School of Tech. Lecturers' Room	2.5m～5.0m	2.4m
Lecture Rooms	3.5m～4.7m	3.0m
Office on the 1st Floor	3.5m	3.0m
Office on the 2nd Floor	3.2m～4.6m	3.0m

(2) Structural Plan

① Description of the structures

The functions of the facilities under this Project are to be used as facilities for vocational training, information management of the campus, and related administration work for the School of Technology and the School of Commerce & General Studies.

- Workshop building for the School of Technology:
  Main structure: steel framed structure, one-story with partial two-story building,
  Basic span : 15.0m x 6.0m
  Floor height : workshops – 6.0m-8.5m
  lecture rooms – 1st floor: 3.5m, 2nd floor: 3.0m
  Floor : 1st floor: concrete slab on grade, 2nd floor: reinforced concrete construction
  Roof : Corrugated metal sheet roofing

- Building (classrooms) for the School of Commerce & General Studies:
  Main structure: Reinforced concrete, one-story building
  Basic span : 8.0m x 6.0m/7.5m/8.0m
  7.0m/5.0m x 6.0m/7.0m/8.0m
  Floor height : 3.5m-4.7m
  Floor : 1st floor: concrete slab on grade
  Roof : Corrugated metal sheet roofing]

- Administration Building：

  Main structure: Reinforced concrete, two-story building

  Basic span : 8.0m/6.0m x 6.0m

  Floor height : 1st floor: 3.5m, 2nd floor: 3.2m～4.6m

  Floor : 1st floor: concrete slab on grade

  2nd floor: reinforced concrete construction

  Roof : Corrugated metal sheet roofing

② Foundation System

According to the geological survey on the project site implemented at the time of the field survey, the surface soil is the sedimentary layer with organic materials approximately 0.2m thick, under which gravel layer including basalt with air hole of 100mm – 400 mm is laid 0.2m – 1.0m/2.5m depth, followed by a layer of extremely hard basalt. The buildings to be constructed under this Project are low rise – two-story at most. It is, therefore, reasonable to adopt direct foundation on the gravel layer or the basalt layer at 1.0m – 1.5m deep from the ground surface as the foundation for the Project. The load bearing capacity of the stratum for structural design is expected to be at least, 20.0t/m^2.

③ Superstructure System

Workshop building for the School of Technology: Since the span is long, 15.0m, a steel structure system will be adopted as the superstructure of the building. Walls will be, in principle, of reinforced concrete block. The floor structure of the first floor will be reinforced concrete on grade.

Lecture room building for the School of Commerce & General Studies: Judging from the fact that the span is relatively short (between 6.0m and 8.0m), efficiency for construction, economical point of view, and from the natural conditions of the area (earthquakes and cyclones), it is reasonable to adopt a R.C. rigid frame structure system as the superstructure of the building. The walls will be made of reinforced concrete blocks for efficiencies in terms of construction, economics, and environments, since it does not require form work. The floor structure of the first floor will be reinforced concrete on grade.

④ Laws, regulations and standards for structure

The values to be used for the structural design of the buildings (live load, lateral seismic coefficient, wind power coefficient, etc) will comply with the National Building Code for

Western Samoa. The standards used for determining sections of each element are the Japanese Building Code and Regulations and the Standard for Structural Calculation of Reinforced Concrete Structures of the Architectural Institute of Japan.

(3) Electrical system plan

① Electrical installation

Electricity will be brought in from the existing 22kV aerial power line along Kolisi Road on the west of the project site. Electric power brought into the premises will be stepped down to low voltage (415V/240V) by a pad mount type transformer (500kVA) installed near a pole, which is to be constructed as a part of the Project, on campus. The power will then be passed through underground cable and supplied to a low-tension distribution panel in a power distribution room. The provision of 22kV aerial power line from outside the premises to the pad mount type transformer, and the supply and installation of power meters (including ancillary equipment) shall be borne by the Government of Samoa.

- Receiving power: 3 ϕ 3W22kV
- Low-tension power: 3 ϕ 4W 415-240V
- Transformer capacity: 500Kva

Table 2-10 Items of Transformer Capacity

Load	Assumed Capacity	Remarks
Lighting & outlet	Floor area 8,000 ㎡×25.0VA/㎡×0.7＝140kVA	0.7 : demand ratio
Power for A/C	Floor area 8,000 ㎡×250.0VA/㎡×0.35×0.2＝280kVA	0.35: efficiency 0.2 : air-con. Area ratio
Power for sanitary system	Floor area 8,000 ㎡×6.0VA/㎡×0.3＝14.4kVA	0.3 : demand ratio
Power for equipment	280KVA×0.7 ＝ 196KVA	0.7 : demand ratio
Total	490.4kVA Rounded up 500kVA	

Also, an automatic voltage regulator (AVR) will be installed as a measure against voltage fluctuation. For equipment requiring more stable electricity, individual measures will be taken, such as attaching a static automatic voltage regulator with faster responses.

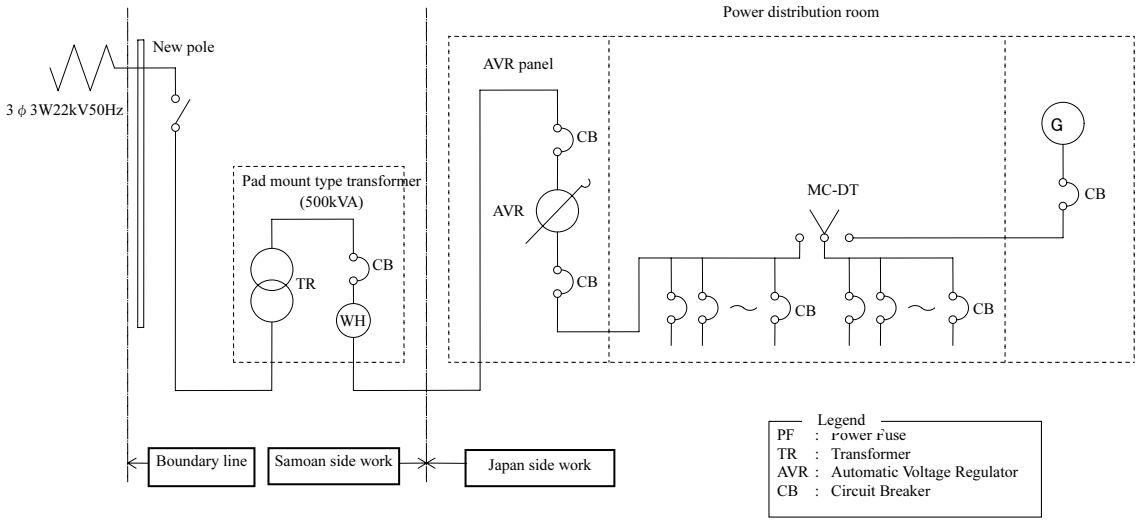

Fig 2-1 Power Distribution System

② Power generator

An emergency power generator (150kVA) will be installed as a measure against power failure. Apart from electricity failure, the generator will kick in when the voltage fluctuation from the electric company exceeds the capacity of the AVR.

The generator will supply electricity mainly for emergency lighting, telephone switchboard, lifting pump, IT equipment, and some part of air conditioners. The oil tank capacity will be of 10 days supply for running the generator.

- Emergency generator 150kVA（to be readjust at a detailed design）
- Oil tank 50L/h
- Assumed load

Table 2-11 Items of Emergency Generator Load

Kind of Load	Assumed Load					Remarks
Emergency Light	Floor Area 8,000 ㎡	×	0.4VA/㎡	=	3,200VA	The whole facility
Telephone Exchange	1500VA/unit	×	1 unit	=	1,500VA	
Lift Pump	5000VA/unit	×	7 units		35,000VA	
Computers	Floor Area 700 ㎡	×	100.0VA/㎡		70,000VA	
Air conditioners	Floor Area 700 ㎡	×	50.0VA/㎡		35,000VA	
Total					144,700VA	
			Rounded Up		150kVA	

③ Main power line

The electricity will be supplied from the low-tension distribution panel of the power distribution

room to distribution panels and power control panels in each building. Main cables between the buildings will be of underground. The voltage of the main cable will be as follows:

- Power 3 ϕ 3W415V
- Lightings and outlets 3 ϕ 4W415/240V

Also, an alarm panel for monitoring main power will be installed in the control room at administration building.

④ Lightings and outlets

a. Lightings

Fluorescent lights will be used as the main lighting source, while incandescent lights will be used in some parts according to the design and the function of the room. In designing the switching system, ease of use and energy conservation will be taken into account.

The target illumination for the main rooms will be as follows:

Table 2-12 Target Illumination for Major Rooms

Building Name	Room Name	Target illumination (lx)
Administration Bldg.	Offices Meeting rooms	350 350
Lecture Room bldg.	Lecture rooms Private/lecturers rooms	350 350
Workshop Bldg.	Workshops Private/lecturers/lecture rooms	500 350

b. Outlets

Outlets will be provided for general use and for the use of various kinds of equipment. For the rooms where lots of equipment are installed, plug boards will be installed separately. The standards of the outlets will comply with standards, AS3100, AS3112, and NZS198.

⑤ Telephone system

The service line will be brought in to the MDF room located on the first floor of the Administration building from the existing telephone line along Kolisi Road on the west of the project site. Distribution within the site will be done with underground cables. The existing PBX set in the NUS and the new PBX installed in the new facilities will be connected so that they can communicate each other via extension lines.

The extension lines will be installed using conduit pipe. The extension lines will be installed from the MDF room to the terminals in each room via relay boards installed in each building. The capacity of the telephone switchboard will be of about 10 service lines and 60 extension lines. New telephone sets will be installed at such rooms as rooms for the administration section, other

offices, the heads of departments, lecturers' rooms, and the library. The construction work to bring in the telephone circuit from outside the premises to the MDF room will be borne by the Samoan side.

⑥ Public address system

For the purpose of general and emergency communications within the campus, the main P/A unit will be installed in the Administration building, which enables announcements to be made to each building separately as well as to all the buildings at once. As for announcements within the existing buildings of NUS, an additional remote microphone will be installed at the new P/A unit connecting to the existing P/A main unit so that announcements can be made from the new facility.

⑦ LAN system

Empty conduit pipe throughout the facilities will be provided for future installation of LAN system. The scope included in the Project will be installation of empty conduit pipes and outlet covers but not include cables, plug-in phone jacks, HABs, and other apparatuses.

⑧ Fire alarm system

A fire alarm system will be installed for the purpose of early discovery of fire, and swift evacuation. Receivers will be set at the Administration building, monitoring each building and the all the facilities. The existing facilities of NUS will also be monitored in the new Administration building by installing an additional sub-display for the existing receiver.

⑨ Outdoor lights

Outdoor lights will be installed around the buildings and roads within the premises.

(4) Air-conditioning system

For the air-conditioning system, individual systems with air-cooled type conditioners will be adopted, to reduce the maintenance and management costs, and make it easy to handle machine failure. The coverage of the air-conditioning system will be minimized, aimed at the reduction in the construction and running costs.

① Target temperature

Table 2-13 Temperature Conditions for Design

	Natural temperature	Target temperature
Temperature	33.1℃	26℃
Relative humidity	79%	Not Specified

② Air-conditioned area

The following shows air-conditioned area of the Project.

Table 2-14 Air-conditioned Area

Bldg. Name	Room Name
Administration Bldg.	1F： Administration, Account Office, Counselor Room, Reception, Control Office 2F： Director's Room, Conference Room
Lecture Room Bldg.	Head of school, Head of Dept., PC room, Language Lab., PC Preparation, Lecturers' room
Workshop Bldg.	Head of Dept., Lecturers' room
Tourism & Hospitality Bldg.	Office, Restaurant, Reception

③ Ventilation system

Natural air ventilation will be the main ventilation means. However, some of the offices, workshops, lavatories, kitchens, and toilets will be equipped with mechanical ventilators, which can discharge odor, heat, and dust. Lecture rooms and other rooms will be equipped with ceiling fans.

As for individual welding booths at workshops of the Welding Department, mechanical ventilators will be installed. Also orbital sander machine room in the Carpentry workshop, cyclone type dust collector and mechanical ventilator will be installed to remove the dust from exhaust air to keep the safety atmosphere around the building.

(5) Water supply, drainage and sanitary system

① Water supply system

A water main of 200mm ϕ is laid along Kolisi Road on the west side of the project site Water will be brought in with branching pipe of 75mm ϕ from the water main. Water will be stored in reservoir tanks first, then be lifted by pumps to elevated tanks, and supplied to each faucet by gravity.

Installation of a water meter and to bring in water from outside the premises to the water meter shall be borne by the Samoan side. As for water for miscellaneous use, such as for lavatories, rainwater will be collected from some of the facilities, stored in tanks, lifted to elevated tanks, and then supplied to required points. Cleanable purifiers will be installed as a measure against possible extraneous materials in both city water and rain water supply systems.

Table 2-15 Required Water Volume

a	Lecturers, Staff	150Person	100 lit/Person x day	15,000 lit/day
b	Students	600Person	60 lit/Person x day	36,000 lit/day
c	Others	20% of above total		10,200 lit/day
			Total	61,200 lit/day

- Suppose that the proportions of clean water and water for miscellaneous use is set at 50:50,
- The amount of clean water to be used will be 61,200×0.5 ≒30,000 lit/day.
- That of water for miscellaneous use will be 30,000 lit/day.
- The capacity of a reservoir tank for clean water will be 30m^3 for one day.
- The capacity of an elevated clean water tank will be 30m^3÷10h≒3m^3 per hour.
- The capacity of an elevated miscellaneous use water tank will also be 3m^3 per hour.

The tank to store water for miscellaneous use will also be used as a tank to store rainwater.

② Hot-water supply system

Hot-water supply system will be installed at pantries, kitchens, and shower rooms. A Solar water heating system will be installed for the shower rooms so as to reduce the running costs.

The followings are the hot-water supply systems in individual facilities:

- Pantries in Administration building: Electric water heating system
- Workshops and shower rooms: Solar water heating system
- Kitchens in Dept. of Tourism & Hospitality: Instantaneous gas water heating system
- Bathrooms in Dept. of Tourism & Hospitality: Instantaneous gas water heating system

③ Water drainage system

There is no public water drainage system in the vicinity of the production site. Thus, waste water from the buildings will be disposed within the premises. Following the Samoan Constructions Standard Law, waste water will be treated in septic tanks and then led to the French drains. In accordance with the facilities layout plan, the capacities of the septic tanks will be as follows.

- Administration building, workshops, lecture rooms 2 x tank for 500 persons
- Department of Tourism & Hospitality 1 x tank for 100 persons

Storm water will be discharged to the existing storm water drain pipe, which is laid along the

northern boundary. The work between the boundary line and the existing drain pipe shall be born by the Samoan side.

④ Sanitary fittings

Toilet stools, urinals, and lavatory sinks commonly used at local facilities will be installed. Urinals will be the stainless steel pan-type that are also commonly used.

⑤ Fire hydrant system

Complying with the Building Code of Samoa, a fire hydrant system will be installed in the new facilities. The existing fire hydrant pumps in NUS will be incorporated into this system. The pipes to new fire hydrant points in the new facilities will be branched off from the existing fire hydrant main pipe within the premises of NUS.

⑥ Gas supply system

Gas supply facility will be provided for the kitchen of the Department of Tourism & Hospitality by using butane gas cylinders.

⑦ Special gas system

The following industrial gas supply will be provided for the Department of Welding in the School of Technology. The manifolds of each gas will be provided outside the building for safety purposes and each gas will be supplied by piping to the outlets.

- Oxygen gas
- Acetylene gas
- Argon gas
- Carbon dioxide gas

⑧ Kitchen facilities

The existing kitchen in the Department of Tourism & Hospitality is to be equipped with various kinds of kitchen equipment. The existing major items in the kitchen will be utilized fully. The following is the equipment list including both the existing and new items to be supplied.

Table 2-16 Kitchen Equipment List

Equipment Name	Qty	Remarks
Double Sink	1	Utilize the existing item
Double Sink	1	Ditto
Double Sink	1	Utilize the existing item
Gas oven	4	Ditto

Gas fryer	1	Ditto
Electric oven	1	Ditto
Salamander	1	Ditto
Worktable	4	Ditto
Dishwasher	1	Ditto
Gas oven	4	New

⑨ Sprinklers system for horticultural fields

A water tank and pump system will be provided to horticultural fields. A pressure-type pump unit will be used for sprinkling water and rainwater will be the main water source for the system.

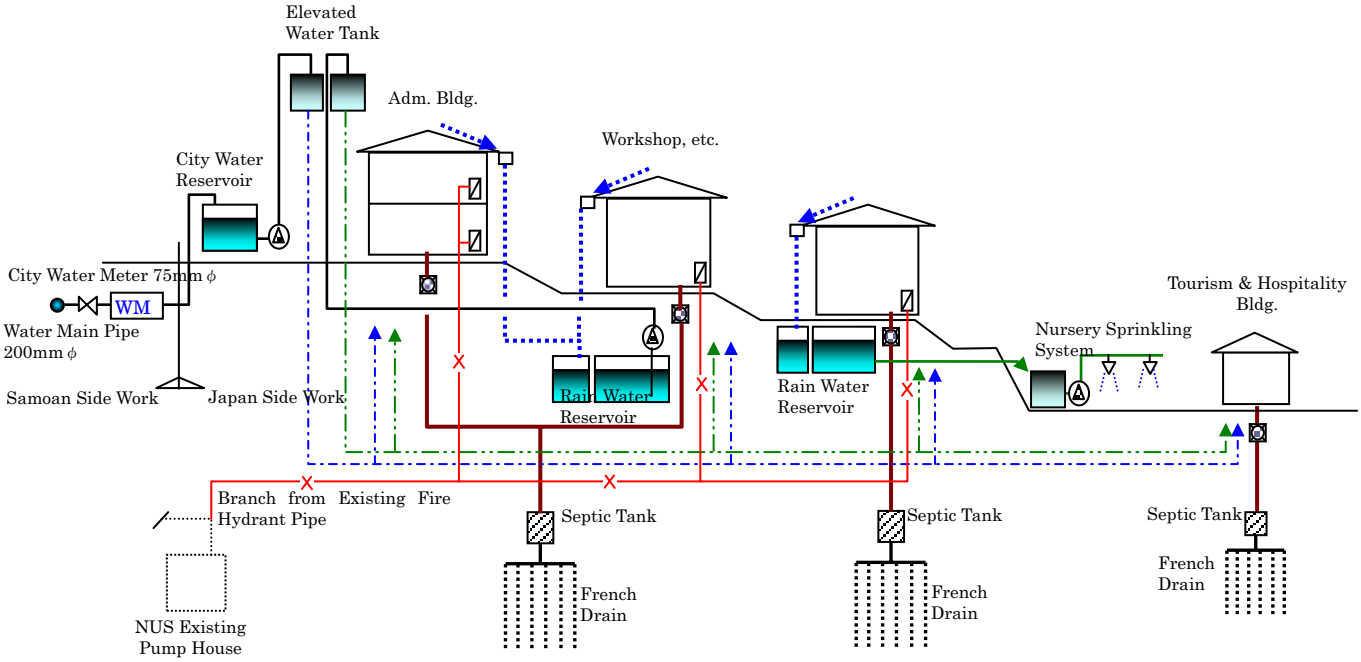

Fig. 2-2 Water Supply System Diagram

(6) Materials and Construction Methods

Construction methods and materials to be used for the Project will be selected according to the factors such as local climate, required performance, construction schedule, costs, availability, and ease of maintenance.

① Finishing materials for exterior

The following table describes the scheduled finishing materials for exterior and the reasons for selecting such materials.

Table 2-17 Exterior Finish Materials and Parts to be Applied

Parts	Finish Material	Reasons
Roof	Corrugated colored steel sheet roofing w/ insulation	Locally common tin roofs are short-life materials. Reliable and better quality corrugated colored steel sheet roofing w/ insulation, therefore, is called for.
Wall	Synthetic resin paint	This is the most locally common material for exterior wall finish. Maintenance, therefore, will be easy in the future.
Doors and Windows	Aluminum	Aluminum windows will be used for their durability against weather. Sliding type will be installed for the air-conditioned rooms for its better air-tightness and jalousie type for other rooms for its superior clear opening ratio.

② Finishing materials for interior

The followings are the finishing materials for interior selected in accordance with the roles and functions required.

Table 2-18 Interior Finish Materials and Parts to be Applied

Room Name	Floor	Wall	Ceiling
V.C., Dty. V.C., Heads of Schools, Meeting rooms, Seminar rooms	Carpet Tile	Wall cloth on plaster board	Mineral acoustic fiber panel
Lecture rooms, Drafting rooms	Porcelain tile	Acrylic emulsion paint	Mineral acoustic fiber panel
Workshops	Dustproof paint on mortar steel trowel	Acrylic emulsion paint	Exposed ceiling
Computer room, Server room, System room	Carpet Tile	Acrylic emulsion paint	Mineral acoustic fiber panel
Toilet, Shower room, Locker room	Porcelain tile	Porcelain tile	Paint on gypsum Ceiling board

2-2-2-2 Equipment Plan

(1) Examination of Requested Equipment

Discussions were held among the heads of departments of SP, chiefs of individual courses and supervisors dispatched from Japan, concerning the contents of necessary equipment under the Project at the time of the field survey of the Basic Design Study. As the conclusions of the discussions, requested equipment was listed in the minutes of the discussions (M/D). After signing the M/D, the conditions and quantities of existing equipment were checked and confirmed at workshops of individual departments based on a list of existing equipment submitted by the SP side. Thereafter, the list was reviewed and the list of equipment for this report was prepared. All equipments selected are possible to repair within the country at the time of disorder.

The scope of this Project remains focusing on strengthening and expanding Vaivase Campus of Samoa

Polytechnic, therefore excluding equipment requested from the School of Maritime.

The descriptions and use of the major equipment requested are as follows:

1. The School of Technology

Table 2-19 Major Equipment of Automotive Engineering

Name of equipment	Main purpose	Remarks
Brake & Speed meter Tester	Automobile testing machine to gauge braking force of automobiles and speed meters.	Existing equipment is partially broken down. It is difficult to transfer to a new site because transferring would likely to cause total break down. Further, the equipment is for small automobiles only. Hence, new equipment applicable to medium and to large size vehicles should be procured.
Training vehicle's Components	Practice for disassembling and assembling of engine, transmission, driveline, brake, and suspension.	Many functions of automobiles, including engine, transmission, brake, suspension, are concentrated in this item. This is an ideal piece of equipment because of its size, smaller than keeping a real vehicle.
Hydraulic & pneumatic brake system model	Learning material of brake systems used for bus, truck, and other large vehicles.	Highly demanded training by business circles.
Pneumatic brake system model	ditto	ditto
Separate type engine bed	Simulating engine breakdowns for practicing purpose to search and diagnose problems of breakdown.	Despite its highly practical feature, this equipment has not been introduced.

Table 2-20 Major Equipment of Panel Beating & Spray Painting

Name of equipment	Main purpose	Remarks
Painting spray gun	Practice for painting vehicles	Newly introduced course Essential basic equipment
Body frame repair system	Important device to adjust deformed frames of vehicles.	Highly demanded technology for a society that commonly uses used cars for a long time.
MIG/MAG welder	Practice for special thin sheet metal welding skills. Other machines cannot carry out welding thin metal sheets, which is unique to vehicle bodies.	Acetylene or electric welding is inappropriate for delicate, thin, and complicated car bodies. Vital for acquiring skills for automobiles.

Hydraulic press and steam cleaner, which are listed as "priority A" of the SP side, will be excluded from the Project because existing machines are still usable. The existing two-pillar lift will be used continually by replacing regular spare parts under the Project. A new calibrator for brake tester will also be supplied for maintenance of brake testers.

Table 2-21 Major Equipment of Carpentry & Joinery

Name of equipment	Main purpose	Remarks
Thicknezzer	Automatic planer to plane panels, square timbers, etc. into a specified thickness.	Existing one is decrepit (more than 20 years old) and needs to be replaced by new one.
Wood lathe	Processing machine used to make furniture and fittings (chair legs, etc.)	There is a barely usable old machine. It is appropriate to supply sufficient number for one machine per group.
Masonry saw (Electric)	Device to cut concrete, such as block walls into designed shape.	Basic equipment to strengthen courses for plasterer.
Metal cutter (bench type)	Processing machine to shape aluminum sash as in drawings.	Basic equipment, because there are quite a lot of work using aluminum material in fittings.

The number of electric tools, such as automatic circular saw, planer, and drills will be adjusted on the principle of one tool per group (5 to 6 persons).

Table 2-22 Major Equipment of Electrical

Name of equipment	Main purpose	Remarks
Electrical teaching aids (motor, lights, magnetic)	Basic supplementary equipments to explain principles of electricity.	No existing equipment. Need to procure new one.
Electronic block system	Learning material to make experimental circuits by combining elements into translucent blocks, which are combined on boards.	ditto

In order to improve basic training, basic equipment required for the electric course, such as analogue/digital multi meters, learning materials for electric and electronic circuits, soldering iron will be provided. The quantity of each item to be supplied will be determined in accordance with the number of students.

Table 2-23 Major Equipment of Refrigeration & Air-Conditioning

Name of equipment	Main purpose	Remarks
Water cooled condensing unit with force air	Practical training machine for water-cooled freezer.	There are numbers of facilities equipped with water cooled freezer in Samoa. Thus, it is a social demand for SP to have one for the practical training since there are none at present.
Kit cool/freeze room with condensing unit & evaporator with accessories	For assembling and disassembling practices of prefabricated refrigerator / freezer room.	Many large industrial refrigerators in Samoa are prefabricated. Therefore, related technologies are in high demand.
Recycling/Recovering station	Machine to collect cooling medium for reuse when freezers are under repair.	Reusable and suitable for advanced training which pays attention to the environmental issues.

Demonstration machine to explain the mechanism of freezing cycles is omitted from the list of equipment because there is usable existing equipment at the moment.

Table 2-24 Major Equipment of Fitting & Machining

Name of equipment	Main purpose	Remarks
Vertical milling machine	Vertical milling machine to make flat plane and/or multiple stepping planes	Existing one is decrepit (more than 30 years old) and needs to be replaced by new one.
Universal milling machine	To be used as an upright milling machine. Also to be used as horizontal milling machine with different heads for making grooves, and for precision cutting.	Horizontal milling machines are not common worldwide. Multipurpose-milling machines are widely used, which can cut materials 3-dimentionally.

The fact that the equipment in this course has been used for as long as 30 years is a convincing evidence for proper maintenance being carried out, e.g. when a gear of a lathe was broken a new replacement was manufactured by using milling machine and repaired.

Milling machines are essential for the Fitting and Machining course. To further improve the functions of the milling machines, an index table and milling heads will be necessary as ancillary devices. It is considered necessary that multipurpose-milling machines, which could be used as vertical as well as horizontal-milling machines, to replace the horizontal-milling machines in the request.

A CNC turning machine was requested for demonstration purposes to show to the students about advanced technologies used in developed countries, however, it will be excluded from the project because the machine is excessively expensive and is composed of black boxes that is not suitable for learning the theory.

Table 2-25 Major Equipment of Welding & Metal Fabrication

Name of equipment	Main purpose	Remarks
Profile cutting machine	Cutting steel plates (straight and curving lines)	Common cutting machine for steel plates, but there is none at SP. Necessary to modernize the training.
DC arc welder	Welding steel plates and other metal materials.	Essential for training in order to compare with AC welder but there is none at the moment at SP.
AC arc welder	The most common electric welding machine to weld steel and other metal materials.	The most fundamental electric welder. However, SP possesses only two machines. Each student should be given a machine, basically.

Initially, ten each of MIG and TIG welders were requested. However, discussions with the SP side have revealed that there are four MG welders and five TIG welders that have been supplied through cooperation aid from Australia. Since these machines were not for general purposes, but for special welding purposes, the current number of the machines is sufficient: Thus, an extra procurement under this Project will not be conducted. An oil-pressure metal cutting

machine, supplied under the Australian cooperation project, is out of order at the moment, however, it can be repaired with their own efforts. Thus, this item will also be omitted from the Project.

Table 2-26 Major Equipment of Plumbing & Sheet Metal

Name of equipment	Main purpose	Remarks
Duct roll machine	To be used mainly for folding galvanized steel sheets for exhaust air ducts and joints of chimneys.	Modernized method replacing the conventional hammering methods.
Threading machine	Tapping water pipes, etc.	One decrepit similar machine exists. New one is necessary.
Cut off machine	Cutting steel bars	Being done manually at the moment. Necessary to modernize the cutting method.

The tapping machine for pipes was not initially included in the requested equipment list, but was added afterwards. This is because the existing machine is extremely old and in bad condition, and needs to be replaced.

Table 2-27 Major Equipment of Radio & Electronics

Name of equipment	Main purpose	Remarks
Desktop computer （w/ UPS）	Necessary for training which uses various computer software.	For smooth progress of class, one student should be given one computer.
Electronic block system	Practical training machines which allow extensive experiments from basic to applied ones concerning rectification, amplified, and oscillating circuits, and various semi-conductors.	ditto
Logic analyzer	To be used for analyzing the state of data processing of computers or other IT machines; understanding control action of the functions, and diagnosing troubles with the devices.	Due to the fast development of IT technology, the existing old-type machine is inappropriate, and needs to be replaced by an advanced one.
Digital oscilloscope	PC and other IT devices use high-speed digital signals. The machine is to be used to learn the ways to gauge various wave patterns and timing of signals. This helps to learn diagnostic methods for troubleshooting.	ditto

Training materials for electric circuits was not included in the list of requested equipment at the time of the Preliminary Study, but was added upon the discussions with the SP side, because it is extremely effective as materials for basic training.

A logic analyzer and a digital oscilloscope were additionally requested upon the discussions with the SP side, with reference to the advice of supervisors dispatched to this course from Japan.

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Table 2-28 Major Equipment of Tropical Horticulture

Name of equipment	Main purpose	Remarks
Tractor & trailer	To be used to deliver various agricultural materials and equipment, seedling pots and so on.	Sometimes difficult to carry agricultural materials and equipment manually. In a long run, it is reasonable to procure a small tractor, which is easy for maintenance and its spare parts are easily available
Mist blower spraying machine	To spray chemicals to seedlings of flowers and fruits mainly at the gardens of the facilities.	Preparation of chemicals and spraying them are the basic work for gardening. For safety use, repeated practices are necessary.

It is said that approximately half of the working population in Samoa are engaged in agriculture. At the same time, various agricultural products, such as vegetables, fruits, flowers, and gardening are in high demand in the tourism. In line with this, equipment needed for gardening is requested.

2. The School of Commerce & General Studies

Of the School of Commerce & General Studies, Computer course, Communication course, and Mathematical and Drawing course are compulsory courses to all the students of SP, so that these three courses are regarded as a kind of common general course. In line with this concept, the discussions encouraged that a new section, "Common Use", to be established. This made it possible to combine the requests for lap-top computers, projectors, and other equipment from various courses so that each course will be able to share the equipment as common use items, which will further help the section to rationally manage the equipment.

Table 2-29 Major Equipment of School of Commerce & General Studies

Course	Name of equipment	Remarks
Common Use	Desktop computer w/ UPS	17 computers were requested for all lecturers (17 persons) of the School of Commerce & General Studies.
	Laptop computer	To be lent out to individual courses for presentations or other purposes, if necessary.
	Projector	ditto
	OHP	ditto
	Photocopier machine	To be shared by courses in the School of Technology、School of Commerce & General Studies.
Secretarial Studies	Electric typewriter	One typewriter each for a class of 25 persons.
Computer Studies	Desktop computer w/ UPS	One computer each for three classes of 20 students.
	Printer	One printer per class. 4 in all.
Communication Studies	L.L. cassette recorder/player	For language learning
Journalism(Media)	Digital video camera	Basic equipment (for interviews)
	Digital recorder	ditto
Mathematic & Technical Drawing	Drawing board w/drafter	Basic equipment. The existing one is in bad shape.
	Drawing board w/ T square	ditto
Hospitality & Tourism	Iron press machine (Commercial)	General training equipment

3. Common Use

This section supports all the courses, and their functions of SP.

Table 2-30 Major Equipment of Administration

Course	Name of equipment	Remarks
Administration	Photocopier machine	Creating teaching materials, documents for advertisements, etc.
	Desktop computer W/UPS & printer	One set each for department managers and higher rankings.
	Filling cabinet	Two set for department managers and higher rankings. One set each for general staff members.

(2) Contents of equipment to be procured

Upon examining the requested equipments, the ones which needs to be supplied under this project are as follows:

Table 2-31 Equipment List

ID No.	Name of equipment	Q'ty
■Automotive Engineering		
1-1	Vernier caliper (0-200mm)	10
1-2	Torque wrench (angle type)	5
1-3	Torque wrench (preset, dial, digital)	1
1-4	Idle roller unit for 4WD	1
1-5	Calibrator for brake tester	1
1-6	Injector tester (for gasoline engine)	1
1-7	Fuel pressure gauge set	1
1-8	Oil pressure gauge (for engine)	2
1-9	Separate type engine bed (for engine training)	1
1-10	Compression gauge (for gasoline engine)	5
1-11	Timing light	5
1-12	Oil filter wrench set	1
1-13	Engine analyzer	1
1-14	Hand vacuum pump	2
1-15	Compression gauge (for diesel engine)	2
1-16	Injection nozzle tester (for diesel engine)	1
1-17	Mechanic puller set	1
1-18	Parts cleaner	2
1-19	Training vehicle's components	4
1-20	Alternator cut model	1
1-21	Distributor (ignition model)	1
1-22	Starting motor (model)	1
1-23	Battery charger	1
1-24	Multi meter (analog)	10
1-25	Multi meter (digital)	10
1-26	Electronic block system	10
1-27	Wheel balancer weight set	1
1-28	Oxy.-acetylene welding /cutting torch set	2
1-29	Deferential (ASR, ASD) mechanism model	1

ID No.	Name of equipment	Q'ty
1-30	Floor jack	2
1-31	Clutch aligner tool	2
1-32	Tube flaring / cutting tool set	2
1-33	Tie rod end lifter	2
1-34	Hydraulic system model	1
1-35	Pneumatic system model	1
1-36	Wheel dolly	2
1-37	Rigid rack (height 1m)	2
1-38	Floor jack (air jack 5ton)	1
1-39	Air impact wrench (heavy duty)	1
1-40	Socket wrench set (25.4.mm square)	1
1-41	Body repair tool set	2
1-42	Body fender tool set	10
1-43	Metal cutting snips set	10
1-44	Body frame repair system	1
1-45	Body puller set	2
1-46	Hydraulic port power set	2
1-47	Vice grip wrench set	4
1-48	Hand riveter tool kit	2
1-49	Paint spray gun cleaner	2
1-50	Air compressor	1
1-51	Jig saw	2
1-52	Spot tool (spot welding separator)	2
1-53	Spot welder	1
1-54	MIG/MAG Welder	1
1-55	Air chisel	2
1-56	Air belt sander	2
1-57	Electric grinder	2
1-58	Electric polisher (200mm)	2
1-59	Double action sander	2
1-60	Orbital sander	2
1-61	Lever block (1t)	2
1-62	Vacuum cleaner	1
1-63	Torque convertor (model)	1
1-64	Automatic transmission cut model	1
1-65	4 speed manual transmission functional model	1
1-66	Oil pressure gauge (for automatic transmission)	2
1-67	Brake speedometer tester	1
1-68	Bench drill	1
1-69	Head light tester	1
1-70	Side slip tester	1
1-71	Spare parts for two(2) post lift (model:TPY-3F)	2
1-72	Bench grinder	1
1-73	Bench vice	15
1-74	Numbering punches (No. & Alphabet)	1
1-75	Painting spray gun	10
1-76	Rotary gate lift (3ton)	1
1-77	Creeping board	10
1-78	Air hose (diameter 6.5mm urethane, 100m)	3
1-79	Air hose (diameter 8.5mm urethane, 100m)	1
1-80	Air coupler (socket for 6.5mm)	20

ID No.	Name of equipment	Q'ty
1-81	Air coupler (plug for 6.5mm)	20
1-82	Air coupler (socket for 8.5mm)	10
1-83	Air coupler (plug for 8.5mm)	10
1-84	Air coupler (socket for pipe female)	20
1-85	Air coupler (socket for pipe male)	20
1-86	Air coupler (socket for rubber hose)	10
1-87	Air coupler (plug for rubber hose)	10
1-88	Air coupler (plug for equipment male)	50
1-89	Air coupler (plug for equipment female)	50
1-90	Air transformer	10
1-91	Air hose (diameter 6.5mm rubber,50m)	1

■Carpentry & Joinery

2-1	Bench grinder (205mm, electric)	1
2-2	Angle grinder (size 4")	2
2-3	Rib saw (table saw)	1
2-4	Jig saw (electrical, portable)	4
2-5	Drop saw (miter saw)	1
2-6	Circular saw	2
2-7	Air compressor	1
2-8	Pin gun (air rivet gun: 6mm)	2
2-9	Router (electrical)	4
2-10	Router bit set	5
2-11	Disk sander (electric orbital sander)	5
2-12	Surface plainer (W:100mm)	5
2-13	Electrical power plainer (thickzzer)	1
2-14	Vacuum cleaner (industrial model)	1
2-15	Wood lathe (table lathe)	5
2-16	Laser measure	2
2-17	Carving tools set	5
2-18	Allen key set (metric)	2
2-19	Allen key set (imperial)	2
2-20	Concrete steel float	5
2-21	Magnesium finishing float	5
2-22	Curving edging tools (exterior)	5
2-23	Oval mouth shovel	5
2-24	Masonry saw （electric)	1
2-25	Chisel of different size set	5
2-26	Level set (450mm)	2
2-27	Pinch bar (600mm)	5
2-28	Mobile scaffolding	1
2-29	Internal right angle trowel (150mm)	5
2-30	Gibraltar board joining trowel (13mm)	5
2-31	Metal concreting trowel (9mm)	5
2-32	Wheel barrows (150kg)	3
2-33	Tile cutter （electric）	1
2-34	Metal cutter (bench type)	1
2-35	Sash cramp	10
2-36	Corner cramp	10
2-37	Cordless drill	3
2-38	Angle drill (for wood 20mm or more)	2

ID No.	Name of equipment	Q'ty
2-39	Bench drilling machine （13mm)	1
2-40	Drill bit set (for wood)	5
2-41	Dust extractor (for power plainer & rib saw)	2
2-42	Blade sharpener 400mm	1
2-43	Tip saw sharpener	1

■Electrical

3-1	AC generator（AC240 over 900VA）	1
3-2	Meter - digital	15
3-3	Ground tester	2
3-4	Cable meter	2
3-5	Analog multi meter	15
3-6	Power supply (DC)	4
3-7	Riveting gun	4
3-8	Bearing puller set	2
3-9	Battery drilling machine	4
3-10	Electric hammer drill	4
3-11	Marker kit	4
3-12	Disk grinder (100mm)	4
3-13	1/4"3/8"drive socket set	4
3-14	Alloy steel cold chisel set	4
3-15	Compact bolt cutter	4
3-16	Conduit cutter	4
3-17	Electrical teaching aids （motor, lights, magnetic)	1
3-18	Electrician chisel	4
3-19	Electronic block system	15
3-20	Engineer square	15
3-21	Folding hearing protector	15
3-22	Goggles	15
3-23	Heavy duty hand snips	15
3-24	Open-end spanner set （metric and imperial）	4
3-25	Pinch off tool-vise-grip	4
3-26	Ring spanner set （metric and imperial）	4
3-27	Screwdriver sets	15
3-28	Soldering irons （copper head 40-60w）	9
3-29	Spring type bender （20mm & 25mm)	4
3-30	Tool pouches with belt	15
3-31	Wire stripper	4

■Refrigeration & Air conditioning

4-1	Gauge manifold	4
4-2	Ac controls domestic air conditioning	1
4-3	Digital multi meter （AC/DC with clamp on ammeter）	5
4-4	Electronic charging scale	2
4-5	Electronic thermo-spectrometer	2
4-6	Insulation tester	4
4-7	Kit cool room （1800W×1800D×2200H with condensing unit & evaporators)	1
4-8	Kit freeze room (1800W×1800D×2200H with condensing unit & evaporators)	1
4-9	Recycling station	1
4-10	Recovery station	2

ID No.	Name of equipment	Q'ty
4-11	Sling psychrometer	4
4-12	Temperature recorder	2
4-13	Vacuum pump（high rate, 2-stage)	1
4-14	Vacuum pump（2-stage）	3
4-15	Water cool condensing unit (with force air evaporator)	1
4-16	1/2"lever type tube bender	4
4-17	3"lever type tube bender (3 size combined)	4
4-18	3/4"lever type tube bender	4
4-19	5/8"lever type tube bender	4
4-20	Angle grinder	1
4-21	Bearing puller	2
4-22	Bench drilling machine,(13mm)	1
4-23	Bench grinder (200mm)	1
4-24	Big tube cutter, (1/4" to 1 5/8"）	4
4-25	Hammer drill, (max13mm)	4
4-26	Mini tube cutter, (1/8"to 5/8")	4
4-27	Mobile complete tool set	4
4-28	Reversible ratchet spanner	4
4-29	Swaging & flaring tool set	4

■Fitting & Machining

5-1	Vacuum cleaner	1
5-2	Assort size puller	1
5-3	Pipe bender (hydraulic)	1
5-4	HSS square cutting tool	50
5-5	Index table and milling machine head	1
5-6	Lathe machine	8
5-7	BSF. Tap & dies set	1
5-8	BSP. Tap & dies set	1
5-9	BSW. Tap & dies set	1
5-10	Dividing or indexing head for milling	1
5-11	Drill bit, imperial (1/8 to 1/2in)	5
5-12	Drill bit, metric (3mm to 13mm)	5
5-13	ISO. Tap & dies set (coarse)	1
5-14	ISO. Tap & dies set (fine)	1
5-15	Pedestal grinder	1
5-16	Pitch gauge and bit gauge	8
5-17	UNC. Tap & dies set	1
5-18	UNF. Tap & dies set	1
5-19	Universal milling machine	1
5-20	Vernier calipers	15
5-21	Portable air compressor	1

■Welding & Metal fabrication

6-1	Cropper cutter (multi cutter)	1
6-2	Profile cutting machine	1
6-3	Power hacksaw or Cut off machine	1
6-4	Spot welder	1
6-5	Pedestal grinder （stone dia..: over 300mm）	1
6-6	Hydraulic pipe bender (max dia.: 50mm)	1

ID No.	Name of equipment	Q'ty
6-7	DC Arc welder	1
6-8	AC Arc welder	8

■Plumbing & Sheet metal

7-1	Galvanized iron pipe bender, hydraulic	1
7-2	Mechanical bench vice	6
7-3	Plastic welder（for PVC）	3
7-4	Roll forming machine	1
7-5	Guillotine (L:2000mm)	1
7-6	Sheet metal roller (L:2000mm)	1
7-7	Electric spot welder	1
7-8	Bench chain vice (for pipe)	6
7-9	Pan brake & cronies brake	1
7-10	Heavy-duty rivet gun (max rivet dia.6mm)	4
7-11	Air compressor	1
7-12	Threading machine	1
7-13	Cut off machine	1
7-14	Geared roll forming machine	1

■Radio & Electronics

8-1	Digital oscilloscope (500Mhz)	2
8-2	Logic analyzer	2
8-3	Electronic block system	15

■Tropical horticulture

9-1	Double-sliding ladder (height:6m)	2
9-2	Knapsack sprayer	3
9-3	Mist blower, spraying machine	2
9-4	Tractor & trailer (SP 's yard maintenance use)	1
9-5	Shade cloth (for green house)	5
9-6	Tool box (with set of tools for machine maintenance)	1
9-7	Weed mat	5
9-8	Weed eater (brush type grass cutter)	5
9-9	Pruning ropes for tree pruning	4
9-10	Hoses with sprinklers	5
9-11	Micro scope	2

■School of Commerce and General Studies, and Common use equipment

C-1	Computer (30: Technology, 52: Commerce, 14: Administration)	96
C-2	Laptop computer (Common use)	4
C-3	Software (MS Office) (30: Technology, 56: Commerce, 14: Administration)	100
C-4	Software (CAD) (Computer Lab.)	22
C-5	Software (sage & myob) (Computer Lab.)	1
C-6	Software (type master) (Computer Lab.)	1
C-7	Software (adobe in-design) (Computer Lab.)	1
C-8	Software (reservation) (Tourism & Hospitality)	1
C-9	Software (fidelio) (Tourism & Hospitality)	1
C-10	Server software (Computer Lab.)	5
C-11	Software (edit scanned text & images) (Computer Lab.)	1
C-12	Printer (laser small) (9: Technology, 10: Commerce, 14: Administration)	33

ID No.	Name of equipment	Q'ty
C-13	Printer (laser) (Computer Lab.)	3
C-14	Stand for printer (9: Technology, 11: Commerce, 14: Administration)	34
C-15	Router (for 21pax) (Computer Lab.)	3
C-16	Hub (for 10/100) (Computer Lab.)	3
C-17	Scanner (1: Commerce, 2: Administration, 1: Library)	4
C-18	Ups (30: Technology, 52: Commerce, 14: Administration)	96
C-19	TV set (multi system) (9: Technology, 9: Commerce)	18
C-20	VCR (multi system) (9: Technology, 9: Commerce, 1: Library)	19
C-21	Cabinet (for TV & VCR) (9: Technology, 9: Commerce, 1: Library)	19
C-22	Desk for student (225: Technology, 86: Commerce)	311
C-23	Chair for student (225: Technology, 169: Commerce)	394
C-24	Desk for lecturer (29: Technology, 28: Commerce, 2: Administration)	59
C-25	Chair for lecturer (29: Technology, 28: Commerce, 2: Administration)	59
C-26	Desk for lecturer (class room) (9: Technology, 15: Commerce,)	24
C-27	Chair for lecturer (class room) (9: Technology, 15: Commerce)	24
C-28	Computer desk (Computer Lab.)	63
C-29	Conference desk (for conference room in Administration)	8
C-30	Conference holding chair (for conference room in Administration)	20
C-31	Sofa set (for counseling room in Administration)	2
C-32	Tea table (for counseling room in Administration)	2
C-33	Stool (20: Technology, 50: Commerce)	70
C-34	Filing cabinet (for text book) (32: Technology, 36: Commerce, 61: Administration)	129
C-35	Filing cabinet (A4 vertical) (24: Technology, 26: Commerce, 47: Administration)	97
C-36	Storage Rack (Technology)	24
C-37	Locker for workshop (6pax unit) (Technology)	68
C-38	Screen (potable) (Common Use)	6
C-39	Pin board (9: Technology, 15: Commerce, 1: Administration)	25
C-40	Pin board (mobile type) (Library)	5
C-41	White board (large) (9: Technology, 15: Commerce, 1: Administration)	25
C-42	White board (mobile type) (9: Technology, 3: Commerce, 1: Administration)	13
C-43	Photocopier machine (monochrome) (1: Commerce, 1: Administration)	2
C-44	Photocopier machine (colour) (Administration)	1
C-45	Shredder (1: Commerce, 2: Administration)	3
C-46	Binding machine (spiral) (1: Commerce, 2: Administration)	3
C-47	Laminating machine (for student ID) (Administration)	2
C-48	Paper punchers (3/2 holes) (Administration)	2
C-49	Staplers (Administration)	3
C-50	Guillotine (for paper) (1: Commerce, 1: Administration)	2
C-51	Overhead projector (Common Use)	4
C-52	Projector for PC (Common Use)	2
C-53	Vertical map cabinet (A1 size) (Library)	2
C-54	Precision cupboard (multimedia) (Library)	5
C-55	CD drive (CD-RW, DVD-Rom) (Library)	1
C-56	Laminating machine (A3 size) (Library)	1
C-57	Step stool (Library)	1
C-58	Wood book shelves (double sided) (Library)	10
C-59	Magazine rack (Library)	2
C-60	Fax machine (Common Use)	1
C-61	Cassette tape recorder (Jounarism)	2
C-62	Typewriter (electronic) (Secretarial Study)	25
C-63	L.L. Control station (for tutor) (Communication)	1

ID No.	Name of equipment		Q'ty
C-64	L.L. Booth (with cassette player & headset, for student)	(Communication)	20
C-65	Digital video camera	(Jounarism)	2
C-66	Digital still camera	(Jounarism)	2
C-67	Digital recorder (for interview)	(Jounarism)	5
C-68	Drawing board set (with drafter)	(Mathematics)	25
C-69	Drawing board set (with t & angle)	(Mathematics)	25
C-70	Compass set	(Mathematics)	25
C-71	Double size bed	(Tourism & Hospitality)	1
C-72	LAN cable 200m (with connector 2x22)	(Computer Lab.)	3
C-73	Iron press machine	(Tourism & Hospitality)	1

2-2-3 Basic Design Drawings

The following basic design drawings have been prepared based on the results of examinations on the request mentioned in the previous chapter.

① Site Plan

② Administration Bldg. A Plans (1F, 2F)

③ Administration Bldg. A Elevations and Sections

④ School of Technology Workshop Bldg. B Plans (1F, 2F)

⑤ School of Technology Workshop Bldg. C Plans (1F, 2F)

⑥ School of Technology Workshop Bldg. D Plans (1F, 2F)

⑦ School of Technology Workshop Bldg. E Plans (1F, 2F)

⑧ School of Technology Workshop Bldgs. Elevations and Sections

⑨ School of Commerce & General Studies Lecture Hall Plans

⑩ School of Commerce & General Studies Lecture Hall Elevations and Sections

⑪ School of Commerce & General Studies Hospitality Bldg. Plans, Elevations and Sections