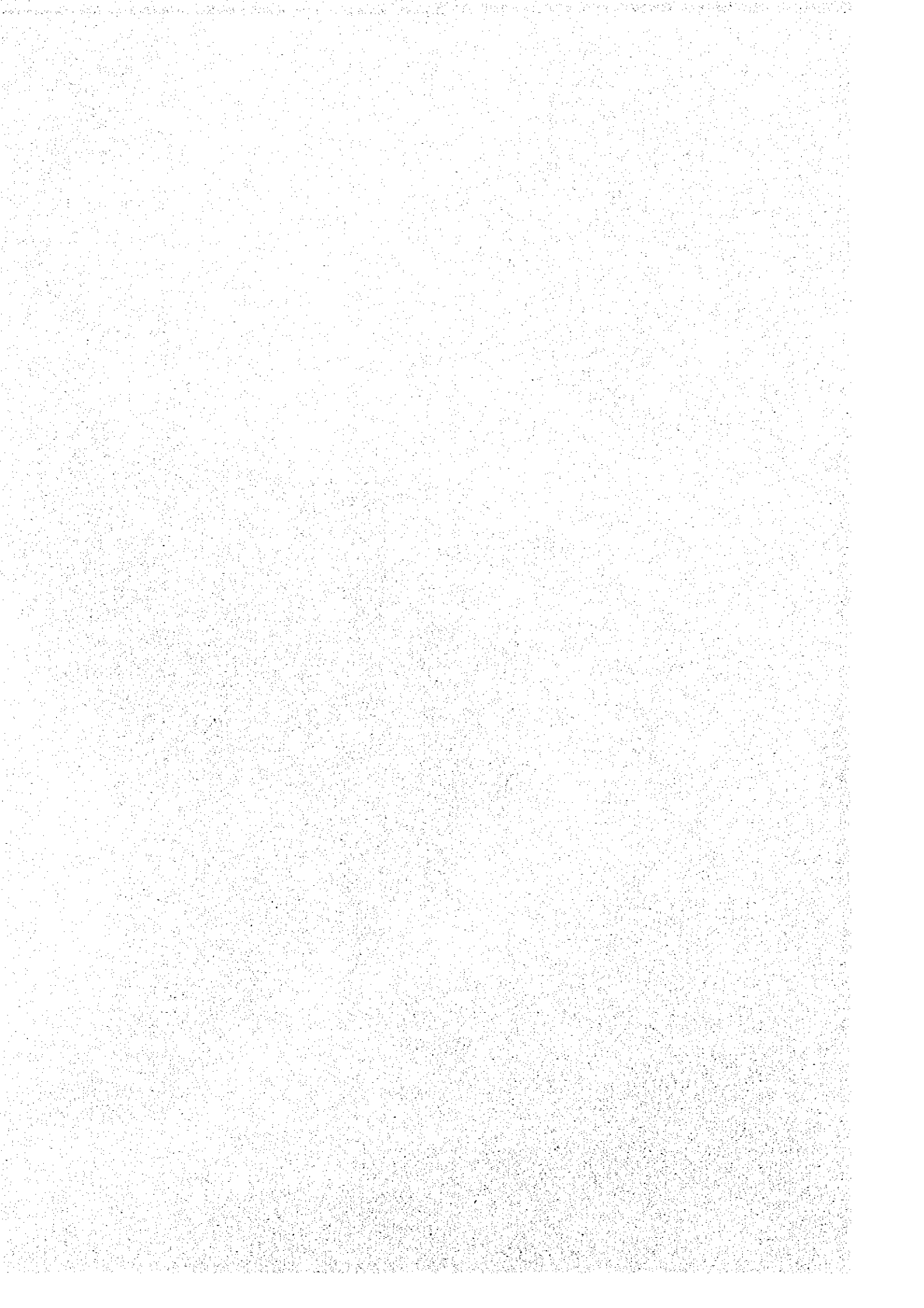


## **CHAPTER 3 IMPLEMENTATION PLAN**



## **CHAPTER 3 IMPLEMENTATION PLAN**

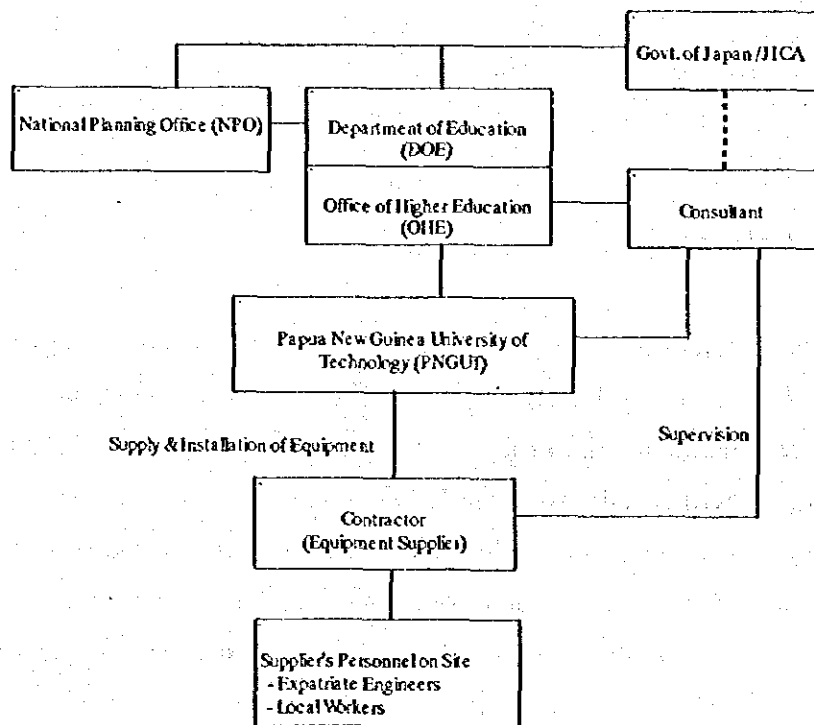
### **3-1 Implementation Plan**

#### **3-1-1 Implementation Concept**

This Project is to provide the Papua New Guinea University of Technology with educational equipment by a Grant Aid of the Japanese Government. The Department of Education which is responsible for the Project will enter a contract with a Japanese consultant. The consultant will execute the detailed design, the preparation and distribution of the tender documents, the tender evaluation and the supervision of equipment installation in lieu of the Department of Education. The Department will also enter a contract with a Japanese supplier. The supplier will procure, transport and install equipment. It will further train the staff members of the Papua New Guinea University of Technology, the executing agency of the Project, in the operation and maintenance of equipment. The unpacking and installation of equipment will be carried out by local labors under the guidance of Japanese engineers. The wiring, the assembling of small parts and the test operation and adjustment of equipment will be carried out by Japanese engineers themselves. Japanese specialists in each of the following fields will be assigned: general scientific instruments; analytic instruments; optical instruments; measuring instruments; computers; and machines and tools. The organization of project implementation is shown in Fig. 3-1.

#### **3-1-2 Implementation Conditions**

The school year of the University is divided into two semesters. The first semester begins in the middle of February and ends in the beginning of June. The second semester begins in the beginning of July and ends in the beginning of November. It is necessary to adjust the work time for installation, test operation and adjustment of equipment in consultation with the University so that the educational and research activities of the University may not be disturbed. The working hours of the University are from eight in the morning to four in the evening. Sundays and Saturdays are holidays.



**Fig. 3-1 Project Implementation System**

### 3-1-3 Scope of Works

#### Papua New Guinea Side

- 1) Repair of buildings, interior work of buildings, foundation work of the equipment.
- 2) Electric work for receiving, transforming and distributing of electric power.
- 3) Water supply and drainage work.
- 4) Electric lighting work.
- 5) Draft and ventilation work.
- 6) Telephone and communication facility work.
- 7) Procurement of furniture and utensils.
- 8) Procurement of chemicals and consumables.

#### Japanese Side

- 1) Procurement, transportation and installation of planned equipment.

- 2) Wiring of secondary circuits.
- 3) Test operation and adjustment of equipment; training in the operation and maintenance.
- 4) Consulting services including the detailed design, preparation of tender documents, management of tendering and supervision of the project implementation.

#### **3-1-4 Consultant Supervision**

In accordance with the policy of the Japanese Government Grant Aid and the consultant contract, the consultant shall form a project implementation team that carries out the detailed design, and supervises the tendering procedures and the project execution. The consultant team consists of a team leader and four engineers in each of the following areas: the scientific and analytical instruments; the machines and tools; the computers and peripherals; and the cost calculation and preparation of tender documents. The consultant, in cooperation with the executing agency, will examine the detailed specifications of equipment and draft the tendering documents. The consultant also administers the tendering and the matters concerning the approval of the Japanese Government. The consultant shall assist the Department of Education and the University in the evaluation of tenders and the negotiation of contract with the supplier of equipment, to facilitate the project implementation. The consultant provides technical assistance to the executing agency of PNG in the kickoff meeting and the approval of the manufacturing design of equipment. Engineers of the consultant will be present at the pre-shipment inspection at a factory in lieu of the executing agency. Engineers of the consultant will supervise the installation, inspection and delivery of equipment at the Project Site.

#### **3-1-5 Procurement Plan**

##### **(1) Methods of Procurement**

Equipment that requires maintenance and repair by the manufacturer and supply of the replacement parts (for example, electrical and electronics equipment) will be a product of the manufacturers that can offer maintenance and repair services through their branch office or agent in PNG, whether it be "made in Japan" or "made in

third countries". In particular the following equipment is preferred to be procured in PNG.

#### 1) Computers

Computers that are sold in Japan are equipped with a Japanese keyboard and ROM that includes Japanese language. These functions are not necessary. Computers should be procured through local agents in order to facilitate upgrades of RAM or hard disks at a later stage whether they be an Australian make, an American make, or a Japanese make tailored to export. There are local agents of manufacturers of the United States, Australia and Japan. There are also local companies that assemble personal computers from imported parts. As of December in 1996, a prevailing model in PNG includes a 133 to 160MHz Pentium processor, 16 MB of RAM and a 1 to 2GB hard disk.

#### 2) Printers and Photocopiers

Printers and copiers require regular maintenance and should be procured through local agents because the consumables and maintenance services are easily available. There are local agents of manufacturers of the United States, the United Kingdom and Japan.

#### 3) Vehicles and Tractors

Vehicles and tractors require regular maintenance and often replacement of parts. They should be procured through local agents near the Project site. There are local agents of manufacturers of Japan, the United States and European countries in Lae and Rabaul which keep a rich assortment of vehicles.

Import duties and sales tax are levied on the goods locally purchased. When goods on the market are purchased, it is difficult to get reimbursement for these taxes. One way to have exemption from these taxes may be for a buyer to obtain tax exemption certificates from the Customs and to receive goods stored in the bonded area.

#### (2) Method of Transportation

Goods procured in Japan and in third countries are preferred to be shipped by container to protect goods from damage. Goods to the Taraka campus are unloaded at

Lae Port. Goods to Vudal University College are unloaded at Rabaul Port. In some cases transshipment may be necessary on the way to the final destination port. The goods are transported by truck from the port to the Project site.

### 3-1-6 Implementation Schedule

The implementation schedule of the Project is shown in Fig. 3-2.

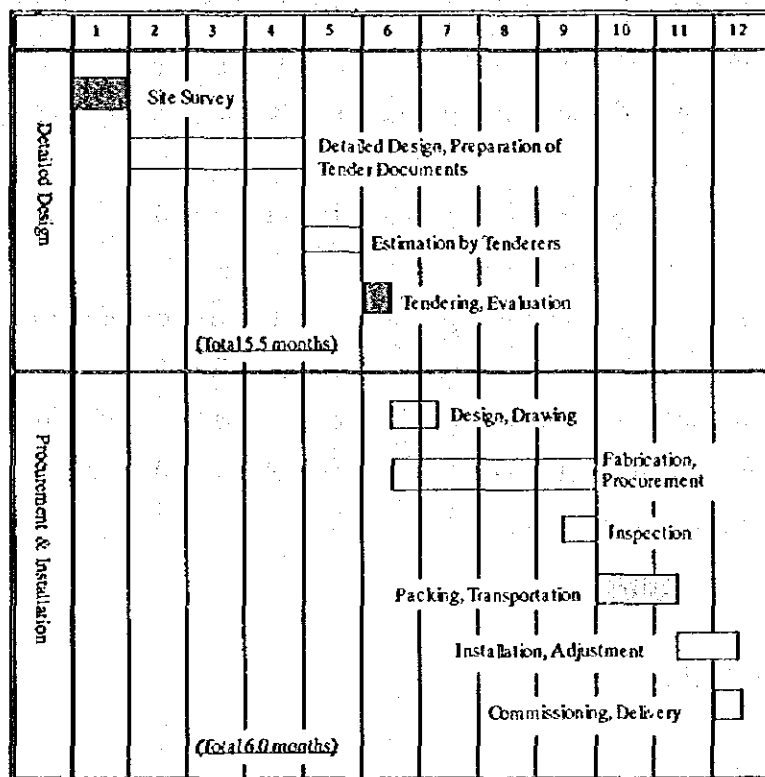


Fig. 3-2 Implementation Schedule

### 3-1-7 Obligations of Recipient Country

In the implementation of the Project, the Papua New Guinea side shall attend to the following matters:

- 1) To take necessary procedures for the unloading, custom's clearance and inland transportation of equipment, and to bear all the expenses required by the procedures.
- 2) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in PNG with respect to the supply of the goods and services under the verified contracts.
- 3) To bear commissions to an authorized foreign exchange bank in Japan for the banking services based on the Banking Arrangement.
- 4) To accord Japanese nationals whose service may be required in connection with the Project such facilities as may be necessary for their entry into Papua New Guinea and stay therein for the performance of their work.
- 5) To operate and maintain the equipment provided by the Grant Aid properly and effectively.
- 6) To proceed with approvals necessary to carry on the Project.
- 7) To ensure the budget and personnel required to operate and maintain the equipment provided by the Project properly and efficiently.
- 8) To bear all other expenses that are not covered by the Grant Aid but may be necessary to carry out the Project.

### 3-2 Project Cost Estimation

The costs to be born by the PNG side are estimated at about 37,500 Kina. The breakdown is as follows:

Works	Amount
Repair and interior work of buildings etc.	K11,000.00
Electric work for receiving, transforming and distributing of electric power	K3,000.00
Water supply and drainage work.	K2,500.00
Electric lighting work.	K5,500.00
Draft and ventilation work.	K2,000.00
Telephone and communication facility work.	K3,500.00
Procurement of furniture and utensils.	K8,000.00
Procurement of chemicals and consumables.	K2,000.00
<b>Total</b>	<b>K37,500.00</b>



### 3-3 Operation and Management

The maintenance and management system of educational and research equipment in the University is as follows: the daily maintenance is conducted by the teaching staff or technical officers of the Department that maintain the equipment. Repairs are done by the Electronic Services Unit of the University. Some equipment is repaired by the technical officers of the Department of Electrical and Communication Engineering or the technical officers of the workshop of the Department of Mechanical Engineering. Computers are maintained by the Computer Services Centre. When the troubles happen that can not be solved by the University, the equipment is sent to the manufacturer directly or through the local agent for its repair. Some manufacturers or agents in Australia offer regular maintenance service to optical and surveying equipment regardless of the origin, sending an itinerant maintenance team once or twice in a year.

The University requests two million Kina for the maintenance cost in the 1997 recurrent budget from the Department of Education. This amounts to about 8% of the total recurrent budget and is considered to be sufficient to maintain the existing equipment and facilities. Most of the equipment to be provided through this Project is renewal of the existing equipment. Eight to ten percent of the recurrent budget is considered to be sufficient to maintain equipment including that to be provided by the Project.

The University is a national educational institution and its income is subsidies from the Government. Students are required to pay yearly 3,000 Kina for tuition fees and board and lodging. Scholarship students bear 10% of these expenses themselves and the remaining 90% is paid to the University directly from the Department of Education. This amounts to about 2.5 million Kina in 1996, which is utilized by the University for its own expenses in addition to the recurrent budget.

**CHAPTER 4 PROJECT EVALUATION AND  
RECOMMENDATION**

## **CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION**

### **4-1 Project Effect**

#### **(1) Improvement of Knowledge and Skills of Students**

Most of the existing items of equipment in the Papua New Guinea University of Technology has been used for more than 10 years (some are for more than 30 years). Many pieces are broken and not workable. The quantity is not enough, either. Teaching materials are textbooks which are selected by the teaching staff as suitable for the students or modules prepared by the teaching staff. Nowadays computers are extensively used in technological education throughout the world. The curriculum needs to incorporate the advanced technology which is widely used in the industry. This entails introduction of the latest findings and techniques in the laboratory and practice classes. Insufficient quantity of equipment impedes the hands-on-experiments and causes insufficient understanding of the subject matters by the students. The industry requests that the graduates are trained in the latest technology which the industry is using. Provision of equipment by this Project is expected to assist students in acquiring scientific thinking habits and in preparing themselves for the jobs which they are expected to perform in their work place after graduation. The University produces about 400 graduates with degrees, diplomas and postgraduate degrees every year. Since the University trains students from other South Pacific countries, these countries will also have spin-offs from the improvement of education through the Project.

#### **(2) Strengthening of Scientific and Technological Education**

One of the weak areas in the current education system of Papua New Guinea is scientific and technological education. How to instill scientific and logical thinking in people is a serious concern. The student's will to study is influenced not only by his ability but also by the learning environment. Improvement of pedagogic skills and laboratory conditions, and coordination of the curriculum and the requirements from the industry are important to maintain the student's will to study.

One of the teaching objectives of the University manifested in its "Development

Objectives and Strategies 1994 - 2000" is " To provide technical education which enables all students to develop appropriate professional skills in addition to skills in research, communication, computer literacy, logical exposition and quantitative analysis."

Provision of equipment including computers by this Project will attract more applicants for the University and be able to expand the higher education as expressed in the national policies. Introduction of new equipment by this Project will be able to stimulate the interest of students and to strengthen the student's will to study. The graduates who have been trained in scientific methodology will contribute to realization of rational life styles in both urban and rural areas.

### **(3) Contribution to Industry**

The Project covers a wide range of subjects taught in the departments. The students are expected to acquire techniques and skills in the investigation, exploration, processing, reproduction and preservation of natural resources that are abundant in the country, and in the planning, construction, management and improvement of the infrastructures necessary for the economic and social development. The education of the University is involved with all economic sectors: mining, manufacturing, agriculture, forestry, fisheries, and animal husbandry. The graduates from the University are working in the public sector (government bodies, research institutions and educational institutions) and the private sector. They are expected to play important roles in:

- Improvement of the quality of mineral products by quality control.
- Investigation and exploration of new mineral resources.
- Development of manufacturing and processing industries utilizing indigenous resources.
- Expansion of infrastructures.
- Development of information networks such as a banking on-line system.
- Computer programming.
- Expansion of market of home products, sales and management.
- Management of business.
- Improvement of agricultural, forestry and fishery products and improvement of cultivation methods.
- Effective use of land and improvement of soils.
- Development of processing of agricultural products and the quality control of

products.

The coordinated development of these activities will expand the economy of the country. The continuing production of competent graduates is expected to gradually replace about 30,000 expatriates who occupy intellectual jobs with local professionals and to help build up a self-reliant nation.

#### (4) Coordination with Localisation Programme

Papua New Guinea is a young country, only twenty-one years after the independence and is a member of the Commonwealth. Ninety percent of the labour force lives in rural areas. Before the independence, it had been administered by Australia. Investment in mineral exploration by foreign capital including Australia became active in 1980s. For these historical reasons, there have been many expatriate experts and engineers working in the public sector as well as in the private sector. The National Manpower Assessment published in 1986 indicates that the population of resident expatriates is 34,669 in 1966, 35,426 in 1971, 32,670 in 1980 and 31,200 in 1984. Although the population of expatriate residents is gradually decreasing, it stays around 1 % of the total population and is estimated about 30,000 at present. About seventy percent of the staff of the University are expatriates. On the average about thirty percent of the staff are expatriates in the public sector. In foreign capital companies in mining and metallurgical industries major posts are occupied by foreigners ( in some cases approximately 50%). The Government is trying to raise the portion of local people by increasing the shares and participating in management.

The Project is in accord with the localisation policy of the Government. The University will produce every year about 400 graduates and 600, after the year of 2000, who have been trained using new equipment provided by the Project. They will be employed by the offices of national and local governments, public corporations, research institutes and educational institutions. They will also work as engineers or managers in private companies in mining, food processing, metal processing, wood processing, tobacco, textile and others. They are expected to play leading roles in these fields for the development of the country.

The Project does not generate a high profit. However, the direct as well as

indirect economical benefits are expected as mentioned above. The Project does not have bad influence on the environment. It can be implemented within a period of one fiscal year. For these reasons it will be justified to implement this Project by a Japanese Government Grant Aid.

#### 4-2 Recommendation

The Project is expected to bring about a lot of benefits mentioned in the previous paragraphs and to contribute widely to basic human needs. This confirms the justification of implementing this Project by a Japanese Government Grant Aid. The funds and manpower on the PNG side are sufficient to manage the Project and no serious problems are expected to arise in the implementation and maintenance of the Project. However, the improvement of the following points will further facilitate the implementation of the Project.

##### (1) Training in the Operation and Maintenance of Equipment

The university has an enough number of teaching staff and technical officers who operate and maintain equipment. Almost all teaching staff have higher degrees from universities in advanced countries including Australia and their technical level is high. However, since some equipment planned to be provided by the Project uses the latest technology, it is preferred to retrain the staff members in the operation techniques of such equipment. It is recommended to train the staff members at the site after the installation in the handling of equipment that requires particularly difficult operation and maintenance. It is also recommended for the University to provide the maintenance staff with opportunities for training in the operation and maintenance of new equipment.

##### (2) Maintenance Costs

About 4 to 11 % of the total recurrent budget had been allotted to cover the maintenance costs every year from 1992 to 1995. The University needs to request from the Department of Education 37,500 Kina to cover the local costs required to implement the Project (renovation of buildings, facilities and purchase of furniture and utensils)

and 2,000,000 Kina per year to cover the costs for maintenance, repair and purchase of parts. Whether the equipment provided is used as planned depends on whether this budget is executed as planned. It may be necessary to monitor the execution of this budget. It is considered necessary to confirm that the Office of Higher Education of the Department of Education which administers the higher education budget ensures the budget.

### (3) Import Duties and Taxes

The Customs Law amended in 1994 levies import duties on any goods imported for the Government bodies including universities regardless of the origin of the funds. It is requested that equipment provided and Japanese nationals related to the implementation of the Project which is implemented by a Japanese Government Grant Aid are exempted from the import duties and internal taxes as stated in the Minutes of Discussions on the Basic Design Study. However, import duties and taxes have not been clearly exempted when the consignee was a Government body in a few cases of grant aid projects implemented in the recent past. The Japanese Embassy in PNG is concerned if this amended law is also applied to this Project. The matters on import duties and internal taxes are under the jurisdiction of PNG. In order to complete the Project by the end of the Japanese fiscal year, it may be necessary to deliberate on these matters with the PNG Government.

## **APPENDICES**



## **Appendix 1 MEMBER LIST OF THE STUDY TEAM**

<b>Akira HARA</b>	<b>Team Leader</b>	<b>Development Specialist, JICA</b>
<b>Dr. Shigeru YAMASHITA</b>	<b>Technical Advisor</b>	<b>Professor, Mining College, Akita University</b>
<b>Wataru SHIGA</b>	<b>Chief Consultant (Education Specialist/ Equipment Planner)</b>	<b>UNICO International Corporation</b>
<b>Takashi KURODA</b>	<b>Equipment Planner</b>	<b>UNICO International Corporation</b>
<b>Satoru HAMAMOTO</b>	<b>Equipment Planner/ Cost Estimator</b>	<b>UNICO International Corporation</b>

## Appendix 2 SURVEY SCHEDULE

No.	Date	Day	Itinerary	City
1	96/11/20	Wed	Lv. Tokyo → Ar. Cairns (19:40-03:55 by JL775)	In-flight
2	96/11/21	Thu	Lv. Cairns → Ar. Port Moresby (13:35-15:00 by QF281)	Port Moresby
3	96/11/22	Fri	Courtesy calls to Embassy of Japan (EOJ), JICA PNG Office, National Planning Office (NPO), Office of Higher Education (OHE-DOE)	Port Moresby
4	96/11/23	Sat	Lv. Port Moresby → Ar. Rabaul (07:00-11:35 by CN104) Survey at the Vudal University College	Rabaul
5	96/11/24	Sun	Lv. Rabaul → Ar. Lae (09:00-11:25 by ND408)	Lae
6	96/11/25	Mon	Meeting with PNGUT, Site Survey	Lae
7	96/11/26	Tue	Meeting with PNGUT	Lae
8	96/11/27	Wed	Meeting with PNGUT, Signing the Minutes of Discussions with Vice-Chancellor	Lae
9	96/11/28	Thu	(Messrs. Hara, Yamashita, Shiga) Lv. Lae → Ar. Port Moresby (11:15-12:00 by PX129) Discussion and signing of the Minutes with OHE-DOE (Messrs. Kuroda, Hamamoto) Discussion on the Project at PNGUT	Port Moresby Lae
10	96/11/29	Fri	(Messrs. Hara, Yamashita, Shiga) Signing the Minutes of Discussions with NPO Report to EOJ, JICA (Messrs. Kuroda, Hamamoto) Discussion on the Project at PNGUT	Port Moresby Lae
11	96/11/30	Sat	(Messrs. Hara, Yamashita) Lv. Port Moresby → Ar. Cairns (11:30-12:55 by PX060) (Mr. Shiga) Lv. Port Moresby → Ar. Lae (13:00-13:45 by PX292) (Messrs. Kuroda, Hamamoto) Data Arrangement	Cairns Lae
12	96/12/01	Sun	(Messrs. Hara, Yamashita) Lv. Cairns → Ar. Tokyo (13:00-19:20 by JL776) (Consultants) Internal Meeting	Cairns Lae
13	96/12/02	Mon	Discussion on the Project at PNGUT	Lae
14	96/12/03	Tue	Discussion on the Project at PNGUT	Lae
15	96/12/04	Wed	Discussion on the Project at PNGUT	Lae
16	96/12/05	Thu	(Messrs. Kuroda, Hamamoto) Discussion on the Project at PNGUT (Mr. Shiga) Lv. Lae → Ar. Rabaul (08:10-10:45 by PX208), Site Survey at Vudal University College	Lae Rabaul
17	96/12/06	Fri	(Messrs. Kuroda, Hamamoto) Discussion on the Project at PNGUT (Mr. Shiga) Discussion with Vudal University College	Lae Rabaul
18	96/12/07	Sat	(Messrs. Kuroda, Hamamoto) Data Arrangement (Mr. Shiga) Lv. Rabaul → Ar. Lae (15:30-17:20 by PX209)	Lae
19	96/12/08	Sun	Internal Meeting	Lae
20	96/12/09	Mon	Discussion on the Project at PNGUT	Lae
21	96/12/10	Tue	Discussion on the Project at PNGUT	Lae
22	96/12/11	Wed	Discussion on the Project at PNGUT	Lae
23	96/12/12	Thu	Lv. Lae → Ar. Port Moresby (11:15-12:00 by PX129) Market Survey of Equipment	Port Moresby
24	96/12/13	Fri	Report to NPO, OHE-DOE, EOJ, JICA	Port Moresby
25	96/12/14	Sat	(Mr. Kuroda) Lv. Port Moresby → Ar. Cairns (11:30-12:55 by PX060) (Messrs. Shiga, Hamamoto) Data Arrangement	Cairns Port Moresby
26	96/12/15	Sun	(Mr. Kuroda) Lv. Cairns → Ar. Tokyo (13:00-19:20 by JL776) (Messrs. Shiga, Hamamoto) Lv. Port Moresby → Ar. Brisbane (13:00-15:50 by PX003)	Home Brisbane
27	96/12/16	Mon	Market Survey of Educational Equipment	Brisbane
28	96/12/17	Tue	Lv. Brisbane → Ar. Tokyo (09:30-19:20 by JL776)	Home

### Appendix 3 List of Party Concerned in the Recipient Country

#### National Planning Office (NPO)

Kila Ai	Director
Kelly Matoli	Acting Assistant Director, Foreign Aid Management Division (FAMD)
Frank Agaru	Acting Assistant Director, Bilateral Programmes Branch (BPB), FAMD
Joe Kenken	Senior Programmes Officer, Japan Desk, BPB, FAMD
Thomas Lisenia	Acting Assistant Secretary, HRP, Health & Population
John Kol	Assistant Programme Officer, Japan Desk, BPB, FAMD
Masayoshi Ono	JICA Adviser, FAMD

#### Department of Education (DOE)

Jerry E. Tetaga	Secretary, and Chairman of Commission for Higher Education
Dr. James Vele Kaiulo	Deputy Secretary (Higher Education), Office of Higher Education
William Tagis	Acting Deputy Secretary, Office of Higher Education
Stuart Hayfield	Monitoring & Evaluation Coordinator, Office of Higher Education

#### Department of Works (DOW)

Roy Harry Mumu	Director (Works)
Kila L. Boto	Assistant Secretary, Procurement & Supply

#### Papua New Guinea University of Technology (PNGUT or UNITECH)

Misty A. Baloi	Vice Chancellor
Wilson F. Tovirika	Pro-Vice Chancellor (Administration)
Prof. Brian Young	Pro-Vice Chancellor (Academic), Head, Department of Civil Engineering
Kevin Clapperton	Director-Planning, Planning & Development Unit
Tess Chan	Registrar
Inno Onwueme	Head, Department of Agriculture
Jim Goodwin	Director, Agriculture & Biotechnology Centre, Department of Agriculture
Ian Grant	Senior Lecturer, Department of Agriculture
Mark Johnston	Senior Lecturer, Department of Agriculture
Kevin Powdl	Lecturer, Entomology/Weed Science, Department of Agriculture
Alfred Uartemink	Lecturer, Soil Science, Department of Agriculture
Luke Wang	Senior Technical Officer, Department of Agriculture
Gelang Gwaidong	Chief Technical Officer, Department of Agriculture
M. R. Khan	Head, Department of Applied Science
Dr. Malcolm Carrick	Senior Lecturer, Department of Applied Science
Claire Eburhart	Acting Laboratory Manager
Dr. W. H. Drake	Acting Head, Department of Applied Physics

<b>Dr. Ilia Kachirski</b>	<b>Associate Professor, Department of Applied Physics</b>
<b>Dr. Samuel Edmond Nonie</b>	<b>Senior Lecturer, Department of Applied Physics</b>
<b>Dr. Subhash Chandra Dey</b>	<b>Lecturer, Department of Applied Physics</b>
<b>Paul Constable</b>	<b>Acting Head, Department of Architecture &amp; Building</b>
<b>Ken Costigan</b>	<b>Senior Lecturer, Department of Architecture &amp; Building</b>
<b>Gomi Gipe</b>	<b>Acting Head, Department of Business Studies</b>
<b>Neil Thomas</b>	<b>Senior Lecturer, Department of Business Studies</b>
<b>Dr. M. Khare</b>	<b>Lecturer, Department of Civil Engineering</b>
<b>Felix Bagie</b>	<b>Assistant Lecturer, Department of Civil Engineering</b>
<b>Marie Bonner</b>	<b>Executive Secretary, Department of Civil Engineering</b>
<b>Josiah Novulu</b>	<b>Senior Technical Instructor, Department of Civil Engineering</b>
<b>Mukura Pepe</b>	<b>Technical Instructor, Department of Civil Engineering</b>
<b>Paul Isan</b>	<b>Chief Technical Officer, Department of Civil Engineering</b>
<b>Russel Aiso</b>	<b>Technician, Department of Civil Engineering</b>
<b>Dr. Robin Johnson</b>	<b>Acting Director, Computer Service Centre</b>
<b>Dr. C. S. Indulkar</b>	<b>Acting Head, Visiting Professor, Department of Electrical &amp; Communication Engineering</b>
<b>Dr. Kris Korzeniowski</b>	<b>Associate Professor, Department of Electrical &amp; Communication Engineering</b>
<b>Kam Khademazad</b>	<b>Senior Lecturer, Department of Electrical &amp; Communication Engineering</b>
<b>Paul McLean</b>	<b>Laboratory Manager, Department of Electrical &amp; Communication Engineering</b>
<b>Dr. Philip Siagoru Kulala Mulung</b>	<b>Associate Professor, Head, Department of Forestry</b>
	<b>Assistant Lecturer, Acting Head, Department of Forestry</b>
<b>John Simaga</b>	<b>Principal Technical Officer, Department of Forestry</b>
<b>Arlsun Sundae</b>	<b>Senior Technical Officer, Department of Forestry</b>
<b>Luke Kawe</b>	<b>Technical Officer, Department of Forestry</b>
<b>Ana Kila</b>	<b>Acting Head, Department of Language &amp; Communication Studies</b>
<b>P. Reu</b>	<b>Head, Library</b>
<b>M. A. Sttar</b>	<b>Prof., Head, Department of Mechanical Engineering</b>
<b>Foad Seddigh</b>	<b>Associate Professor, Department of Mechanical Engineering</b>
<b>Khalil A. Awan</b>	<b>Lecturer, Department of Mechanical Engineering</b>
<b>Andrew Puy</b>	<b>Lecturer, Department of Mechanical Engineering</b>
<b>Justin Helele</b>	<b>Acting Chief Technical Officer, Department of Mechanical Engineering</b>
<b>John Ume</b>	<b>Mechanical Engineer II, Department of Mechanical Engineering</b>
<b>Surek Bordia</b>	<b>Prof., Head, Department of Mining Engineering</b>
<b>Dr. Nimal Subasinghe</b>	<b>Senior Lecturer, Department of Mining Engineering</b>
<b>Dr. Katsuo Ito</b>	<b>JICA Expert, Department of Mining Engineering</b>
<b>Rodney Little</b>	<b>Professor, Department of Surveying &amp; Land Studies</b>
<b>Jones Taugaloidi</b>	<b>Acting Head, Department of Surveying &amp; Land Studies</b>

**Vudal University College (VUC)**

**Dr. Alan R. Quartermain**  
**Neville Legg**  
**A. Ralph Yamb**  
**Phillip N. Ragh**  
**Paul Tringin**

**Principal**  
**Farm Supervisor (Lincoln International)**  
**Senior Technical Officer**  
**Estates & Services Manager**  
**Academic Coordinator**

**Embassy of Japan**

**Yukiharu Kobayashi**

**Second Secretary**

**JICA Papua New Guinea Office**

**Masahiro Kobayashi**  
**Juichiro Sasaki**  
**Kenzo Iwakami**

**Resident Representative**  
**Assistant Resident Representative**  
**Assistant Resident Representative**

**JICA Forest Research Project**

**Masami Noguchi**  
**Hideshi Maruta**

**Expert, Forest Research Institute (FRI)**  
**Coordinator, FRI**



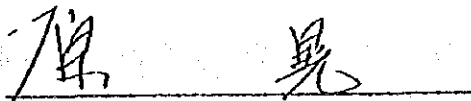
**Minutes of Discussions**  
**on**  
**the Basic Design Study**  
**on**  
**the Project for Improvement of Equipment**  
**for the Papua New Guinea University of Technology**

In response to the request made by the Government of Papua New Guinea, the Government of Japan has decided to conduct a Basic Design Study on the Project for Improvement of Equipment for the Papua New Guinea University of Technology (hereinafter referred to as "the Project"), and Japan International Cooperation Agency (JICA) has sent the Basic Design Study Team headed by Mr. Akira Hara, Development Specialist, JICA from 20th November to 17th December, 1996.

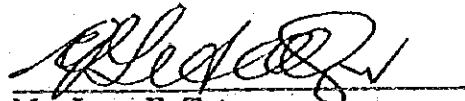
The Team had a series of discussions with the authorities concerned of the Government of Papua New Guinea and conducted a field survey.

As the result of the discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to the work and prepare the Basic Design Study Report on the Project based on the items.

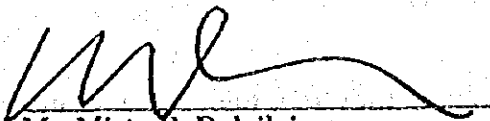
29th November, 1996



Mr. Akira Hara  
Team Leader,  
JICA



Mr. Jerry E. Tetaga  
Secretary,  
Department of Education



Mr. Misty E. Baloiloi  
Vice Chancellor,  
The Papua New Guinea  
University of Technology



Mr. Kila Ai  
Director,  
National Planning Office

## ATTACHMENT

### 1. OBJECTIVE OF THE PROJECT

The objective of the Project is to strengthen and upgrade the educational activities of the Papua New Guinea University of Technology through provision of essential educational equipment.

### 2. PROJECT SITE

Papua New Guinea University of Technology in the city of Lae and its affiliated Vudal University College in East New Britain Province

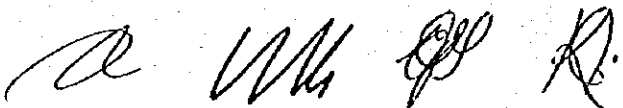
### 3. EXECUTING AGENCY

The Office of Higher Education, the Department of Education is the executing agency of the Project.

### 4. ITEMS REQUESTED BY THE GOVERNMENT OF PAPUA NEW GUINEA

After the discussions with the Basic Design Study Team, equipment for the teaching departments and relevant sections described in Annex-I, which would be necessary for education in the Papua New Guinea University of Technology, including its affiliated Vudal University College, was finally requested by the Papua New Guinean side.

Both sides have agreed, however, that the final components of the Project will be decided by the Basic Design Study Team after further studies in Japan on the basis of the scope of the Project as well as the scheme of Japan's Grant Aid Programme.

 A-4-2



5. COMMENTS BY THE JAPANESE SIDE ON THE ITEMS IN 4 ABOVE

The Japanese side raised some comments on the items referred to in the clause 4 above as follows, and the Papua New Guinean side acknowledged the same.

The equipment to be given higher priority in the Project are:

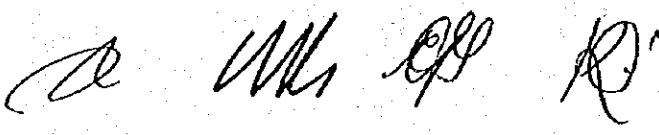
- 1) the equipment to be replaced with the existing equipment which is already deteriorated, outdated or obsolete.
- 2) the equipment to be added to the existing ones that are in short of quantity in consideration of the size and frequency of laboratory experiments or classes.
- 3) the essential equipment for indispensable curricula of education.

While, the equipment to be given lower priority in the Project are:

- 1) the equipment with some difficulties on installation/infrastructure conditions,
- 2) the expensive equipment less utilized because of infrequent experiments, and
- 3) the equipment with financial/marketing difficulties on the procurement of consumable and spare parts etc.

6. JAPAN'S GRANT AID PROGRAMME

- (1) The Government of Papua New Guinea and the Office of Higher Education, the Department of Education have understood the system of Japanese Grant Aid explained by the Team (see Annex-II).
- (2) The Government of Papua New Guinea and the Papua New Guinea University of Technology will take necessary measures described in Annex-III for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

 2

**7. SCHEDULE OF THE STUDY**

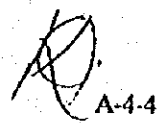
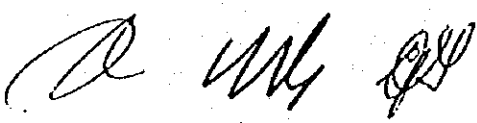
- (1) The consultants of the Basic Design Study team will proceed to undertake further studies in Papua New Guinea until the 14th of December, 1996.
- (2) JICA will complete the Basic Design Study report and send it to the Government of Papua New Guinea by April 1997.

**8. REPLY TO THE QUESTIONNAIRE**

Papua New Guinean side will submit the answers to the questionnaire to the Study Team by 11th December, 1996 at the latest.

**9. MONITORING**

The Department of Education of the Government of Papua New Guinea through the Office of Higher Education has the responsibility of monitoring progress of each phase of the Project and reporting it to the Embassy of Japan and JICA Papua New Guinea Office annually through the National Planning Office, provided that the Japan's Grant Aid is extended to this Project.



A-4-4

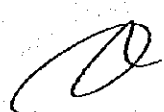
**List of Departments requesting Equipment**

**A. Taraka Campus in Lae**

- (1) Department of Agriculture
- (2) Department of Applied Physics
- (3) Department of Applied Science
- (4) Department of Architecture & Building
- (5) Department of Business Studies
- (6) Department of Civil Engineering
- (7) Department of Electrical and Communication Engineering
- (8) Department of Forestry
- (9) Department of Language and Communication Studies
- (10) Department of Mathematics and Computer Science
- (11) Department of Mechanical Engineering
- (12) Department of Mining Engineering
- (13) Department of Surveying and Land Studies
- (14) Classroom Computers

**B. Affiliated College in East New Britain Province**

- (15) Vudal University College



## Japan's Grant Aid Scheme

### 1. Grant Aid Procedures

1) Japans Grant Aid Program is executed through the following procedures.

Application	:(Request made by a recipient country)
Study	:(Basic Design Study conducted by JICA)
Appraisal & Approval	:(Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
Determination of of	:(The Notes exchanged between the Governments of
Implementation	Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the Project to see whether or not it is suitable for Japans Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourth, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed be the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

## 2. Basic Design Study

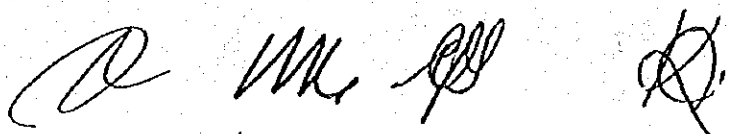
### 1) Contents of the Study

The aim of the Study (the Basic Design Study), conducted by JICA on a requested project (hereinafter referred to as the Project) is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- a) Confirmation of the background, objectives, and benefits of the requested Project and also institutional capacity of agencies concerned of the recipient country necessary for the Projects implementation
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view
- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project
- d) Preparation of a basic design of the Project
- e) Estimation of costs of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the



implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

## 2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA select (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Projects implementation after the Exchange of Notes, in order to maintain technical consistency and also to avoid any undue delay in implementation should the selection process be repeated.

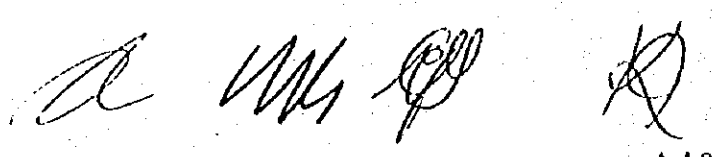
## 3. Japan's Grant Aid Scheme

### 1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

### 2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.



- 3) The period of the Grant Aid means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed.

However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

- 4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting, constructing and procurement firms, are limited to Japanese nationals. (The term Japanese nationals means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

- 5) Necessity of the Verification

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This Verification is deemed necessary to secure accountability to Japanese taxpayers.

- 6) Undertakings required to the Government of Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

- (1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction

- (2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites
- (3) To secure buildings prior to the procurement in case the installation of the equipment
- (4) To ensure prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid
- (5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts
- (6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work

**(7) Proper Use**

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.


**(8) Re-export**

The products purchased under the Grant Aid should not be re-exported from the recipient country.

**(9) Banking Arrangements (B/A)**



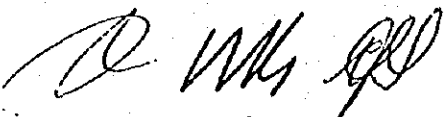
- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as the Bank). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.



**NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF  
PAPUA NEW GUINEA**

The following items of work related to the realization of the Project shall be executed by the PNG side whenever required.

- 1) Civil work for the building contemplated to install the requested equipment, interior work of the building and the relocation work of the existing equipment and facilities
- 2) Electric work for receiving, transforming and distribution of electric power
- 3) Electric lighting work
- 4) Air conditioning work, if necessary
- 5) Telephone and communication facility work
- 6) Utensils and furniture
- 7) To ensure prompt unloading, exempt taxes, and take necessary measures for custom's clearance at port of disembarkation and inland transportation in PNG of the equipment provided under the grant aid, and bear all expenses for going through formalities
- 8) To exempt Japanese nationals (physical and juridical) from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts
- 9) To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement

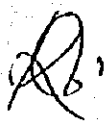


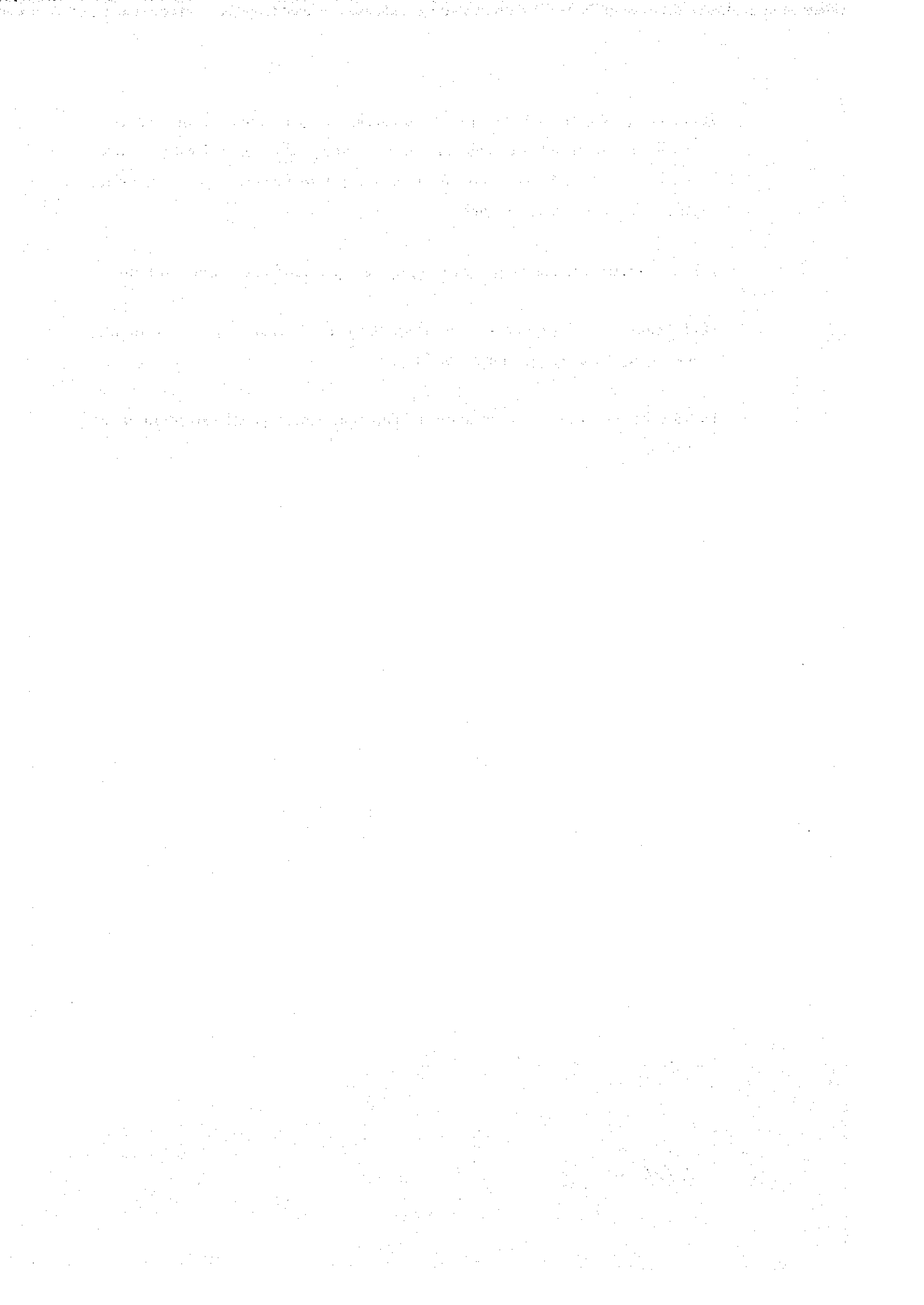
10) To accord Japanese nationals whose services may be required in connection with the supply of products and services under the verified contract such facilities as may be necessary for their entry into PNG and stay therein for the performance of their work

11) To maintain and use properly the equipment provided under the grant aid

12) To bear all the expenses other than those to be borne by the grant aid, necessary for the execution of the Project

13) To take measures of permission and sanction necessary for execution of the Project.





## **Appendix 5 References**

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2. Higher Education Act, 1983
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6. National Higher Education Plan, 1990
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9. A Report of the Facilities and Equipment Audit for the Papua New Guinea Higher Education Project, Asian Development Bank, 1996
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12. The Papua New Guinea Islands University Bill, 1996 (Draft)
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14. Agriculture Education, Training and Research in Papua New Guinea, the Office of the Vice Chancellor, PNG University of Technology
15. PNG Budget Tax Notes, 1996 PNG National Budget, Coopers & Lybrand, 1995
16. Quarterly Bulletin, Mining Division, Department of Mining and Petroleum, July-September 1996
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18. Economic Indicators , National Statistical Office, October 1996
19. Abstract of Statistics, March Quarter 1996, National Statistical Office
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21. **Economic and Development Policies (Volume 1), Presented by the Honorable Chris S. Havieta, MP, Deputy Prime Minister and Minister for Finance and Planning on the Occasion of the 1995 Budget, 1995**
22. **PNG University of Technology, Performance Indicators as of 1st June, 1996**
23. **Development Objectives and Strategies 1994-2000, The Papua New Guinea University of Technology, 1994**
24. **Calendar 1993-1994, The Papua New Guinea University of Technology, 1993**
25. **Courses Handbook 1996, The Papua New Guinea University of Technology, 1996**
26. **Information for Intending Students, The Papua New Guinea University of Technology, 1996**
27. **1997 Capital Equipment List Submitted for Funding under Australian Commodities Assistance Program, The Papua New Guinea University of Technology**
28. **Answers to the Questionnaire, The Papua New Guinea University of Technology, 1996**

## Appendix 6 List of Equipment

Code	Description	Q'ty
<b>A. Taraka Campus</b>		
<b>1. Department of Civil Engineering</b>		
CE.1.1	A1 flat bed reprographic machine	1
CE.1.2	Micro-computers and accessories	4
CE.1.3	A0 Plotter	1
CE.1.4	Software	1
CE.1.5	Radar speed meter	2
CE.1.6	Time lapse camera and projector unit	1
CE.1.9	Portable axle weighing machines	4
CE.1.10	GPS	3
CE.2.1	Plate Loading Apparatus	1
CE.2.2	Los Angeles Machine	1
CE.2.3	Nuclear Density Meter	1
CE.3.1	Strain Indicator and Load Cell	1
CE.3.4	Data Logger	1
CE.4.1	Microscope	1
CE.4.2	Analytical Balance	1
CE.4.5	Autoclave	1
CE.4.6	Portable Microbiological Laboratory	1
CE.4.7	Hydrolab.	1
CE.6.1	TV/VTR	1
CE.6.2	Photocopier	1
CE.6.3	Laser Printer	1
<b>2. Department of Electrical and Communication Engineering</b>		
EE.1.1	Digital Signal Processing System	1
EE.2.1	Assembly Kit "Transformer and Rectifier Circuits"	1
EE.3.1	Assembly Kit "Power Electronics-Basic Equipment"	4
EE.4.1	Assembly Kit "Drive Controls, 200W"	4
EE.5.1	Assembly Kit "Two-Way Converter"	1
EE.6.1	Assembly Kit "Phase Angle Control"	4
EE.7.1	Demonstration Model for System Protection	1
EE.8.1	Demonstration Model for Generator Protection	1
EE.9.1	Variable Resistors in Protective Enclosures	1
EE.10.1	JJ Sets	8
EE.11.1	Large Screen Projector	1
EE.12.1	16 Pin Logic Led Indication	1
EE.13.1	Assembly Kit "Protection Schemes Against Excessive Touch Voltage"	1
EE.14.1	Low-Voltage Switchgear Experimenter	1
EE.15.1	Electronic Phase-Angle Meter	1
EE.16.1	Cut-Away Models of Electrical Machines	4
EE.17.1	Electronics Load-Controllers	2
EE.18.1	Transformers	1
EE.19.1	AC Ammeters	6
EE.20.1	AC Voltmeters	1
EE.21.1	Student PC Laboratory Multi-media training Lab	1
EE.21.2	UPS	4
EE.21.3	Digital Camera	2
EE.23.1	Micro Processor Training Kits	15
EE.23.2	Robot Simulator	1
EE.23.3	Traffic Light Simulator	1
EE.23.4	Washing Machine Simulator	1

Code	Description	Q'ty
EE.23.5	Multi-sensor Trainer	1
EE.24.1	Data Show/Overhead Projector	1
EE.25.1	Assembly Kit "Contactor Controls"	4
EE.26.1	Network Interface Cards	25
EE.27.1	RF Signal Generator	12
EE.28.1	SSB Transverter	1
EE.29.1	Frequency Counter	12
EE.30.1	Emmona Lab 4 Instrument	12
EE.31.1	Mechanical Workshop	1
EE.32.1	Oscilloscope	15
EE.32.2	Multimeters	15
EE.32.3	Digital Designer IC Breadboard	15
EE.35.1	Solar Equipment	1

### 3. Department of Civil Engineering

ME.1.1	Lathe Machine	1
ME.2.1	Dot Printer	1
ME.2.2	Laser Printer	1
ME.2.3	Plotter	1
ME.3.1	FFT Spectrum Analyser	1
ME.4.1	Design CAD	1
ME.10.1	Universal Testing Machine	1
ME.11.1	Test Equipment	1
ME.12.1	Refrigeration Test Bench	1
ME.13.1	Gas Turbine	1
ME.14.1	Air-Conditioning Bench	1
ME.15.1	Heat Transfer Bench	1
ME.18.1	Brinell Hardness Testing Machine	1
ME.19.1	Microscope Fitted with a Video Camera	1
ME.20.1	Electric Discharge Machining	1

### 4. Department of Surveying and Land Studies

SL.1.1	GPS	3
SL.1.2	Detail Survey Total Stations	3
SL.1.3	Total Stations	3
SL.1.4	Theodolites	6
SL.1.5	Levelling	3
SL.1.6	Data Loggers	5
SL.1.7	Surveying & Mapping and Processing System	1
SL.1.8	UPS	2

### 5. Department of Mining Engineering

MN.1.1	Personal Computer System	1
MN.1.2	UPS	1
MN.2.1	Photocopy	1
MN.2.2	Camera	1
MN.3.1	Universal Testing Machine	1
MN.3.2	Core Drill	1
MN.3.3	Soft Rock Penetrometer	1
MN.4.1	X-ray Diffractometer	1
MN.4.2	Particle Size Distribution Analyser	1
MN.4.3	Microphotometry System	1
MN.4.4	Lamps (XRF,XRD,AA)	1
MN.4.5	Glassware	1
MN.4.6	Chemicals	1



Code	Description	Q'ty
MN.4.7	Muffle furnace and Fume hood	1
MN.4.8	Fume Scrubber	2
MN.4.9	Dust collector	1
MN.4.10	Balance	3
MN.4.11	Screen	1
MN.4.12	Oven	1
MN.4.13	Sieve Shakers	1
MN.4.14	Bond grinding mill	1
MN.4.15	Sieve series	1
MN.4.16	Process Control Equipment	1
MN.4.17	Filtration equipment	1
MN.4.18	Compressed air supply	2
MN.4.19	Magnetic separator	1
MN.4.20	Electrostatic separator	1
MN.4.21	Flow meters for air and water	1
MN.4.22	Slurry pump	1
MN.4.23	Laboratory jig	1
MN.4.24	Samples splitters for slurries + Dry solids	1
MN.4.25	Heavy medium separator	1
MN.4.26	Bottles rollers for leaching experiment	1
MN.4.27	Pelletising/Agglomeration	1
MN.4.28	Viscometer	1
MN.4.29	Distilled water making equipment	1
MN.4.30	Electro-winning equipment	1
MN.4.31	Pulveriser grinder	1
MN.4.32	Floatation M/C	1
MN.4.33	Thermo-hygrorecorder	2
MN.4.34	Electronic centrifuge	2
MN.4.35	Flask shaker	2
MN.4.36	Refrigerator	1
MN.4.37	Argon gas 20 + Control valve 2	1
MN.4.38	Platinum crucibles	5
MN.4.39	Electronic Briquetting press	1
MN.4.40	Ion exchange resin	3
MN.4.41	Al or Ti cup for drip filter	1
MN.4.42	PR gas Cylinder	5
MN.4.43	Electronic muffle furnace	1

#### **6. Department of Architecture and Building**

AB.1.2	Drawing Boards	25
AB.1.3	Parallel Drafting Rules	25
AB.1.7	Whiteboards	4
AB.1.8	Television Sets	2
AB.1.10	Plan Filing Cabinets	10
AB.1.11	Student Personal Metal Locker	60
AB.1.13	Autocad Laboratory	1
AB.1.14	Air Conditioning	2
AB.1.15	UPS	1
AB.1.16	Digital Camera	1
AB.1.17	Copier	2

#### **7. Department of Agriculture**

AG.1.1	Vehicle	1
AG.2.1	Kjeldhal Scrubber	2

Code	Description	Qty
AG.2.2	Fume Hood with Acid Extractor	3
AG.2.3	Acid Resistant Cupboard & Extractor	5
AG.2.4	Microscope for Students	5
AG.2.5	Portable Analytical Balance	4
AG.2.6	Leaf-area Meter, Non-destructive	1
AG.2.7	Haematocrit	1
AG.2.8	4 Liter Leaf Chamber	1
AG.2.9	Mini Electrophoretic Unit	1
AG.2.10	Balance	2
AG.2.11	pH Meter	5
AG.2.12	Benchtop Centrifuge	2
AG.2.13	Fridge/refridgerator	1
AG.2.14	Steel Insect Cabinet	4
AG.2.15	Line Quantum Sensor	1
AG.2.18	Compound Research Microscope	1
AG.2.19	Video outfit for attachment to Microscope	1
AG.2.20	Fiber Optics illuminator	1
AG.2.21	VCR (VHS)	1
AG.2.22	TV 20ins.4system	1
AG.2.23	Camera	1
AG.2.24	Illuminated Cooled Incubator	1
AG.2.25	Lighting Accessories for Greenhouse	3
AG.2.26	Light meters	1
AG.2.27	Growth Chambers	3
AG.3.1	Computer	5
AG.3.2	Scanner	1
AG.4.2	Soil Bin Workshop Extension	1
AG.4.3	Tachometer	2
AG.4.4	Moisture Meter & Sensor Kit	2
AG.4.5	Laboratory Oven	1
AG.4.6	Soil Bulk Density Core Kit	2
AG.4.7	Water Tank	1
AG.4.8	Irrigation Pump	1
AG.4.9	Sprinkler Irrigation Nozzle	20
AG.4.10	Cone Penetrometer	2
AG.4.11	Ladder	2
AG.4.12	Trowel	4
AG.4.13	Header Tank	1
AG.4.14	Hand Grain Miller	2
AG.5.1	Fume Extractor for Workshop	1
AG.5.2	Pipe Bender	2
AG.5.3	Sheet Metal Guillotine Machine	1
AG.5.4	Sheet Metal Roller	1
AG.5.5	Pillar Drills	3
AG.5.6	Oxy-acetylene Welding Kit	2
AG.5.7	Oxy-acetylene Cutting Kit	2
AG.5.8	Arc Welder	2
AG.5.9	Metal Bandsaw	1
AG.5.10	Air Compressor Spray Kit	2
AG.5.11	Anaemometer	2
AG.5.12	Mullimeter	1
AG.5.13	Cut-off Wheel	2

Code	Description	Q'ty
AG.5.14	Hole Cutter (Metal Set)	2
AG.5.15	Hole Cutter (Wood Set)	2
AG.5.16	Micrometer Screw Gauge	5
AG.5.17	Vernier Calipers	5
AG.6.1	Portable diesel engines	4
AG.6.2	Dumpy Level	6
AG.6.3	Ranging Rods	20
AG.6.4	Leveling Staff	6
AG.6.5	Staff Bubble	6
AG.6.6	Steel Tape	6
AG.6.7	Theodolite	2
AG.6.8	Chain	4
AG.6.9	Abney Level	4
AG.6.10	Optical Square	6
AG.6.11	Stop Watch	6
AG.6.12	Spring Balance	8
AG.6.13	Tripod Stand	6
AG.6.14	Compass	4
AG.6.15	Clinometer	6
AG.6.16	Oil Seed Grinder	1
AG.7.1	Fertiliser spreader(spinner type)	1
AG.7.2	Diaphragm Pump	1
AG.7.3	Mist Blower	1
AG.7.4	Tractor Trailer	1
AG.7.5	Post Hole Digger	1
AG.7.6	Electric Shears and Arm Units	3
AG.7.7	Knapsack Sprayers and Safety Equipment	4
AG.7.8	Mobile Water Tank	1
AG.7.9	Front End Loader	1
AG.7.10	Winches	2
AG.7.11	Hoist and Frame	1
AG.7.12	Soil Sterifiser	1
AG.7.14	Mist Propagation Unit	1
AG.7.16	Electronic Butcher Saw	1
AG.7.17	Incinerator	1
AG.7.18	Slasher	1
AG.7.19	Air Compressor	1
AG.7.20	Plucking Machine	1
AG.9.1	Computer	1
AG.9.2	Computer Peripherals	1
AG.9.3	Refrigerator	2
AG.9.4	Preezer	2
AG.9.5	Growth Chamber	4
AG.9.6	Stereozoom Microscope drawing attach.	1
AG.9.8	Plant Canopy Analyzer	1
AG.9.9	Global Positioning Unit	1
AG.9.10	VCR(Video Cam)	1
AG.9.11	Camera	1
AG.9.12	Balance	1
AG.9.13	Waterbath	1
AG.9.14	Microcentrifuge	1
AG.9.15	Drying Oven	1

Code	Description	Q'ty
AG.9.16	Autoclave	1
AG.9.17	Laminar Flow	1
AG.9.18	Light Traps	6
AG.9.19	Electric Insect Killers	10
AG.9.20	Berlese Funnels	12

#### 8. Department of Forestry

FO.1.1	Compound Microscope	20
FO.1.2	Tractor/Slasher	1
FO.1.3	Digital Balance	2
FO.1.4	Surveying Compass	6
FO.1.5	Microtome	1
FO.1.6	Compactus Unit	6

#### 9. Department Mathematics and Computer Science

MC.1.1	New Computer Laboratory	1
MC.1.2	Air Conditioning	1
MC.1.3	UPS	1
MC.2.4	Multimedia Computer	1
MC.2.5	Air Conditioning	1
MC.2.6	Power conditioner	1

#### 10. Department of Business Studies

BS.1.1	Overhead Projector	4
BS.1.3	LCD Multimedia Projector	1
BS.1.4	Projection Screens	5
BS.2.1	Hub(16ports)	3
BS.2.2	Hub(10ports)	1
BS.3.1	Personal Computer	15
BS.4.1	Computer Laboratory Refurbishment	1
BS.5.1	UPS	6
BS.5.2	AVR	25
BS.5.3	Air Conditioning	4

#### 11. Department of Applied Physics

AP.1.1	Frank-Hertz Exp.	1
AP.1.2	Hall Effect	1
AP.1.3	Decade Boxes	10
AP.1.4	Milikan Apparatus	1
AP.1.5	RF Signal Generator	1
AP.1.6	Chart Recorder	1
AP.1.7	UV Pulsed Lasers	2
AP.1.8	Portable X-ray Set	1
AP.1.9	Comp. Electron Spin Resonance System	1
AP.1.10	Hydraulic Press	1
AP.1.11	PMT Detection System	1
AP.1.12	Current Measuring Amplifier	1
AP.1.13	Resistivity Test Units	1

#### 12. Department of Applied Sciences

AS.1.1	Centrifuge	1
AS.1.2	Colorimeter	1
AS.1.3	pH Meter with Electrodes	1
AS.1.4	Photomicrograph System	1
AS.1.5	Sieve Shaker with Set of Sieves	1
AS.1.6	Refractometers	2

Code	Description	Qty
AS.1.7	Homogeniser	1
AS.1.8	Water Baths	2
AS.1.9	Polarograph with ASV Capacity	1
AS.1.10	Portable Mill	1
AS.1.11	Atomic Absorption Spectrophotometer with Graphite Furnace	1
AS.1.12	Fraction Collector	1
AS.1.13	Rotary Evaporators	2

### **13. Language and Communication Studies**

LC.1.1	Computer System	1
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### **14. Computer Services Centre**

CS.1.1	Student Work Station	1
CS.2.1	Student Work Station	1
CS.2.2	Student Work Station	1
CS.2.3	Student Work Station	1
CS.4.1	E-Mail and Internet Service	1
CS.5.1	UPS	5

Code	Description	Q'ty
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**B. Vudal University College**

**1. Educational Equipment**

	<b>1-1 Laboratory Equipment</b>	
VC.1.1	Soil hydrometer	5
VC.1.3	Spectrophotometer	2
VC.1.4	Flame Photometer	1
VC.1.5	Water Distillator	1
VC.1.6	Fume Cupboard	1
VC.1.9	Electronic Balances	10
VC.1.10	Top Pan Balance	1
VC.1.11	Microscopes	20
VC.1.13	Incubator	2
VC.1.14	Centrifuge	3
VC.1.15	Kjeldahl Nitrogen Distillation Equipment	1
	<b>1-2 Teaching Apparatus</b>	
VC.2.1	Stop Clocks	20
VC.2.2	Trip Balances	10
VC.2.3	Ray Boxes	10
VC.2.4	Lenses Biconvex/Concave	10
VC.2.5	Prisms Rectangular	10
VC.2.6	Vernier Caliper	10
VC.2.7	Micrometer Screw Gauge	10
	<b>1-3 Farm Equipment</b>	
VC.3.1	Horsepower Tractor)	1
VC.3.4	Rice thrasher	1
VC.3.5	Rice Polisher-28row	1
VC.3.6	Boom Sprayer-28 zones	1
VC.3.7	Multitined cultivator	1
VC.3.8	Slaughter house-hot water system	1
VC.3.9	Chiller Unit for cutting room	1
VC.3.11	Generator	1
VC.3.12	Chainsaw	1
VC.3.13	Battery Charger	1
VC.3.14	Tools and Cabinet	1
VC.3.15	Water pump with generator	1
VC.3.16	Rotary hoe	1
VC.3.17	Farm computer	1
VC.3.18	Stationary Grinder	1
VC.3.19	Knapsack Sprayer	2
VC.3.21	Tachometer	2
	<b>1-4 General Equipment</b>	
VC.4.1	Overhead Projector	4
VC.4.2	Slide Projectors	2
VC.4.3	Direct Projectors	2
VC.4.4	Daylight Screens	4
VC.4.12	Data-show Projection	2
VC.4.13	Computer	1
VC.4.14	Video projection and viewing equipment	1
VC.4.15	Muffle Furnace	1
VC.4.17	Electrothermal heating mantle	2
VC.4.18	Automatic Weather Station	1
VC.4.19	Bus(25 seaters)	1

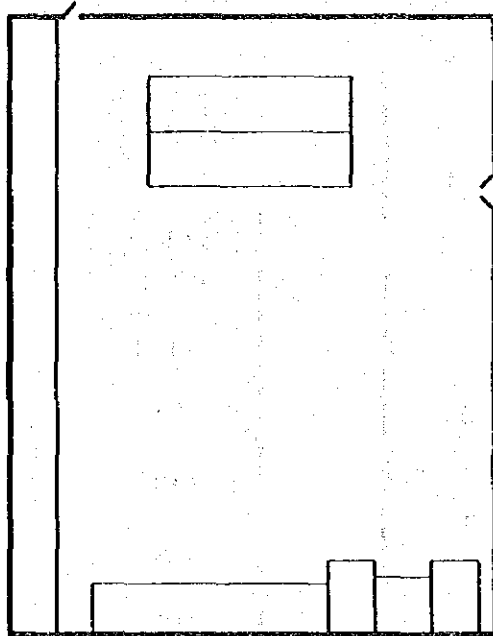
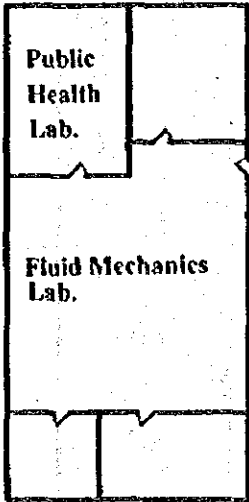
Code	Description	Qty
VC.4.20	Single Cab Utility	1
VC.4.22	Photocopier	1
	1-5 Maintenance/Library	
	1-5-1 Maintenance/Woodwork	
VC.5.1	Fix thicknesser	1
VC.5.2	Fixed Rip Saw	1
VC.5.3	Fix radial arm saw	1
VC.5.4	Fix Planer	1
VC.5.5	Fix jig saw	1
VC.5.6	Floor sander	1
	1-5-2 Maintenance/Mechanical	
VC.5.7	Electrical tyre repairer	1
VC.5.8	Electric key cutter	1
VC.5.9	Heavy duty truck jack	2
VC.5.10	Arc welding machine	1
	1-5-3 Administrative Equipment	
VC.5.11	Photocopier	1
VC.5.12	Fax machine	1
VC.5.13	2-way radio system	1
<b>2. Workshop Equipment</b>		
VC.5.14	Tap and Die set	2
VC.5.15	Power Hacksaw	1
VC.5.16	Arc Welding Machine	8
VC.5.17	Oxygen Acetylene Welding Set	10
VC.5.18	Welding Torch	10
VC.5.19	Grinding Machine	2
VC.5.20	Bench Top Drill	1
VC.5.21	Pipe Bender	1
VC.5.22	Hand Grinder	2
VC.5.23	Jig Saw	2
VC.5.28	Tool Chests	1
VC.5.29	Battery Charger	1
VC.5.30	Inverter	1
VC.5.31	Solar Panel	1
VC.5.32	Tape Recorder	5
VC.5.33	Generator	2
VC.5.34	Outboard Motor	1
VC.5.35	Dinghy	1
VC.5.36	Tool Cabinet and Tools	1
VC.5.37	Dumpy Level	10
VC.5.38	Level Tripod	10
VC.5.39	Leveling Staff	10
VC.5.40	Clinometer	10
VC.5.41	Ranging Pole	40
VC.5.42	Optical Square	10
VC.5.43	Stylon Tape 50m	10
VC.5.44	Plumb Bob and Reel	10
VC.5.45	Poisomantic Compass	30
VC.5.46	Computer system(printer, Word ,Excel etc.)	1
VC.5.47	Electric Typewriter	1
VC.5.48	Shredding Machine	1



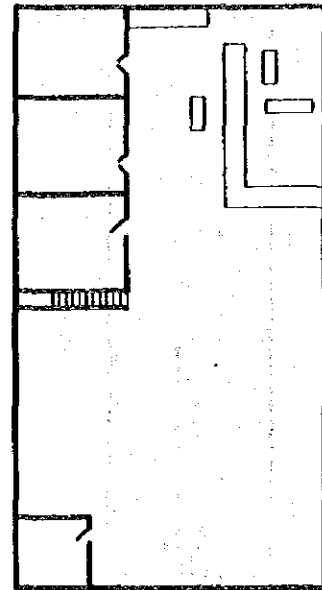


**Appendix 7 Layout Plan**

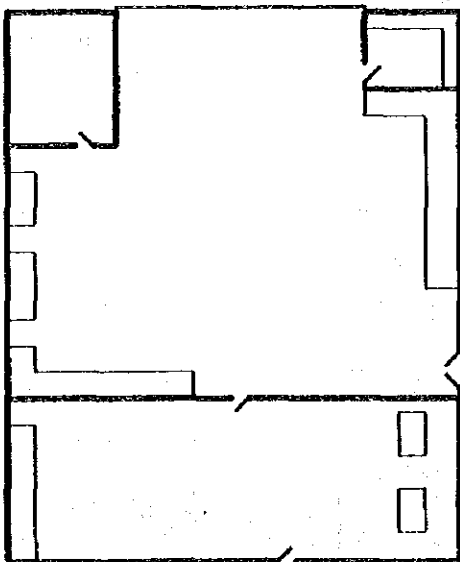
**Dept. of Civil Engineering**



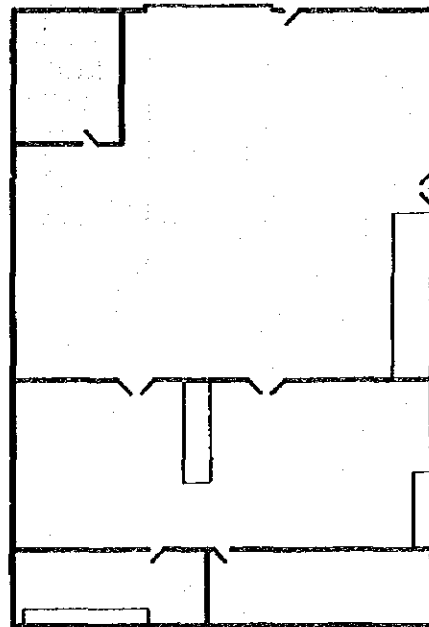
**Transport Lab.**



**Concrete Lab.**

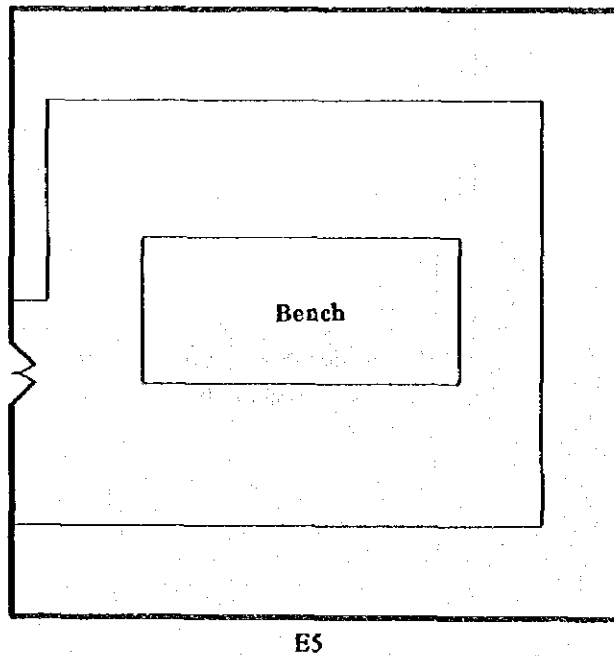
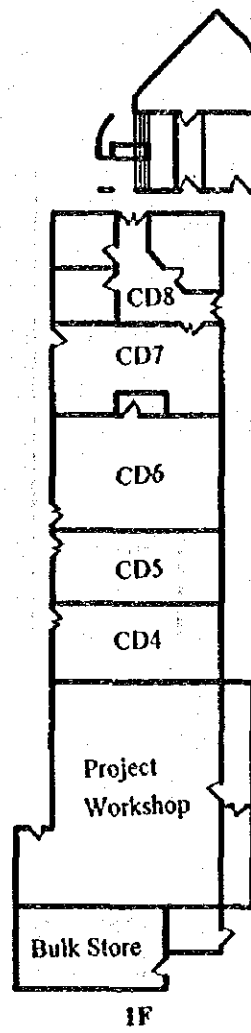
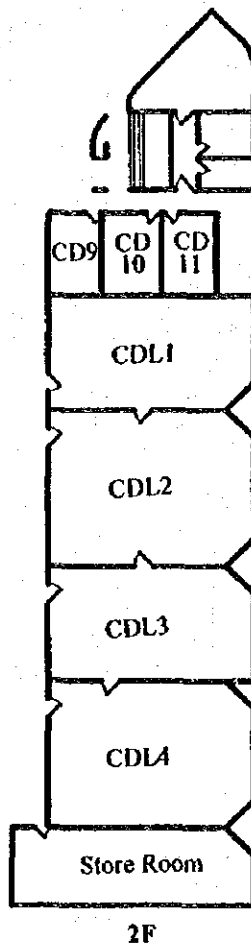
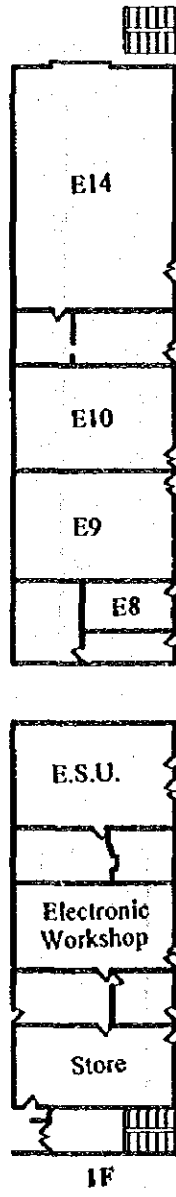
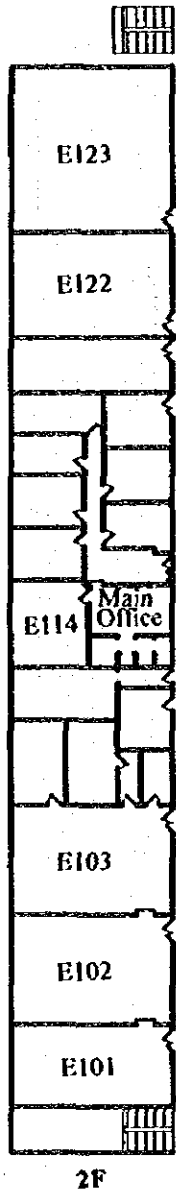


**Soils Lab.**

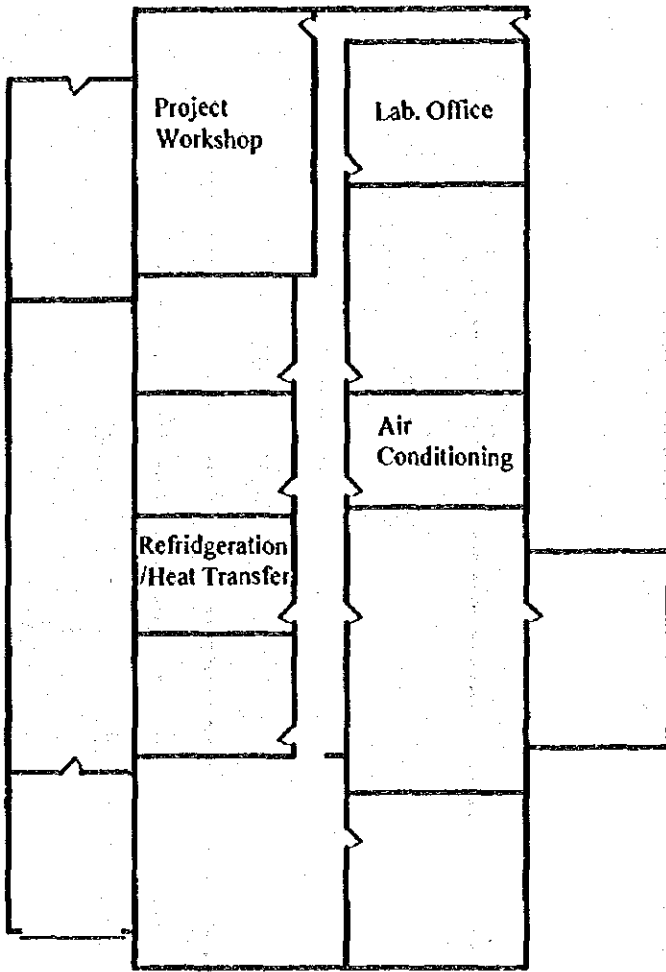


**Structure Lab.**

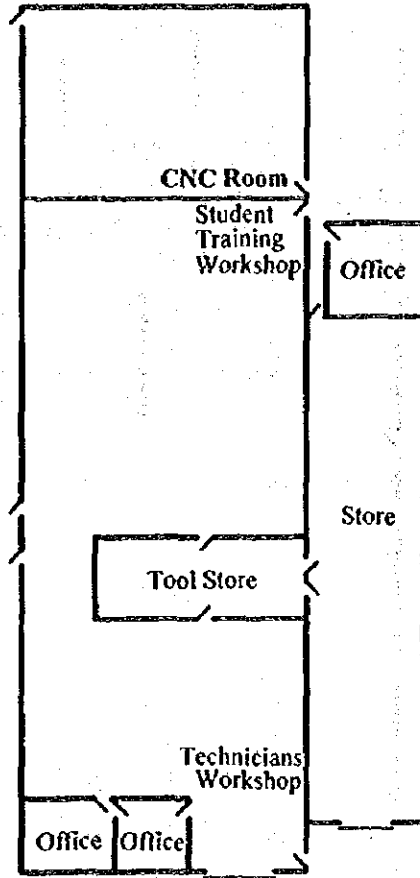
Dept. of Electrical & Communication Engineering



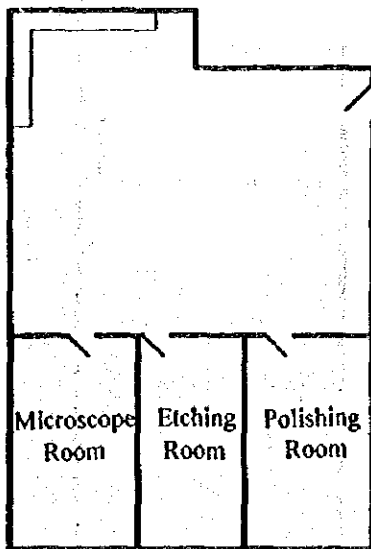
Dept. of Mechanical Engineering



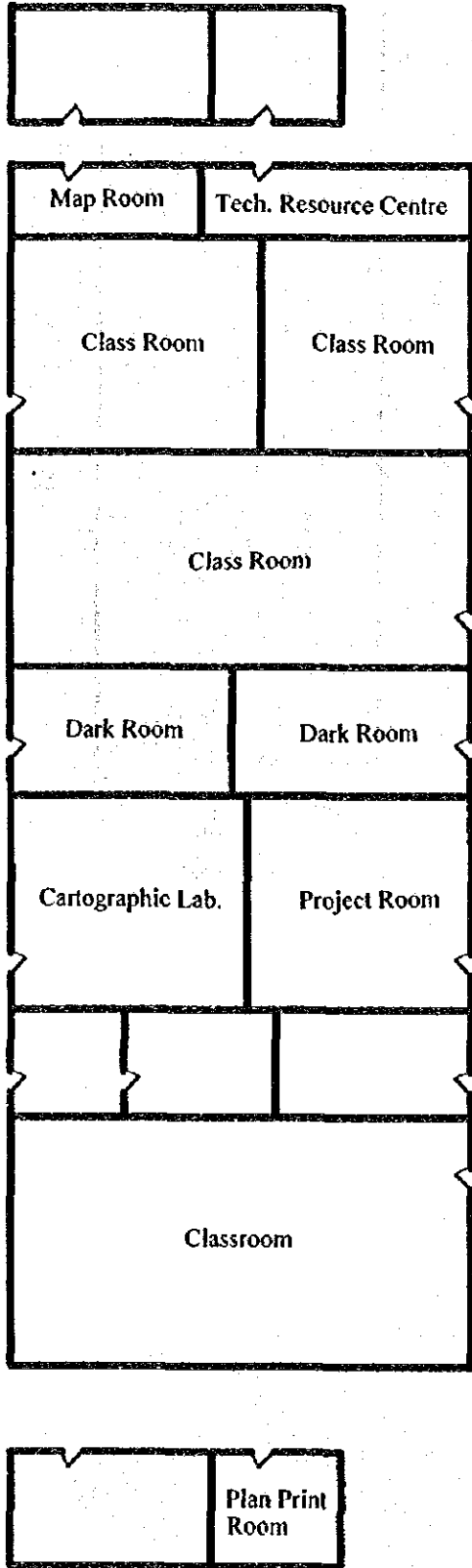
Thermal Building



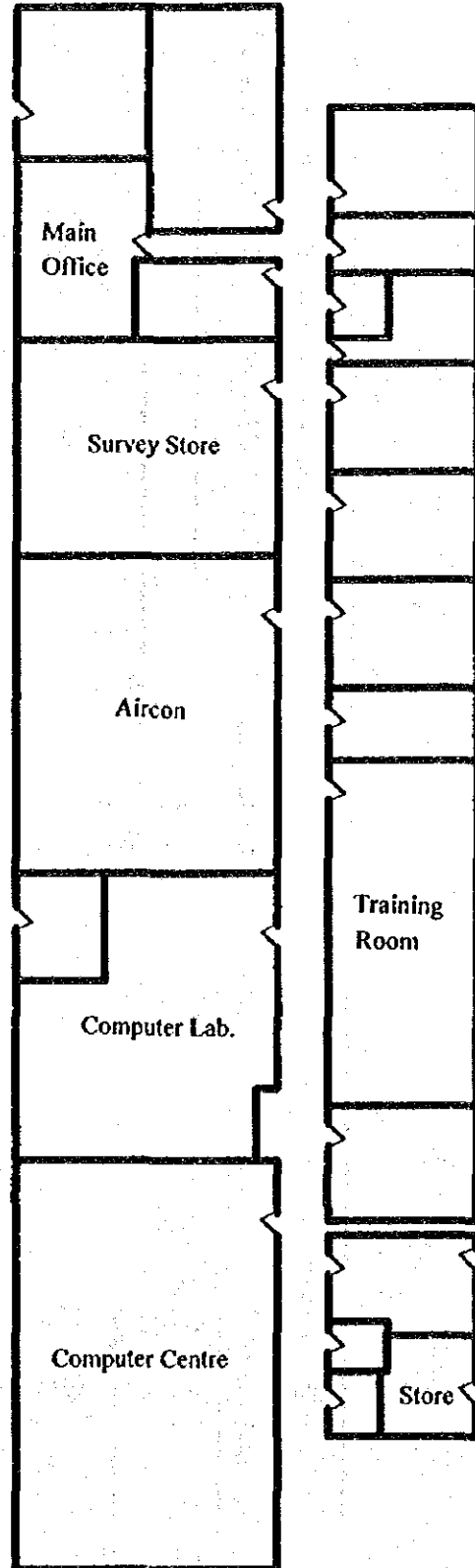
Workshop



Material Sciences Lab.

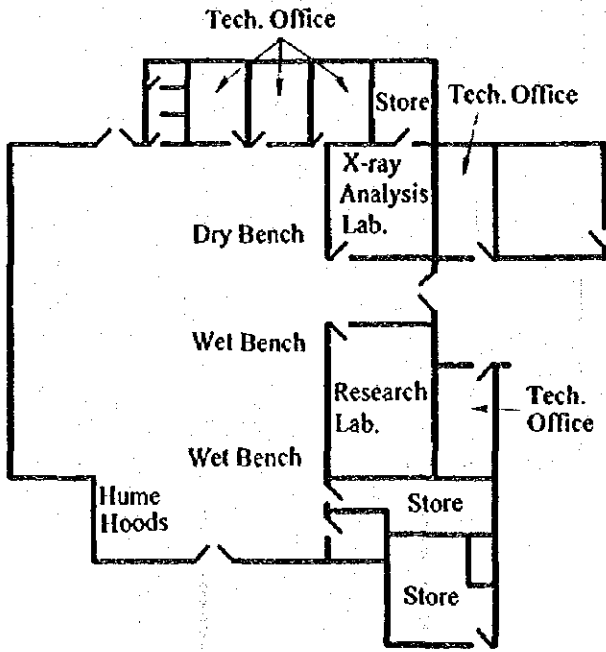


Sandover Building 2F

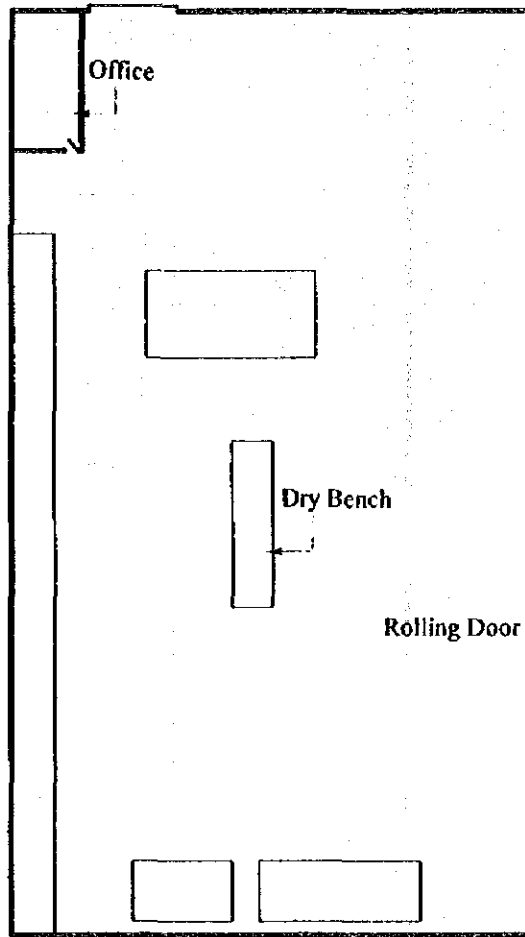


Sandover Building 1F

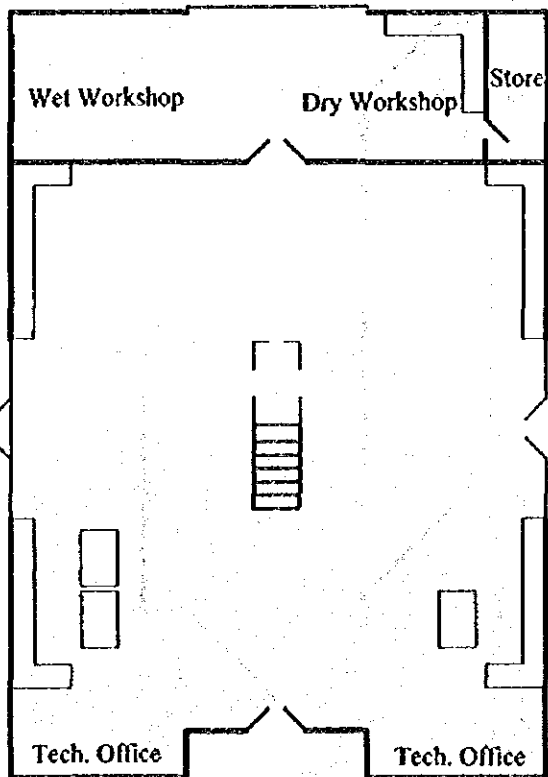
**Dept. of Mining Engineering**



**Mineral Processing Lab. (New)**

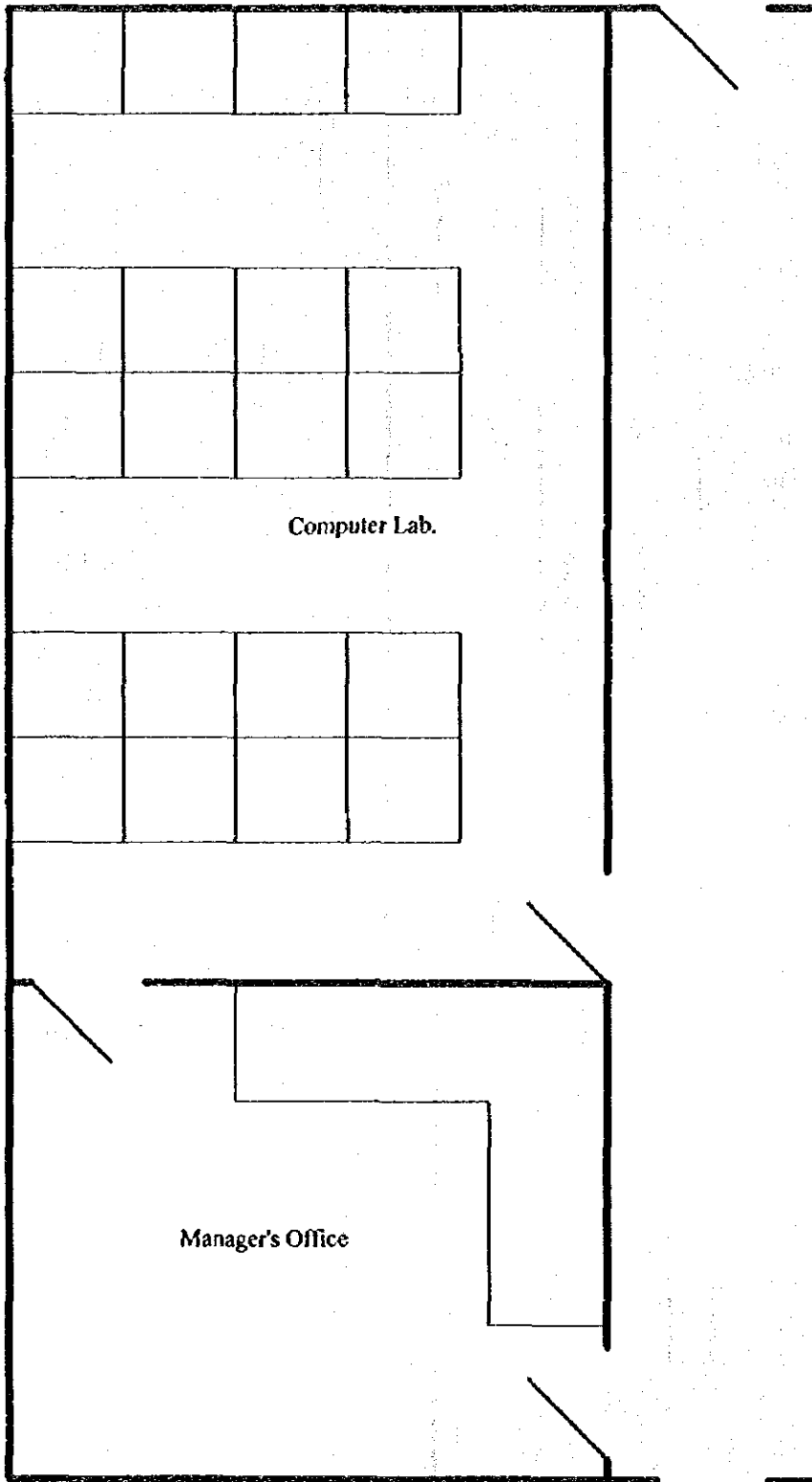


**Mineral Processing Lab. (Kaindi Bldg.)**

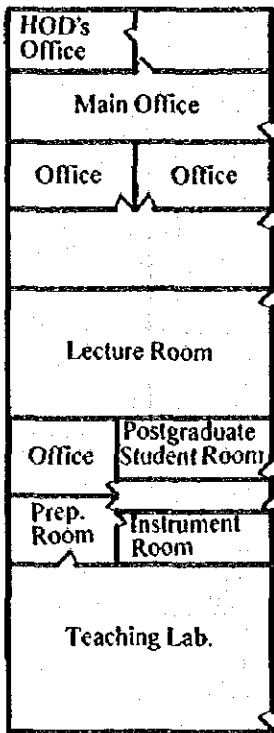


**Mining Lab. (Ok Tedi)**

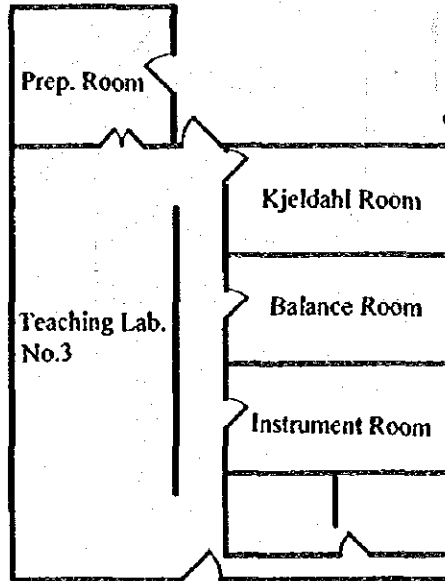
**Dept. of Architecture & Building**



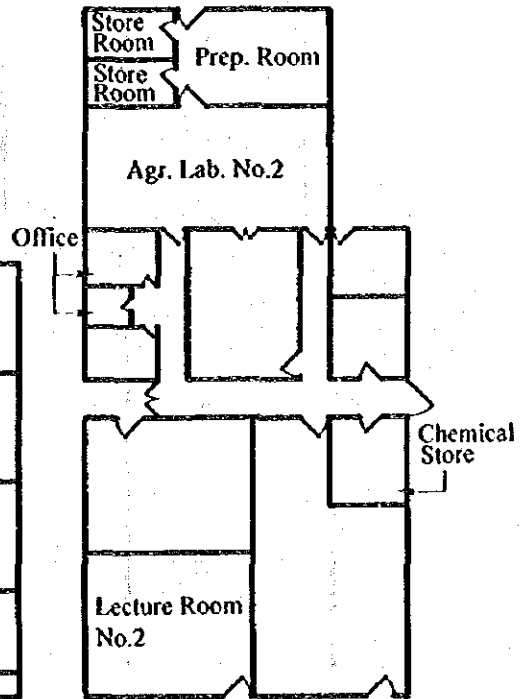
**Dept. of Agriculture**



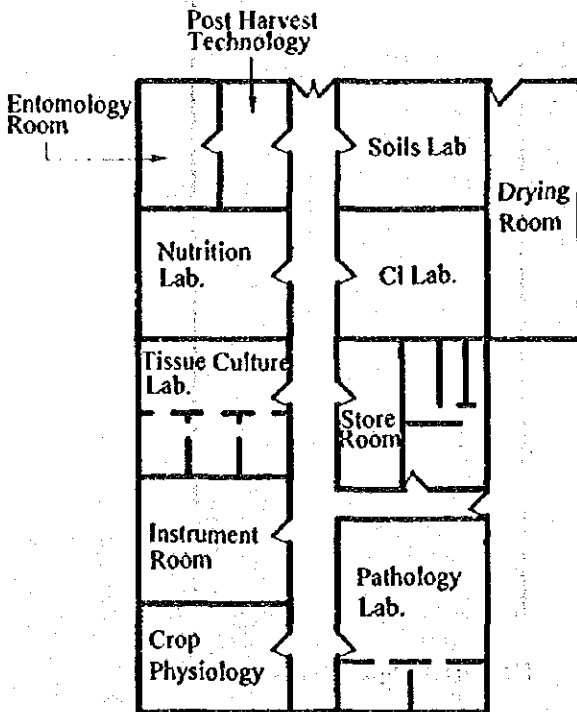
**Agriculture Building No.1**



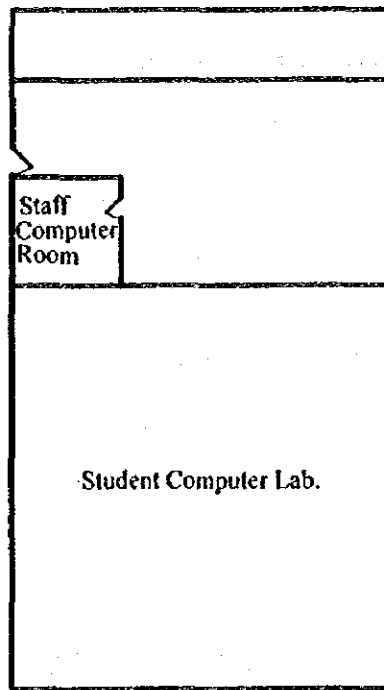
**Agriculture Building No.2**



**Natural Resources Bldg.**

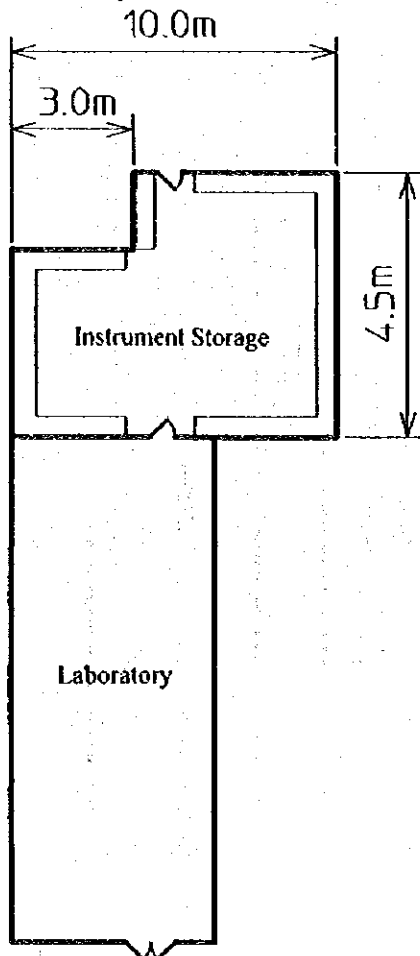


**Sir Julius Chan Building**

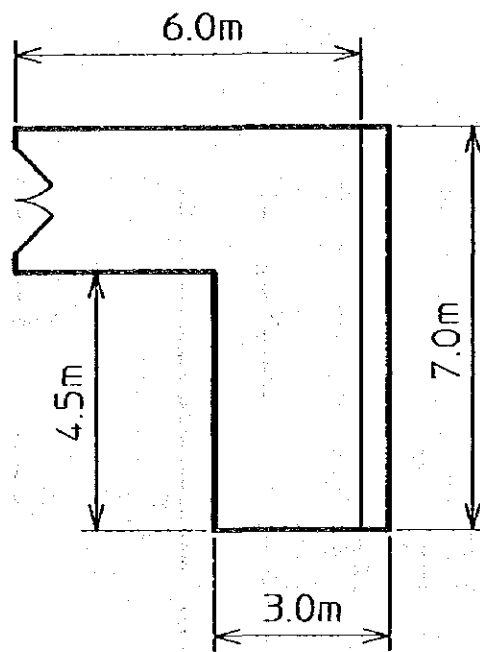


**National Analysis Bldg.**

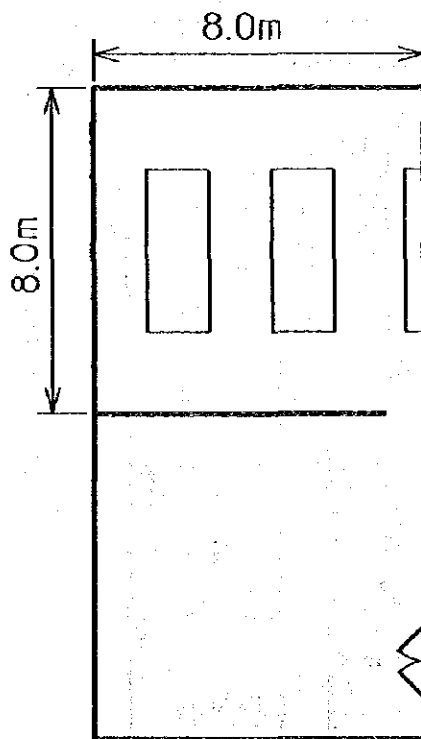
**Dept. of Forestry**



**Prep. & Instrument Room**



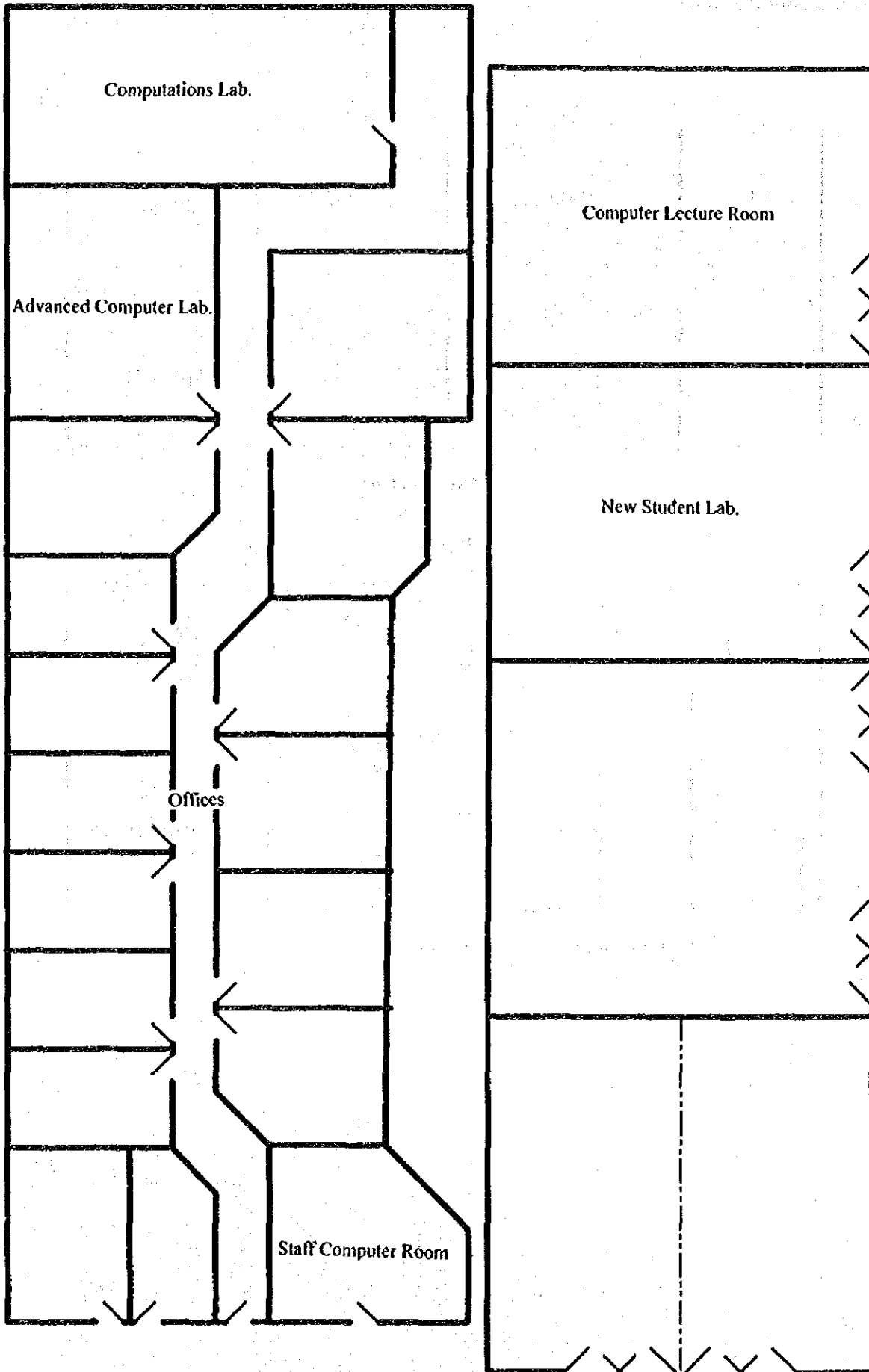
**Map Room**



**Herbarium (Specimen Storage)**

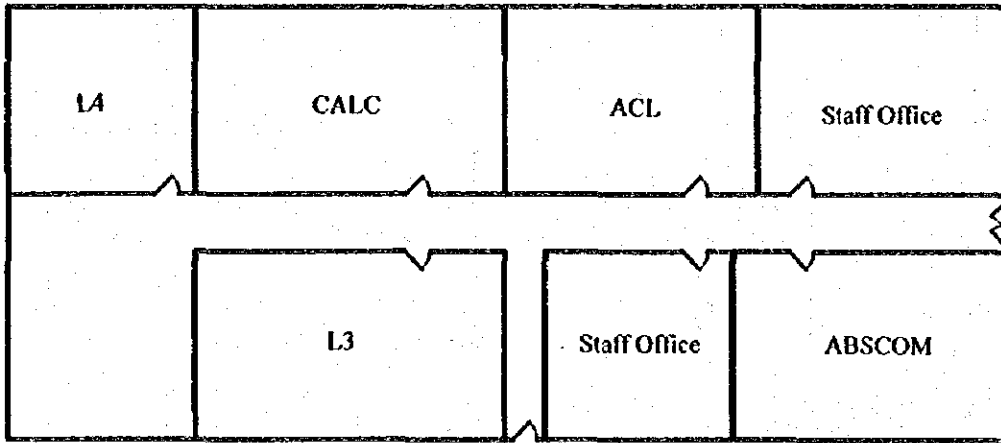


**Dept. of Mathematics & Computer Science**

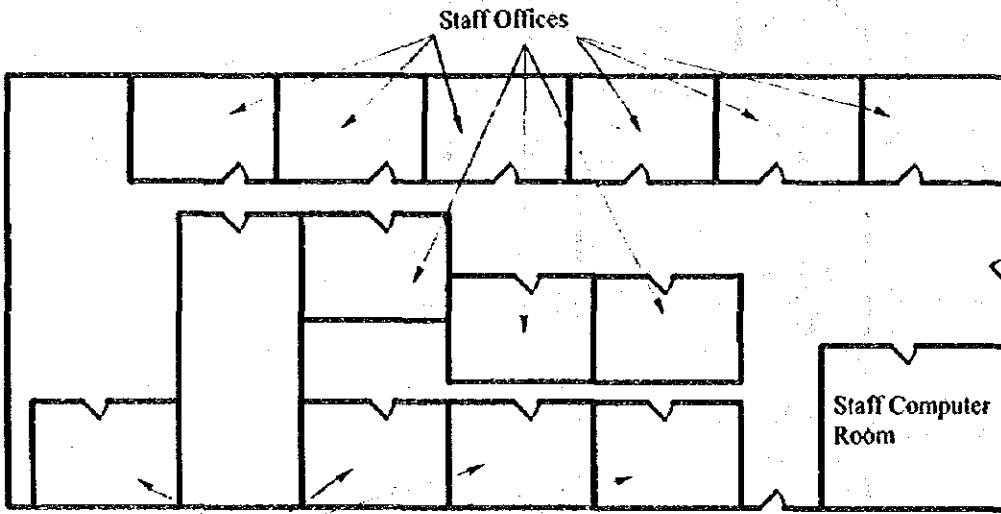


**Math. & Computer Science Building**

Dept. of Business Studies

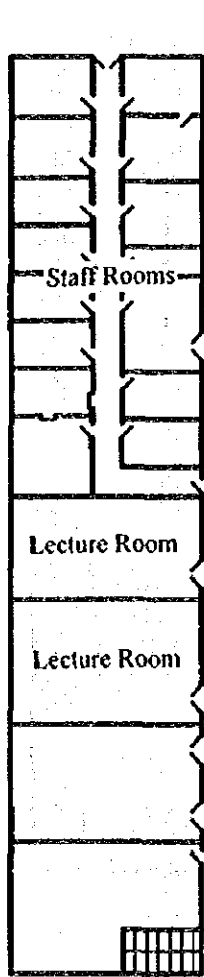


Ground Floor

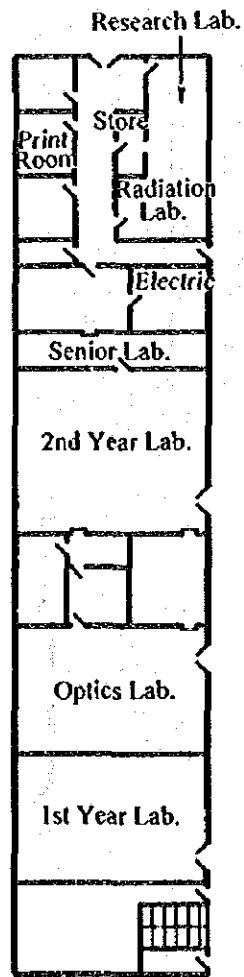


Staff Offices First Floor

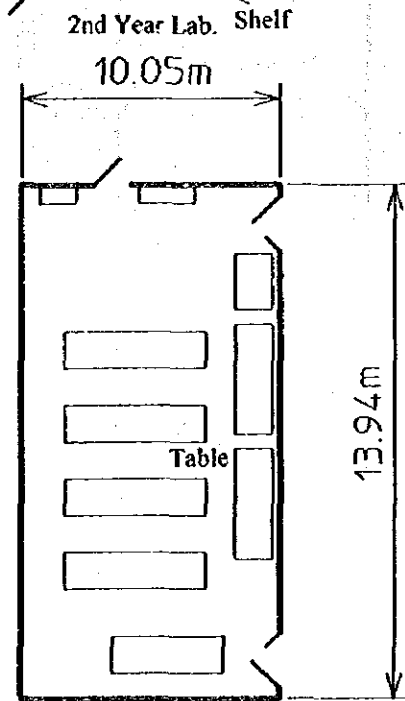
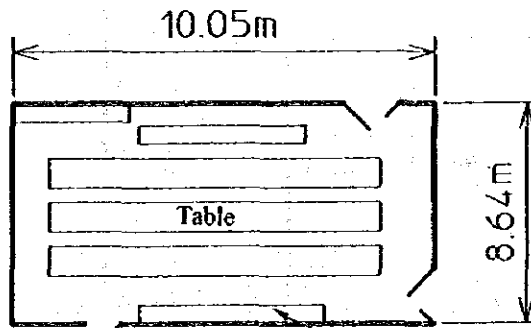
Dept. of Applied Physics



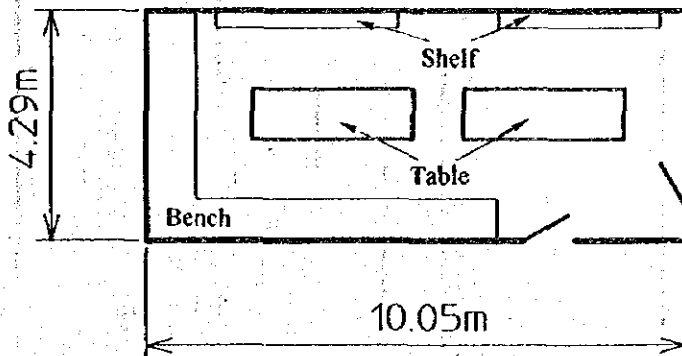
First Floor



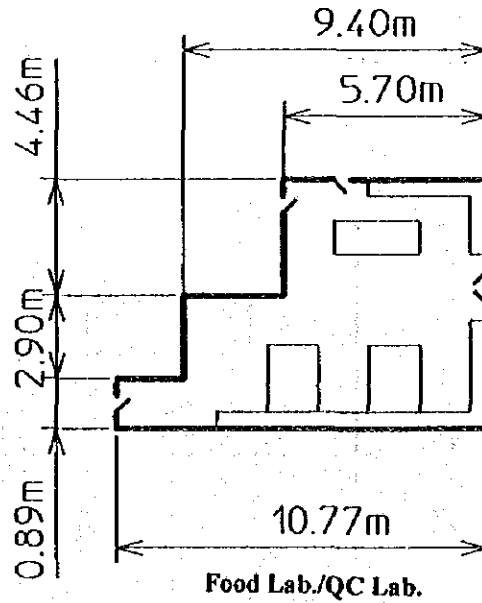
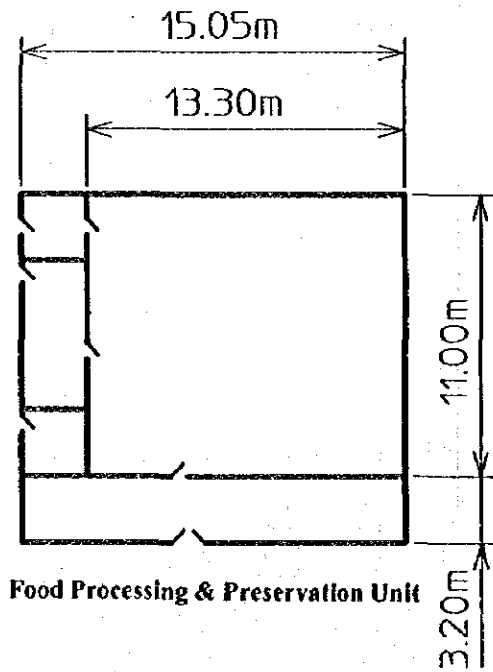
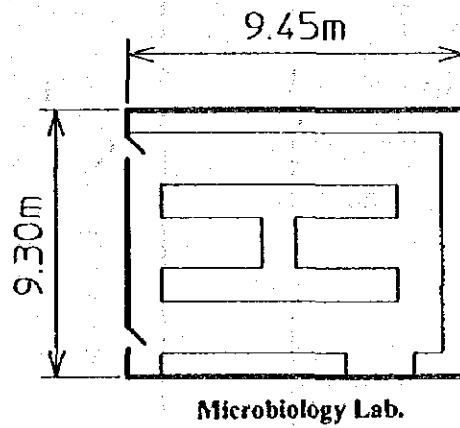
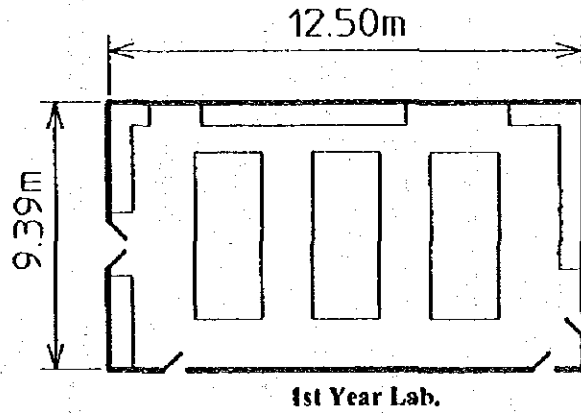
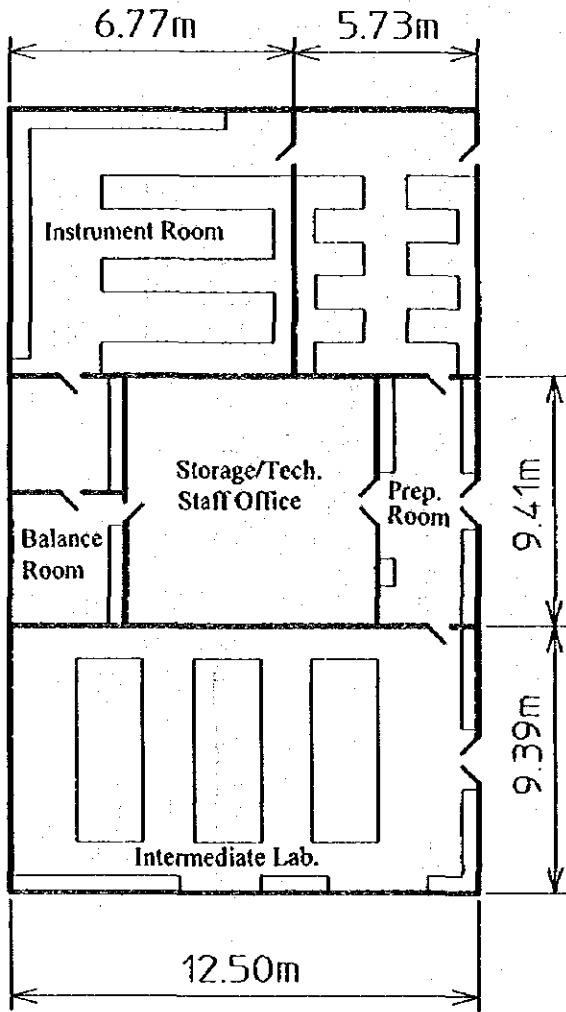
Ground Floor

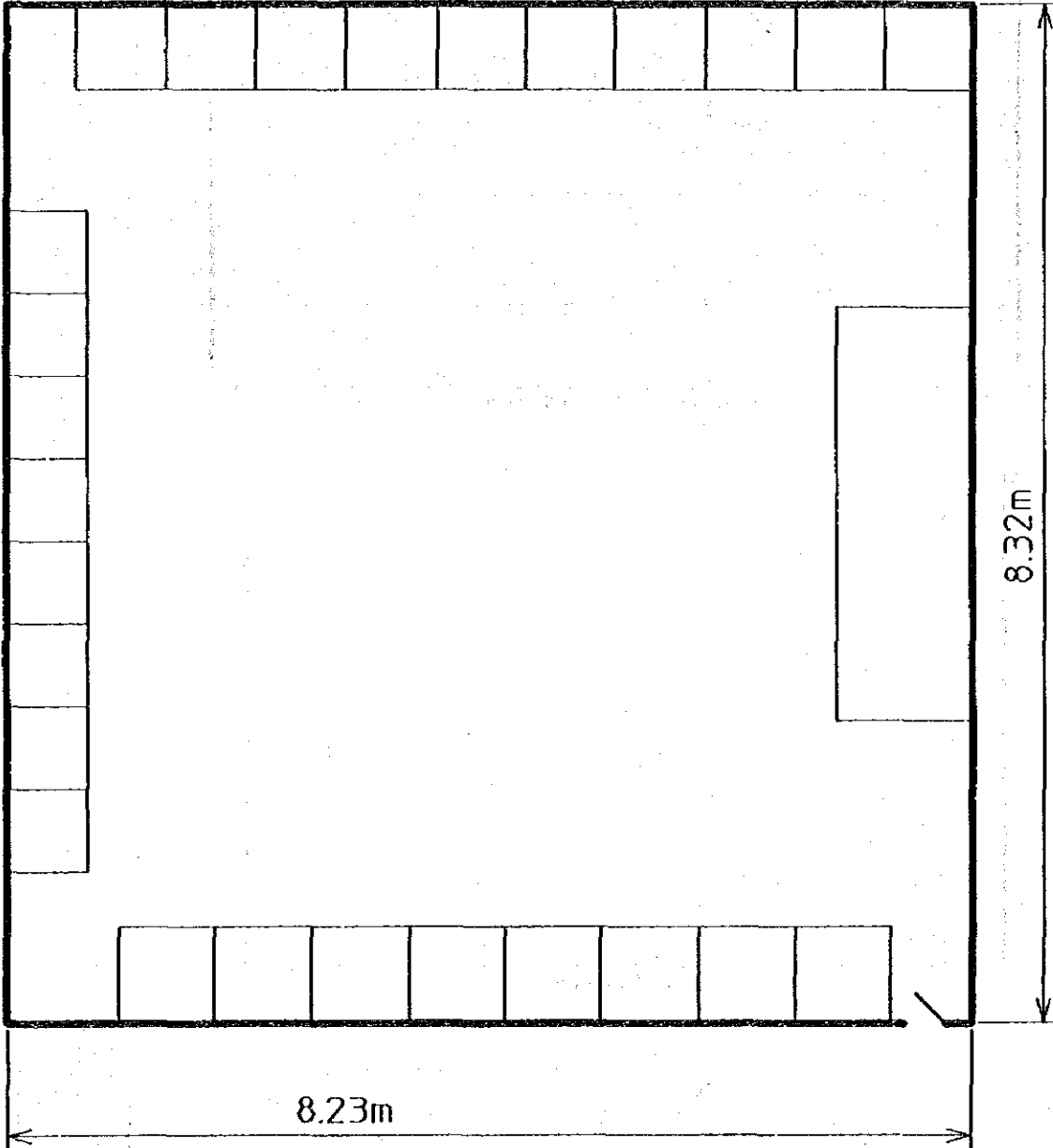


1st Year Lab.



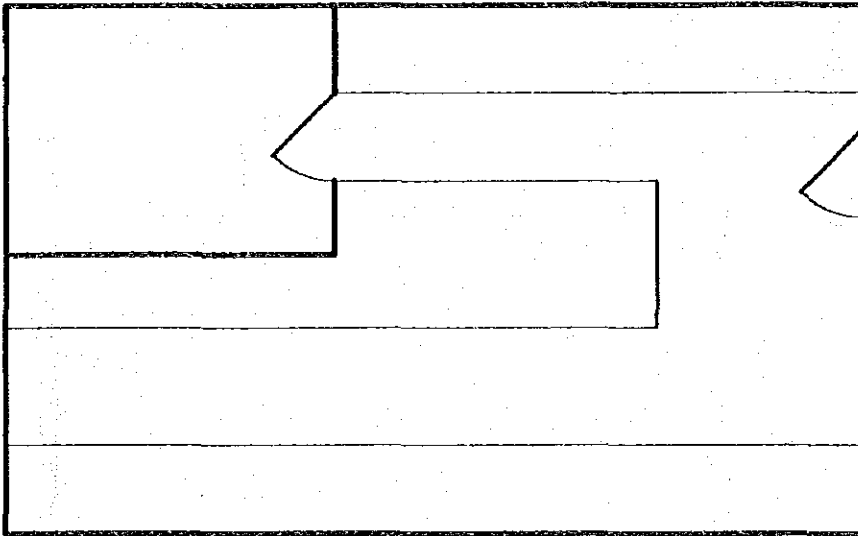
Dept. of Applied Science



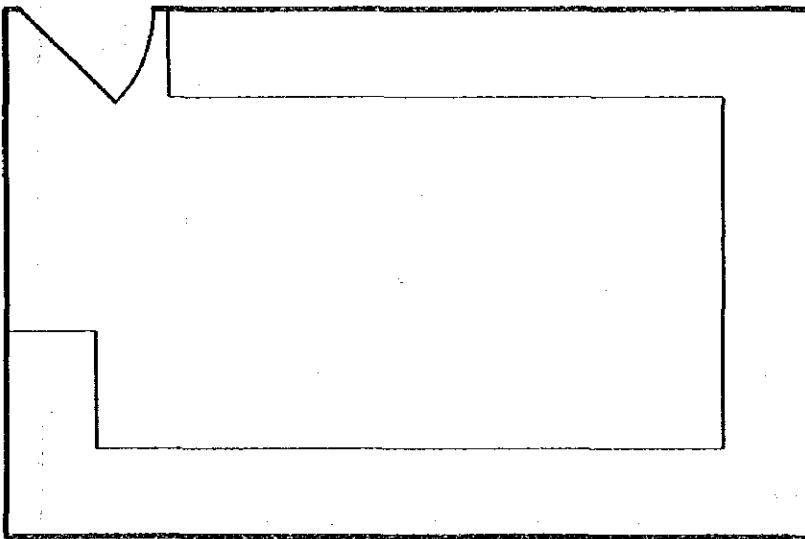


Language Lab.

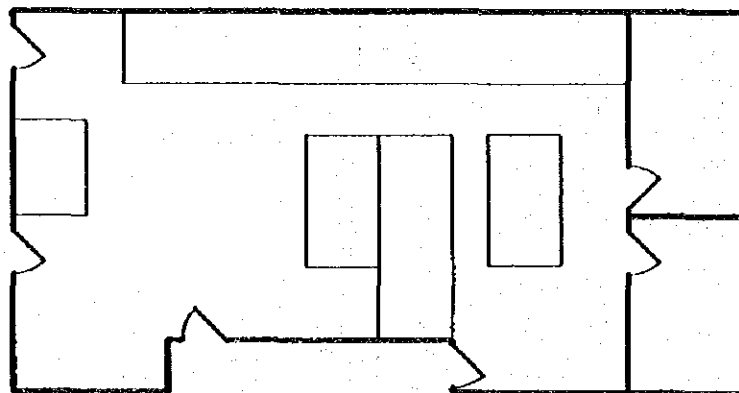
**Computer Services Centre**



**Mathematics Computer Lab.**



**Sandver Computer Lab.**



**Computer Services Centre**

# Yudal University College

Parking Area

