CHAPTER 4. BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4.1 Design Policy of Equipment

The Project represents a plan for educational equipment to be used in the engineering departments as part of the HEDS program, and an evaluation was carried out on the basis of the following policies.

(1) Upgrading of the Educational Level of Regional Universities

Equipment provision is to contribute to the qualitative upgrading of education at the S-1 level (course of 4-7 years, with required credits between 140 and 160 and equivalent to a B.Sc.). This upgrading forms one of the objectives of the HEDS project in Indonesia.

The equipment provision is to conform to the details of the practical courses of the 11 target universities in the HEDS project.

(2) Equipment Scale and Operability

Equipment which is suitable in scale and operability to the needs of student experiments and training is to be chosen since the aim of the Project is the upgrading of educational levels in the target universities. Further, it is important that the equipment chosen be such that it can be used in a number of different experimental and training situations and has a multi functional nature, with the exception of a number of specialized devices. The equipment should make it possible to respond to the needs of upgrading future educational standards and to reinforcing the capacity to meet regional needs for experimentation and training.

(3) Compatibility with the Needs of the Areas Concerned

Equipment provision should contribute both directly and indirectly to regional development and to an expansion of employment in the areas where the target universities are situated.

(4) Duplication of other Equipment Provided by Foreign Assistance Programs

With regard to UNTAN, UNLAM, UNSRI and UNSYIAH, which are also requesting provisions of equipment to other assistance bodies parallel to the Project for equipment provision it is necessary to ensure that any duplication is avoided in the equipment.

(5) Lay Out Plan of Equipment

Laboratory equipment delivered under the Project shall be installed in the laboratories and training facilities of the engineering departments of the target universities. However, in the case of UNSRI, UDA, UMA, UNAND, USU and UNSYIAH there exist plans for a transfer of laboratories and training rooms or new buildings for these are actually under construction, and laboratories and training rooms considered are those after transfer. Also in the case of UISU whose present laboratory and training facilities are judged inadequate to install the equipment scheduled for provision, a plan for a modification of lecture rooms in existing buildings to serve as training facilities should be submitted by the university, during the detail design stage.

The specification and consumption of utility for equipment must be taken into consideration in the layout plan for equipment.

4.1.1 Educational and Laboratory Equipment for 11 Target Universities

11 target universities may be classified into three groups on the basis of their present situation.

Group 1 are universities which possess a certain amount of equipment in laboratories of certain departments so that the overall shortage of equipment forces the departments to put together curricula which are very strained and in particular encourage makeshift measures for the scheduling and pedagogic methods of practical courses.
In particular, this is the case in the national universities of UNTAN and UNLAM in Kalimantan, UNAND and UNILA in Sumatera.

Group 2 are national universities which possess adequate equipment in terms of both quantity and quality thanks to assistance either

from the programs for equipment provision of the MOEC or through foreign support. However, reinforcement and strengthening of a section of equipment is needed in order to upgrade the university education program.

Group 3 are the private universities which have been specially recommended by the MOEC of Indonesia for the beneficial effect of promoting regional industry which is anticipated to arise from a reinforcement of the educational equipment of these universities.

The first group is composed of UNAND, UNILA, UNTAN and UNLAM. A common problem shared by universities in this group is the shortage of even the most basic equipment needed for experimentation so that students have to be divided into groups and experiments repeated several times in turn. Further, it is necessary for students in the case of some courses required for graduation which involve expensive facilities to employ the facilities of ITB at their own cost for experiment and practical training. With the exception of the electrical engineering department of UNTAN, the universities of this group have in common the experience of foreign equipment assistance at some time in the past.

The second group is composed of USU, UNSRI and UNSYIAH. The laboratories of the Civil Engineering Dept. of USU possess equipment which exceed in quantity those of the average national university of developed countries. However, several pieces are no longer in working order due to the shortage of maintenance budget or inadequate maintenance, and such idle equipment was placed in the corners of laboratories unused.

UNSRI has a long history, particularly the Mining Dept., and the presence of large oil fields, refineries and mining excavations nearby means there is a strong regional demand from industry for high quality mining engineers. The department possesses a large amount of equipment which it seems to have obtained from industries secondhand but much of this is very superannuated and no longer usable.

UNSRI has a certain quantity of equipment for educational and training use but this is insufficient and reinforcement of certain fields is needed.

The third group is composed of UMA, UISU, UDA and Nommensen. Nommensen is a private university but equipment has been installed with assistance from a Christian foundation in Australia. In comparison with other private universities such as UDA, UISU and UMA is well equipped.

The remaining three private universities are unable to carry out equipment preparation due to budgetary limitations and there is a shortage of even basic equipment.

4.1.2 Facility Utilization Policy

It is of prime importance to ensure that the equipment to be provided under the Project does not create a burden which will add to the already chronic shortage of budget for running costs of the 11 target universities. It has therefore been an aim of this study to examine the current situation adequately regarding the use of facilities in this perspective. The following aspects of current facilities were examined:

(1) The floor area and campus position of existing facilities
(2) The current layout of facilities
(3) The layout and capacity of utilities among the existing facilities

Further, in the case of universities with new campus buildings under construction or scheduled for construction, these were evaluated on the basis of blueprint drawings obtained.

4.1.3 Policies for Selection of Equipment

The following policies were established and evaluated for the selection of equipment scheduled for the Project.

(1) Compatibility with the Aims of the Higher Education Equipment Provision Project

The Project aims at the upgrading of the educational level of regional universities of Indonesia. Therefore the prime consideration is to ensure that equipment is selected which results in a sufficient upgrading of engineering educational levels.

(2) Compatibility with the Curricula of the Various Universities

Slight differences result in the details of experimentation of the various universities even though course names may be the same because of particular factors such as the level of staff guidance or the requirements of regional industries.

This is particularly true of the experiments and practical training for third year students since a more specialized content is involved.

It is therefore advisable for equipment selection purpose to have carried out interviews with the responsible teaching staff for experimental and practical training courses rather than just a simple investigation of their curricula.

In this way equipment selection will ensure the best match with the individual requirements of the universities, based on the actual details of practical courses.

(3) Scale and Operability of Equipment

Basic data to be considered for determining equipment quantities is the number of students attending practical training and experimentation courses and the required equipment and existing available equipment.

It is also judged acceptable to determine equipment types in view of the teaching capacities of the staff responsible for the experimental and practical courses as evaluated through interviews.

Except in the cases where the capacities of the responsible staff are considered insufficient to the selected equipment or experiments can only be treated with special equipment, emphasis should be put

on equipment of a general use nature which can be applied to a variety of experimental and training purposes. Consideration should be given to enriching the experimental activities so as to respond to an upgrading of engineering educational levels.

(4) Facility of Equipment Operation, Maintenance and Administration

As the equipment to be installed under the Project will only be used in the student laboratories there is no need for complicated and/or sophisticated equipment. The operation of the equipment should be easily mastered by even unexperienced students, and it is important to have equipment of a simple nature with which experiments can be contrived.

Further, equipment should have a UPS or keep relay to protect them from sudden power failures, and it is desirable to use equipment for which safety devices are available so that breakdown prevention can be carried out in advance.

It is important for maintenance purposes that the equipment fulfill the four following points.

1) that it is easy to technical servicing of the equipment in the regions where the universities are located

2) that parts supply is easily available and that the equipment is provided with maintenance manuals in English

3) that black box elements which can not be repaired are minimized

4) that breakdowns are infrequent and maintenance costs low

It is especially important to give attention to point 4 in view of the stringent limits on maintenance and administration expenses in the universities.

4.1.4 Utilities

(1) Electricity

Although power failures have not been completely eradicated in the Sumatera and Kalimantan there has been a very significant improvement over the situation 10 years ago. At present, these occur at a rate of three to five times per month in frequently affected areas and about once a month elsewhere. However, as sudden power failures will result in damage to the hardware parts of equipment using a large number of electrical parts, it will be necessary to equip them with appropriete devices, if needed.

Voltage fluctuations in Sumatera and Kalimantan islands are about plus or minus 10% and an electric voltage adjustor needs to be attached to precision equipment to reduce this to a voltage fluctuation of the order of plus or minus 5%.

(2) Water

With the exception of UNAND and UNSYIAH which employ well water, all of the other universities rely on public water facilities. Excepting USU, the water quality can be described as relatively good, and it is possible to employ this as drinking water also. Although they are situated in the same area of Medan City the universities of USU, UMA, UDA and UISU possess water sources other than those of public facilities and so the water quality is inferior and water can not be used for drinking.

Areas on the university campus which are particularly sensitive to water quality are chemical analysis and boiler feed water. In the case of the former the installation of a water distilling apparatus is perfectly adequate as a response. With regard to the boiler general type low pressure devices are mostly used, problems due to the high concentration of silica, calcium or oxygen, etc. do not arise.

(3) Gases

None of the universities concerned employs city gas facilities.

LPG is used for burners or other cases when the need for a combustible gas arises.

There is a sufficient city supply of oxygen, nitrogen, carbon dioxide, hydrogen, etc. and imports are not required.

4.1.5 Waste Water Treatment

Experiments which require special attention to be given to waste water, such as heavy metal analysis, plating treatment, food processing, leather tanning, etc. are not carried out in the target universities. There is consequently no need for the construction of comprehensive waste water treatment facilities. It is considered sufficient to ensure that the solutions used in each experiment be recovered and treated by mixing in a neutralizing agent.

With regard to the oil-water mixture which results as a waste of oil analysis experiments in the mining department the provision of an API type three stage sink may be considered, if necessary.

4.2 Design Condition

4.2.1 Environmental Conditions

(1) Temperature and Humidity

As the Sumatera and Kalimantan are located in the tropical forest zone, there is few climate variation. The climate is divided into a dry and wet season.

The outside temperature throughout the year is around 25 - 27 degrees Celsius and humidity is 80%.

Therefore, design condition for the equipment should be:

Temperature: Max. 30°C

Humidity : Max. 85%

4.2.2 Buildings and Utilities

(1) Electric Power Supply

UNSYIAH is at present in the course of changing over from single phase 110 volt and three phase 200 volt systems to single phase 220 volt and three phase 380 volt systems.

The area in which UNLAM and UISU are located has a three phase 380 volt supply but these two universities do no at present have three phase lines into their campus. The time required for installation of three phase incoming lines is about 2 months from application.

At present, the other universities concerned employ single phase 220 volt and three phase 380 volt lines. It is considered acceptable to set all the power source specifications for equipment to be installed under the Project at 220 volts for single phase and at 380 volts for three phase.

(2) Water Quality

With regard to water quality of the universities concerned refer to 4.1.4 above.

(3) Buildings and Constructions

It is supposed to install the heavy large scale equipment used for road construction tests, concrete tests and hydraulic tests in the civil engineering dept. and for the construction training and materials tests in the mechanical engineering dept. on the ground floor of each university at the time of building foundations. The laboratories for these facilities are all at present located on ground floor sites and so equipment installation poses no problems.

4.3 Study of the Basic Specifications

(1) Specification of Equipment

As indicated in the previous chapter, the Project issues from a request from the Indonesian government and forms a component of the HEDS project. Of course there are natural limits to scope of equip-

ment provision and the undertaking only involves the initial objective of a provision of S-1 grade student experimental equipment. It is naturally impossible to fully equip all of the 35 departments of the 11 target universities.

The previous chapter formulates the minimum model requirement for S-1 grade experimental equipment on the basis of a consideration of the curricula, actual activities for laboratory practice in each department, the equipment available, and equipment provision programs through multilateral and bilateral assistance. The chapter presents an overall prospect for future expansion which includes the present project.

The present chapter outlines the basic policy of equipment allocation and the process of basic design to effectively realize the Project for the target departments and universities.

It was agreed to evaluate the following two model cases as proposals for an equipment expansion program through discussions with the DGHE on the occasion of the on site survey of the Basic Design and of the Draft Final Report presentation.

1) Case 1; An academic proposal for an equipment allocation mainly based on the analysis of the actual activities of laboratory practice carried out at the target departments of the universities, taking into account the equipment models for S-1 grade student practical experiments as well as considering the equipment currently available and equipment to be provided by multilateral or bilateral assistance at target universities.

2) Case 2; A proposal taking account of the level attached in the provision of equipment for S-1 grade student experiments in the target universities and departments as well as certain policies of the DGHE relating to expansion of experimental and practical training equipment in addition to a consideration of national university and private university policies to the factors for consideration in (1) above, since the equipment provision of all 35 departments of the target universities is considered impossible in view of budgetary restrictions. The policies of the DGHE relating to 11 universities and 9 departments are as follows;

a) To increase the equipment for those national universities suffering from an extreme lack of available equipment and those with a small number of departments. (in other words, the following national universities of A group, the Mechanical Engineering and Civil Engineering Departments of UNAND, the Civil Engineering Department of UNILA, the Electrical Engineering Department of UNTAN and the Civil Engineering Department of UNLAM, being a total of 4 universities and 5 departments).

b) To provide those national universities which can be expected to attain a satisfactory complete level of equipment allocation through just a small provision of equipment through the Project because of the fact that they have already received equipment through numerous past multilateral and bilateral assistance and have sufficient, competent teaching staff. (In other words, the following national universities of B group; the Civil Engineering Department of UNSYIAH, the Electrical and Industrial Engineering Departments of USU, and the Chemical Engineering and Mining Departments of UNSRI, giving a total of 3 universities and 5 departments concerned.)

c) To promote those departments among the target private universities which sustain energetic practical and experimental activities and which are considered most in need of reinforcement among the universities involved. (The Electrical Engineering Department of Nommensen University, the Mechanical Engineering Department of UMA, the Industrial Engineering Department of UDA and the Civil Engineering Department of UISU, being 4 universities and 4 departments.)

After an evaluation of the two model proposals it was concluded to carry out the Basic Design using case 2 above.

An evaluation of the basic specifications of the equipment to be provided will be carried out on the basis of the policies for equipment design and for equipment selection (4.1.3) which have been established.

(2) Quantity of Equipment and Layout Plan

1) As the Project aims at the upgrading of educational standards of the universities concerned the core of equipment provisions will be chosen to reinforce educational equipment. However, as certain universities are also locking in basic experimental equipment (with the exception of certain laboratories) it is consequently necessary to study existing equipment and then ensure the provision of quantities of these matching student numbers.

2) In the case of experiments required by curricula but which cannot be carried out because of lack or shortage of departmental equipment, it is necessary to install one full set of the missing equipment in accordance with the laboratory priorities as established in the discussions held between the individual universities, DGHE and the study team.

3) Equipment which suffers annual breakage and can therefore be classed as consumables, for example ribbons, poles, thermometers, glass ware in the civil engineering departments; terminals and/or relay items in the electrical engineering departments; and specimen preparation sets and glass ware in the mining departments, must, of course, be purchased. In the present equipment provision plan allowance has been made for a supply to cover a two to three year period of use, calculated on the basis of the student numbers of the individual departments of the various universities.

4) Equipment to be provided under the Project is divided into the following categories:

a) The main items of the equipment indicated in (1) and (2) above relating to the study topics of S-1 grade student experiments. As many of the equipment items involved are of a system equipment nature it is necessary to select these.

b) The equipment and devices for measuring the results of experiments carried out with the main experimental equipment of 1) above. It will be necessary to provide several of each for items of group 1) above.

c) Supporting equipment needed for major practical experimentation with the main equipment 1) above. These will include

such equipment as compressors, pumps, and recorders etc. and numbers required in the laboratories will be determined in relation to the types of experiment undertaken, since use of these items varies according to the type of experimentation.

d) The fourth group includes tools, consumables and spare parts, that is those items which are expended through repeated use in experiments or through use in experiment preparation of 1) above. As the present case relates to student experiments it is expected that the percentage of equipment accounted for by this category will be around 3 - 4%.

5) Provision of several personal computers per department has been proposed in view of the importance of computer studies in the engineering education.

Major equipment for each department are listed below and details are shown in Appendix-6.

4.3.1 University of Syiah Kuala

Civil Engineering; Land Surveying Equipment, Standard Penetrometer, Pavement Material Testing Equipment, Hydraulics Experimental Apparatus etc.

Mechanical Engg. ; Brinnel/Rockwel/Vickers Hardness Tester, Water Tank for Synthetic Hydro-Experimental Machine, Electrical Basic Measuring Equipment, Internal Combustion Engine Testing Apparatus, etc.

Chemical Engg. ; Special Glassware, Basic Chemical Experiment Equipment (Bunsen gas Burner, Thermometer, Stirrer, Autoclave, Electronic Balance, Microscope, etc.), Liquid/Gas Flow Meter, Heat Conduction Apparatus, Distilling Testing App., etc.

University Management; Personal Computer

4.3.2 University of North Sumatera :

Civil Engg ; Land Surveying Equipment, Standard Penetrometer, Plate Bearing Test Set, Field CBR Test Set, Rainfall hydrographs, etc.

Mechanical Engg ; Universal Milling Machine, Brinnel/Vickers/ Rockwel Hardness Tester, Metallurgical Microscope, AC Arc Welding Machine, Resistant Loss Measuring Apparatus, Tools, etc.

Electrical Engg. ; Tools, High voltage Experimental Equipment, High Voltage testing equipment, etc.

Chemical Engg. ; Special Glassware, Basic Chemical Experiment Equipment (Bunsen Gas Burner, Thermometer, Stirrer, Autoclave, Electronic Balance, Microscope, etc.), Fluid Friction Apparatus, Adjustable Bed Flow Channel, Wetted Wall Gas Absorption Column, Liquid Phase Chemical Reacter, etc.

Industrial Engg. ; Video Projecter, Slide Projecter, Strobo Scopic Camera, Drawing Instruments, Model Plate for Equipment and Facilities, Luxmeter, etc.

4.3.3 Nommensen University :

Civil Engg. ; Personal Computer

Mechanical Engg. ; Personal Computer

Electrical Engg .; Analog Testers, Transformers, Constant Voltage Generater, Pneumatic Training Package, Tools, Personal Computers, etc.

4.3.4 University of Medan Area:

Civil Engg. ; Personal Computer

Mechanical Engg. ; Band Sawing Machine, Hack Sawing Machine, Pedestal Grinder, Charpy Impact Testing Machine, Brinnel/Rockwel Hardness Tester, Metallurgical microscope, Electric Muffle Furnace, Spot Welding Machine, Water Tank for Synthetic Hydro-Experimental Machine, Tools, etc.

Electric Engg. ; Personal Computer

Industrial Engg. ; Personal Computer

4.3.5 Dharma Agun University:

Civil Engg. ; Personal Computer

Mechanical Engg. ; Personal Computer

Electrical Engg. ; Personal Computer

Industrial Engg. ; 8 mm Film Projecter, Slide Projecter, Copying Machine, Video Camera, Light Table, Teacher's Drawing Tools etc.

Mining Engg. ; Personal Computer

4.3.6 The Islamic University of North Sumatera :

Civil Engg. ; Theodolite, Leveling Machine, Direct Shear Apparatus, Electric Unconfined Compression Apparatus, CBR Test Set, Liquid Limit device, Drying Oven, Vicat Apparatus, Thermostatic Constant Chamber for Mortar, Gravel Specific Gravity Testing Set, etc.

Mechanical Engg. ; Personal Computer

Electrical Engg. ; Personal Computer

Industrial Engg. ; Personal Computer

4.3.7 Andalas University :

Civil Engg. ; Theodolite, Leveling Machine, Plane Table Set, Multi triaxial Apparatus, Marshall Test Apparatus, CBR Test Set, Mortar/Concrete Testing Equipment, Floating Body Experimental Apparatus, Universal Hydraulics experimental Apparatus, Sediment Transport Channel, Wave Generator, etc.

Mechanical Engg. ; Radial Drilling Machine, Universal Milling Machine, Band Sawing Machine, Pedestal Sawing Machine, Universal Testing Machine, Charpy Impact Testing Machine, Oxyacetylene Gas Welding and Cutting Kit, Water Tank for Synthetic Hydro-experimental Machine, Electrical Measuring Equipment Tools, etc.

4.3.8 University of Sriwijaya :

Civil Engg. ; Land Surveying Equipment, Constant Head Permeameter, Particle Size Analysis Set, Floating Body Experimental, Universal Hydraulics Experimental Apparatus, Resistant Loss Measuring Apparatus, Sediment Transport Channel, Orifice Experimental Apparatus, Water Generator, etc.

Mechanical Engg. ; Universal Testing Machine, Torsion Testing Machine, Sharpy Impact Testing machine, Repeated Torsion & Bending Fatigue Testing Machine, Brinnell/Rockwell/Vickers Hardness Tester, Pedestal Grinder, Tools, etc.

Electrical Engg. ; Multi Tester, Transformer, 3-Ph Watt Meter, Oscilloscope, Tools, High Voltage Experimental Unit, AC/DC Di-electric Withstand Test Unit, Transmission Line Demonstrator, Digital Galvanometer, etc.

Chemical Engg. ; Basic Chemical Experimental Equipment (Thermometer, Bunsen Gas Burner, Magnetic Stirrer, Dessiccator, Vacuum Pump, Electronic Balance, etc.), Liquid/Gas Flow Meter, Fluid Friction Apparatus, Heat Convection Apparatus, Adjustable Bed Flow Channel, Liquid Mixing Apparatus, Wetted Wall Gas Absorption Column, Batch Drying, etc.

Mining Engg. ; Cannon fensky Viscosimeter, Aniline Point Tester, Universal Asphalt Penetration Tester, Cleveland Flash Point Tester, API Hydrometer Test Set, Electric Detection Apparatus, etc.

4.3.9 University of Lampung ;

Civil Engg. ; Plane Table Set, Direct Shear Apparatus, Multi Triaxial Apparatus, Constant Head Permeameter, Liquid Limit Device, Dutch Cone Penetrometer, CBR Test Set, Road Testing Equipment, Concrete Testing Equipment, etc.

University Management; Personal Computer

4.3.10 University of Tanjungpura ;

Civil Engg. ; Multi Triaxial Testing Apparatus, Road Testing Equipment, CBR Test Set, Concrete Testing Equipment, Floating Body Experimental Apparatus, Universal Hydraulics Experimental Apparatus, Resistant Loss Measuring Apparatus, Sediment Transport Channel, Orifice Experimental Apparatus, etc.

Electrical Engg. ; Basic Electric Measuring Equipment, High Voltage Experimental Unit, AC/DC High Voltage Measuring Test Set, Transmission Line Demonstrator, Portable Protective Relay Test Set, Fault Locator, Micro Computer Trainer, Micro-processor and Computer training Unit, etc.

4.3.11 University of Lambung Mangkurat ;

Civil Engg. ; Multi Triaxial Testing Equipment, Floating Body Experimental Apparatus, Universal Hydraulics Experimental Apparatus, Resistant Loss Measuring Apparatus, Sediment transport Channel, Orifice Experimental Apparatus, Wave Generator, etc.

4.4 Study of Operational Cost

(1) Annual Electric Power Consumption of Educational Equipment

A'though there are variations according to university the average weekly hours scheduled for experiment in each of the departments are as follows:

Department	Civil	Mechanical	Electrical	Chemical	Industrial	Mining
Hours	13.3	16.2	10.4	13.0	7.1	8.5

In one year there are 40 weeks of operation on the above indicated levels of weekly experiment time, of which 20% is assumed to be taken up for explanatory guidance, etc. and so represents lag time.

Further, the average electric load capacity, load ratio and electric power load classified by department are shown below.

Department	Civil	Mechanical	Electrical	Chemical	Industrial	Mining
Load Capacity (kW)	60	80	60	40	40	60
Load Rate	0.2	0.2	0.2	0.2	0.2	0.2
Average Located Power (kW)	12	16	12	8	8	12

The average student numbers for each department are taken to be 250, and so the average electric energy consumption per student of each department is shown below.

(2) Electricity Charges

Civil Eng.:
(12 kW x 13.3 x 40 weeks x Rp.86/kW)/250 = Rp.1,760/year

Mechanical Eng.:
(16 kW x 16.2 x 40 weeks x 0.8 x Rp.86/kW)/250 = Rp.2,850/year

Electrical Eng.:
(12 kW x 10.4 x 40 weeks x 0.8 x Rp.86/kW)/250 = Rp.1,370/year

Chemical Eng.:
(8 kW x 13.0 x 40 weeks x 0.8 x Rp.86/kW)/250 = Rp.1,140/year

Industrial Eng.:
(8 kW x 7.1 x 40 weeks x 0.8 x Rp.86/kW)/250 = Rp.630/year

Mining Eng.:
(12 kW x 8.5 x 40 weeks x 0.8 x Rp.86/kW)/250 = Rp.1,120/year

(3) Water Charges

The areas which are expected to show the greatest increase in water costs due to the implementation of the Project are in hydraulic experiment and concrete testing of the civil engineering dept. and in Laboratory practice for filtration and fermentation of the chemical

engineering dept. It is estimated that each of these areas which give rise to running cost increase in water consumption no larger than 150 cubic meters of water per annum.

(150 M^3 x Rp.120 per M^3)/250 = Rp.72/year

Consequently the increase in annual water consumption resulting from experiments in the departments of civil engineering and chemical engineering are estimated to 72 Rupiah per student.

(4) Materials and Chemicals, etc.

There are slight variations according to the department considered, but the monthly increase in costs involved for an entire department consequent on the equipment expansion is estimated to be of the order of 12,000 Rupiah.

Consequently, the average annual increase in costs in the use of materials and chemicals is calculated to be approximately 600 Rupiah per student.

(5) Annual Increase in Lighting and Heating Expenses by Department

Addition of the above gives us the following figures for the increase in the cost of heating and lighting which results in each department from the implementation of the Project for equipment.

(Unit : Rupiah)

Department	Civil	Mechanical	Electrical
Additional Expenses	602,000	874,500	504,500
Department	Chemical	Industrial	Mining
Additional Expenses	447,000	175,500	442,000

4.5 Layout Plan of Equipment

The large and/or heavy equipment which requires foundations for installation is shown in Appendix-7 showing the position of the laboratories and workshops of the individual departments concerned. The experimental equipment, measuring devices and work tools for use on laboratory benches will be stored in the laboratories on the benches or on racks.

4.6 Project Implementation Plan

4.6.1 Implementation Organization

Responsibility for implementation of the Project is with the engineering departments of the universities concerned, under the supervision of the DGHE of the MOEC.

Therefore, procedures involved in consultant contracts, contractor contracts, bank agreements and equipment planning and facility planning are to be carried out by the engineering departments of the universities concerned, and the tasks involved will be proceeded with under the responsibility guided by the DGHE.

4.6.2 Implementation Plan

After the Exchange of Notes concerning the Project, the DGHE and the selected Japanese consultant will carry out discussions as necessary relating to the implementation planning, tender of bids and delivery of contracted materials, and installation works on the site in accordance with the policies drawn up in the Basic Design.

With regard to the execution plan the consultant will evaluate the following points in conjunction with the DGHE and establish appropriate implementation schedule and measures concerning these.

- the scope of works for each country and the timing for commencement of works
- the delivery to site of materials and the installation of equipment
- the designation of technical assistants in each university concerned responsible for test operations and adjustments

Further, it is necessary to establish a construction and installation plan to ensure that works are completed smoothly in the scheduled period allotted. This should afford consideration to determining the best time for the dispatch of engineers for the equipment installation and test operation, adjustment works mentioned above.

4.6.3 Scope of Works

The scope of works of Japan will include the provision of the educational equipment, its transportation and delivery to the site, installation, inside wiring, test operation and adjustments after installation, together with consulting works such as the drawing up of tender guidelines and supervision of tenders. The party of Indonesia will be responsible for the preparation and execution of the following items.

(1) The electric power sources and lighting facilities needed for all equipment provided. Further, for the preparation of utilities, including water, fuels, etc.

(2) The preparation of the foundations and emplacements for the equipment which is determined on in accordance with the foundation drawing submitted by the Consultant.

(3) The installation and preparation of experiment benches, racks and lockers which are required in accordance with the layout drawings for the equipment lay out plan.

(4) Procedural work, bearing of expenses, etc.

- Bank commissions
- Expenses accompanying the procedure for 10% import tax for imported product, and 10% of value added tax for local product, etc.
- Expediting measures for customs clearanace and for inland transportation
- Coordination of approvals required for all procedures relating to implementation of the Project under control of SEKNEG.
- Procedures for tax exemption from taxes and other fiscal duties of Indonesia imposed on Japanese personnel engaged in the implementation of the Project in accordance with the agreement that has been approved.

- Privileges for the entry into and the stay in the Indonesia by the Japanese to conduct the work in accordance with the agreement that has been approved.

- Placement of the staff necessary for the administration and control of the Project under the precisely planned personnel placement plan.

4.6.4 Works to be Undertaken by the Indonesian Government

Cost of the Work to be borne by the Indonesian Government is estimated as follows, leaving aside necessary undertakings relating to the project assistance by ADB and Germany, etc.

Foundation work for equipment	:	2,100,000 Rupiah
Repair and/or modification of building	:	20,850,000 Rupiah
Total	:	22,950,000 Rupiah

These should include a installation and finishment of partition, replacement and installation of wire, installation of experimental table, shelf, and locker, and shall be undertaken by the Indonesian government.

4.6.5 Implementation Schedule

The project shall be divided into two phases as stated in 3.2.3. Implementation of Phase II shall be recommended to start in line with a progress of the construction of the buildings for target universities.

In the implementation of the Project through a grant aid cooperation of the Japanese government, Each Phase shall be executed in three stages after the signing of the Exchange Note by the two countries, comprising the preparation of the design documents, the tender and work contracts, and the erection.

Phase I : Detail Design 3 months, Equipment Manufacture 9 months
Total 12 months

Phase II : Detail Design 3 months, Equipment Manufacture 9 months
Total 12 months

Target universities shall be divided as follows:

Phase I : Andales University, University of Lampung, University of Tanjungpura, University of Lambung Mangkurat, University of Medan Area, Dharma Agung University, The Islamic University of North Sumatera

Phase II : University of Syiah Kuala, University of North Sumatera, University of Sriwijaya, Nommensen University

(1) Detail Design

The tender documents are prepared according to the basic design and are composed of the detailed design drawings, specifications, calculations, estimations of budget, etc. In the detail design stage, after deliberate discussions with the organizations concerned of Indonesia, when necessary, the work relating to the tender is conducted with the approval of the final documents. The time required is estimated to be 2 months.

(2) Tender and Evaluation

On completion of the work relating to the tender, the prequalification screening shall be done in Japan upon public announcement. Based on the results of the screening, the executing body shall invite the companies that participated in the tender, and conduct the bidding in the presence of the parties concerned. The bidder of the lowest price, when the contents of its bid is evaluated to be proper, shall be the successful bidder, and shall enter into a contract with the Indonesian government. The period from the tender to the execution of the contract is expected to be 1 month.

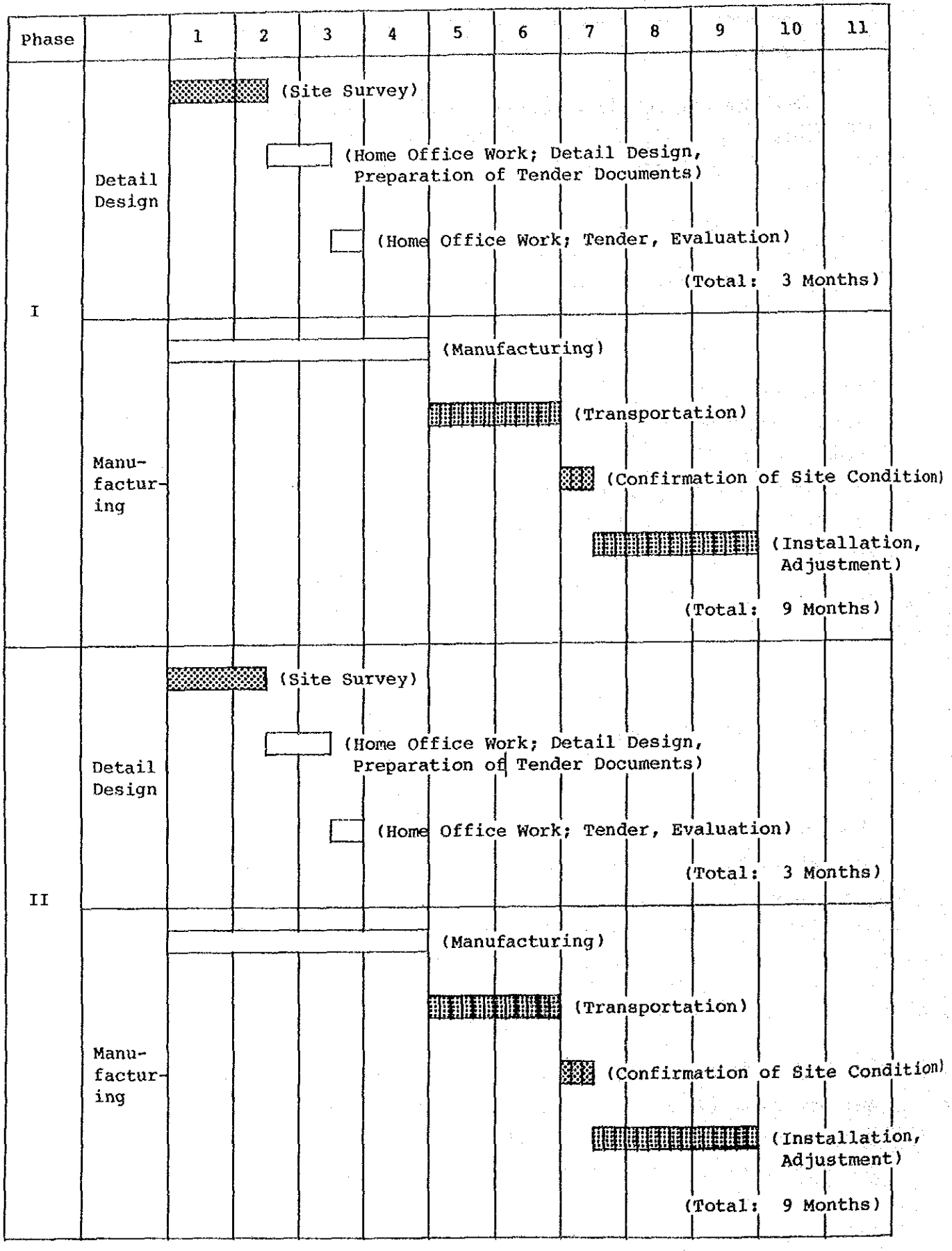
(3) Delivery of Equipment

After the signing of the contract, the fabrication of the equipment shall be commenced and the time required for the work on the Provision of Equipment for the Higher Education Development Support Project is estimated to be approximately 12 months judging from the

size and the facilities of the target universities, assuming that the procurement of the equipment is carried out satisfactorily and the preparatory work within the scope of the Indonesian side proceeds smoothly.

The overall schedule for each phase is conceived as indicated in Fig. 4-1.

Fig. 4-1 Overall Schedule for Providing the Equipment for the Higher Education Development Support Project



CHAPTER 5. PROJECT EVALUATION AND CONCLUSION

CHAPTER 5 PROJECT EVALUATION AND CONCLUSION

5.1 Project Evaluation

It is judged that the personnel resources and maintenance-administration systems available in the DGHE of the MOEC which will form the managing body after the implementation of the present project are easily capable of assuming the operation and management of the project. In addition to the numerous benefits which can be expected to arise from this project its implementation will contribute both directly and indirectly to the improvement of the standard of life widely and in view of the above benefits and reasons it is considered an appropriate and deserving object of a Japanese grant aid cooperation.

Table 5-1 Results and Degree of Improvement to be effected by the Project Implementation

Present Situation and Problems	Measures of the Present Project	Results of the Project Level of Improvement
1. The educational levels in the islands excepting Java Island are low and those of Sumatera and Kalimantan Islands, which are to play an important role in the Repelita V program, do not meet the socio-economic requirements of those regions. The reason for this inadequacy is the poor quality of the Engineering Departments of the universities of both these islands. In particular, this is due to an extreme lack of equipment needed for student experimentation.	1. Provide basic experimental equipment required in student experimentation of the civil Engineering, Electrical Engineering, Chemical Engineering, Industrial Engineering and Mining Engineering Departments of the 11 universities concerned.	1. Through the provision to these departments of necessary experimental equipment for student use it will be possible for experiments to be conducted in areas which this was not possible heretofore. The provision of engineers and technicians matching regional requirements will be easier to accomplish. The number of students who will thereby be able to contribute indirectly to regional development should be of the order of 12,000 students and 1,500 graduates.
2. Student experimental equipment is composed of a number of elements and if there is a lack of spare parts for these the breakdown of any component part of geographic circumstances may hinder an immediate repair in many cases. This results in hindrances to the operation of the curriculum.	2. In addition to the above, the provision of component equipment and small items which are needed in support of the basic experimental equipment is to be carried out.	2. Through the provision of the equipment it will be possible to reinforce equipment resources for basic experimentation and allow creative initiatives. Superannuated and idle equipment will be avoided and it will be possible to use equipment more effectively. At the same time OR training for staff, technical assistants will be provided.
3. The technical progress of the industrial sector, and particularly of private industry, in Indonesia surpasses the technology of the public institutes and universities. Computer studies manifest this gap very strongly and this is particularly a problem in the Sumatera and Kalimantan islands.	3. With the exception of certain particular departments of a part of the universities in question, a number of personal computers are to be provided to each department where computer studies from a part of the student curriculum.	3. At present, personal computer is widely utilized in the industrial sector, there are great needs to engineer and/or technician competent with computer technology. Through this project, university will be able to provide such graduates to the industrial sector.
4. Problems of Indonesian universities include the upgrading of technology which is common to industry, the lack of development capacity in application technology directed at regional resources and the quality of technical services to the region. Technical support and cooperation is needed in these areas.	4. The provision of experimental equipment which is attractive to the industrial sector is to be added to the basic experimental equipment provision, so far as it is possible for this to be used for student experimentation also.	4. By the introduction of the equipment the universities will be able to act as antennas receptive to the development of their regions in the areas of scientific and industrial technology. At the same time through the establishment of regular contact between the universities and industry the promotion of scientific technology which is common to industrial needs can be effected.
5. Despite the importance of the role of private educational institutes in the higher education of Indonesia, the quality of the private universities is poor and it is required that they be upgraded to the levels of the national universities.	5. Equipment is to be provided to four private universities in addition to the seven national universities concerned.	5. There are few cases to date of private universities becoming the object of multi-national or bilateral assistance programs. The present project is founded on a policy of assistance which embraces the national and private universities in the same way. This will create an incentive to the 872 colleges of Indonesia (student population: national universities 7 million and private universities 1.1 million).

5.2 Conclusion

As can be seen from the above table 5.1 the object of the benefits of the present project are the less privileged areas of the Sumatera and Kalimantan. The application of the Project will provide a greater equality of opportunity to higher education in these areas. At the same time the Project will promote the policies concerning education and human resource development, with which the project accords. Further, the Project accords with the main aims of the HEDS program and the Repelita V for the Higher Education sector.

However, in order to ensure that the full effect is realized it will be necessary for the Indonesian Government to direct its own efforts in the following:

(1) Project Execution Body

The DGHE is the executive body of the Project. However, it is expected that the DGHE will implement an appropriate division of tasks involved as the Project proceeds and form implementation teams in the target universities at the same time as setting up a Project Management Office inside its own organization.

(2) Assurance of Teaching Staff

It is desirable that attention be given to avoid any interruptions in the training and experimental guidance given to students which might result from the overseas training of teaching staff which forms part of the long term program of the target universities for assuring relevant teaching staff.

(3) Assurance of Running Costs

The equipment to be provided under the Project is basic experimental equipment for S-1 grade student experimental use and covers a wide range of student experimental equipment. During the discussions held with the DGHE during the Basic Design Study it was agreed to exclude such items as glassware and tools which could easily be supplied within Indonesia. The assurance of adequate running costs is therefore essential. It is considered necessary that the DGHE be in close contact with the target universities during the implementation of the Project and further operation of the activities.

(4) Provision of Experimental Guides and Equipment Manuals

Some of the target universities still continue to lack a complete provision of experimental guides and this needs to be rectified. Further, the manuals or instructions originally provided for a certain amount of the equipment which was received under previous multilateral and bilateral assistance programs to the target universities have been lost and consequently it is impossible to maintain the equipment. Therefore, it is desirable to give due attention to the storage of equipment instructions and manuals in the future.

APPENDIX 1. MEMBERS OF THE STUDY TEAM

Appendix-1 Members of the Study Team

1.1 Basic Design Survey Team (August 14, 1990 - September 6, 1990)

Dr. Fumio NISHINO	Team Leader Professor Department of Civil Engineering Faculty of Engineering The University of Tokyo
Dr. Hiroomi HOMMA	Technical Official Advisor Professor Department of Energy Engineering Toyohashi Institute of Technology
Mr. Satoshi MACHIDA	Program Coordinator Deputy Director of Second Basic Design Study Div. Grant Aid Study and Design Department Japan International Cooperation Agency
Mr. Takashi KURODA	Expert, Electrical Engineering UNICO International Corporation
Dr. Kunihito MATSUI	Expert, Civil Engineering UNICO International Corporation
Dr. Yukio OHBA	Expert, Mechanical Engineering UNICO International Corporation
Mr. Akira YUKAWA	Expert, Chemical Engineering UNICO International Corporation
Mr. Hirofumi YAMAUCHI	Expert, Mining Engineering UNICO International Corporation
Mr. Reiichi TOKORO	Expert/Layout Plan, Cost Estimation UNICO International Corporation

Appendix-1 Members of the Study Team

1.2 Draft Report Explanation Team (November 21, 1990 - November 30, 1990)

Dr. Fumio NISHINO	Team Leader Professor Department of Civil Engineering Faculty of Engineering The University of Tokyo
Mr. Shigeyuki SETO	Program Coordinator Information Division Institute for International Cooperation Japan International Cooperation Agency
Mr. Takashi KURODA	Expert, Electrical Engineering UNICO International Corporation
Mr. Akira YUKAWA	Expert, Chemical Engineering UNICO International Corporation

APPENDIX 2. SURVEY SCHEDULE

APPENDIX-2

Table A-2-1(1) SCHEDULE OF BASIC DESIGN STUDY TEAM (14th of August - 6th of September, 1990)

No	Day	Date	PROF. DR. NISHINO FU PROF.DR. HOMMA HIRO MR. MACHIDA SATOSHI Consultant DR. KURODA TAKASHI Consultant MR. YUKAWA AKIRA	Consultant DR. OOBA YUKIO MR. TTOKORO REIICHI	Consultant DR. MATSUI KUNIHITO MR. YAMAUCHI HIROFUMI
1	TUES	14/8	11:00-16:15 TYO – JKA [GA 873] 18:30-20:30 PMO JICA Team & B/D Team Meeting (CHIKUYO' TEI)		
2	WED	15	09:00-12:00 PMO Meeting (Discussion on Policy, Concept, etc.) Place: DGHI Prof. Yuhara office 14:30-14:55 Visit to JICA 15:00-15:30 Visit to Embassy of Japan		
3	THUR	16	10:00-12:00 PMO Meeting (Detailed Discussion) Place: DGHI Prof. Yuhara office 14:00-16:00 Consultant member: work in Jakarta to prepare "the paper" under the supervision by the leading members		
4	FRI	17	- ditto -		
5	SAT	18	- ditto -		
6	SUN	19	- ditto - 20:45-23:00 JKT – MDN [GA 154] (m)		
7	MON	20	08:00-12:00 USU Brief, Observation and/or 4 Universities Brief, Observation 14:00-17:00 Discussion & study on the equipment		
8	TUES	21	09:00-12:00 USU Discussion & study 14:00-17:00 - ditto - 19:40-21:55 MDN – JKT [GA 155] Mr. Machida		
9	WED	22	12:00-13:00 MDN – BTJ [GA 034] 14:00-17:00 UNSYAH Brief, Observation		09:00-11:00 UDA Brief, Observation 13:00-15:00 Discussion & study
10	THUR	23	08:00-12:00 UNSYAH Discussion & study 13:50-18:00 BTJ – JKT [GA 035]	08:00-12:00 UNSYAH Discussion & study 14:00-17:00 - ditto -	09:00-12:00 UDA Discussion & study 13:00-17:00 - ditto -
11	FRI	24	09:00-11:00 DJC Meeting 14:30-15:30 M/M Drafting by Both Side 16:00-16:30 M/M Signing	08:00-11:00 UNSYAH Discussion & study 13:50- : BTJ – MDN [GA 035]	09:00-12:00 UMA Brief, Observation 14:00-17:00 Discussion & study

(PMO) : (m) = MR. MIYAKE SEIFU

Table A-2-1(2) SCHEDULE OF BASIC DESIGN STUDY TEAM (14th of August - 6th of September, 1990)

No	Day	Date	Consultant DR. KURODA TAKASHI MR. YUKAWA AKIRA		Consultant DR. OOBA YUKIO MR. TOKORO REIICHI		Consultant DR. MATSUI KUNIHITO MR. YAMAUCHI HIROFUMI	
12	SAT	25	08:05-21:15 (PROF.NISHINO,PROF.HOMMA,MR.MACHIDA)	JKT - TYO [CX-710 & 500]	08:00-11:00 14:00-17:00	**UISU** Brief, Observation Discussion & study	09:00-12:00 19:40-21:55	**UMA** Discussion & study MDN - JKT [GA 155] (m)
13	SUN	26	14:40-15:40	JKT - PLB [GA 136]		Field Report Making	15:00-16:25	Field Report Making JKT - PNK [MZ 508] (m)
14	MON	27	09:00-11:00 14:00-17:00	**UNSRI** Brief, Observation Discussion & study	08:00-11:00 14:00-1700	**UISU** Brief, Observation Discussion & study	08:00-12:00 14:00-17:00	**UNTAN** Brief,Observation Discussion &study
15	TUES	28	09:00-11:00 14:00-17:00	**UNSRI** Discussion & study - ditto -	15:00-16:00	MDN - PDG [GA 031]	08:00-12:00 14:00-17:00	**UNTAN** Discussion &study - ditto -
16	WED	29	08:35-09:40	PLB - JKT [GA 131]	08:00-12:00 14:00-17:00	**UNAND** Brief, Observation Discussion & study	11:00-12:25	PNK - JKT [GA 509] (m)
17	THUR	30	09:00-09:55	JKT - TKG [MZ 200] **UNILA** Brief, Obsaervation	08:00-12:00 14:00-17:00	**UNAND** Discussion & study - ditto -	08:30-11:10 12:00-17:00	JKT - BDJ [MZ 532] (m) **UNLAM** Brief,Observation Discussion &study
18	FRI	31	08:00-12:00 14:55-15:50	**UNILA** Discussion & study TKG - JKT [MX 211]	09:20-11:05	PDG - JKT [GA 233]	09:00-14:00 16:55-17:40	**UNLAM** Brief,Observation Discussion &study BDJ - JKT [MZ 533] (m)
19	SAT	1/9						
20	SUN	2		- ditto -				
21	MON	3		- ditto -				
22	TUES	4	09:00-12:00	PMO & B/D Team Meeting regarding to Field Rerpot				
23	WED	5	09:00-12:00 : - :	Visit to JICA to report the study Visit to Embassy of Japaqn to report the study Visit to ADB				
24	THUR	6	22:45 08:00	JKT - TYO [GA 872]				

(PMO) : (m) = MR. MIYAKE SEIFU

Table A-2-2 SCHEDULE OF BASIC DESIGN TEAM FOR DRAFT FINAL REPORT (21st of November - 30th of November, 1990)

No	Day	Date	1. Prof.Dr. NISHINO Fumio (Team Leader) 2. Mr. SETO Shigeyuki (Project Corrdinator)	Dept. of Civil Engineering Faculty of Engineering The University of Tokyo (Hotel Indonesia 537) Staff, Information Div., Institute for International Coereration, JICA	3. Mr. KURODA Takashi Experimental Equipment (Electrical Engineering) UNICO International Corporation 4. Mr. YUKAWA Akira Experimental Equipmentt (Chemical Engineering) UNICO International Corporation
1	WED	21 /11	10:00-18:00 19:30-21:00	TYO - JKT [JL 721] PMO/HEDS JICA Team & B/D Team Meeting	Place: Hotel Indonesia
2	THUR	22	09:00-10:00 10:30-11:10 14:00-16:40	Visit to JICA Indonesia Office Visit to Embassy of Japan PMO Meeting	Place: JICA Indonesia Office Place: Embassy of Japan Place: PMO Office/HEDS Project
3	FRI	23	09:00-11:30 14:30-17:30	PMO Meeting Team Meeting	Place: PMO Office/HEDS Project Place: PMO Office/HEDS Project
4	SAT	24	10:00-12:00 14:00-16:00	PMO/HEDS JICA Team & B/D Team Meeting DGHE Meeting	Place: PMO Office/HEDS Project Place: DGHE Ruang Sidang Proyek CIDA (First Floor/DIKTI)
5	SUN	25		Team Meeting	
6	MON	26	09:00-10:00 10:00-12:00 14:00-16:00 19:00-21:00	USAID Meeting (Mr. Rifkin & Mr. Kuhn) PMO Meeting DGHE Meeting DGHE - B/D Team Round-table conference	Place: JICA Indonesia Office Place: PMO Office/HEDS Project Place: DGHE Ruang Sidang Proyek CIDA (First Floor/DIKTI)
7	TUES	27	10:00-12:00 14:00-16:00	PMO Discussion PMO Discussion	Place: PMO Office/HEDS Project Place: PMO Office/HEDS Project
8	WED	28	09:30-10:30 10:30-11:30 11:40-12:30	Signing of Minutes of Discussion Visit to JICA Indonesia Office Visit to Embassy of Japan	Place: DGHE Ruang Sidang Proyek CIDA (First Floor/DIKTI) Place: JICA Indonesia Office Place: Embassy of Japan
9	THUR	29	12:00-13:00	PMO Meeting Jakarta - Tokyo [CX710, CX500]	Prof.Dr. NISHINO Fumio Mr. SETO Shigeyuki
10	FRI	30	08:00-12:00	Jakarta - Tokyo [CX710, CX500]	Mr. KURODA Takashi Mr. YUKAWA Akira

APPENDIX 3. MINUTES OF DISCUSSION

APPENDIX-3 MINUTES OF DISCUSSIONS

ON

PROVIDING THE EQUIPMENT
FOR THE HIGHER EDUCATION DEVELOPMENT SUPPORT PROJECT
IN THE REPUBLIC OF INDONESIA

In response to the request of the Government of the Republic of Indonesia for providing the equipment for the Higher Education Development Support Project, the Government of Japan decided to conduct a basic design study and entrusted the study to Japan International Cooperation Agency. Japan International Cooperation Agency sent to the Republic of Indonesia the Basic Design Study Team headed by Prof. Dr. Fumio Nishino of The University of Tokyo for 24 days from 14th August to 6th September 1990.

The Basic Design Study Team had a series of discussions and exchanged views with the authorities concerned of the Government of the Republic of Indonesia.

As a result of the discussions, the Basic Design Team and the Indonesian authorities concerned agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Grant Aid Project for providing equipment.

24th August 1990

Prof. Dr. Fumio Nishino
Leader,
Basic Design Study Team,
Japan International
Cooperation Agency

Prof. Dr. Yuhara Sukra
For Director General of Higher
Education,
Ministry of Education and
Culture,
Republic of Indonesia

ATTACHMENT

1. The Government of the Republic of Indonesia and the Government of Japan agreed and signed the Record of Discussions on 12th April, 1990 on the Japanese Technical Cooperation for the Higher Education Development Support (hereinafter referred to as "HEDS") project for the purpose of upgrading competence of the academic staff of eleven target universities in Sumatera and Kalimantan in the disciplines of engineering by providing support for postgraduate studies in Indonesia and for non-degree short-term training programs in Indonesia and in Japan.

2. There is a related project by United State Agency for International Development (hereinafter referred to as "USAID") aiming at the same purpose as the above item 1 for the target universities but in the disciplines of basic sciences.

3. HEDS is a tripartite project with three executing agencies, Directorate General of Higher Education of the Ministry of Education and Culture of the Government of the Republic of Indonesia, (hereinafter referred to as "DGHE"), USAID and Japan International Cooperation Agency (hereinafter referred to as "JICA")

4. The objective of this Grant Aid Project (hereinafter referred to as "the Project") being studied by the Basic Design Study Team (hereinafter referred to as "the Team") is to enhance the quality of engineering education of the eleven target universities of the tripartite HEDS project even further by providing the necessary but presently not available or insufficient basic equipment to be used for undergraduate education and the equipment to improve management of the target universities and their engineering faculties and departments.

5. The names of the target universities and the fields of engineering for which the Indonesian authorities requested to provide the equipment are listed in Annexes I and II, respectively.

6. The sites of the Project are located in Sumatera and Kalimantan as shown in Annex III.

7. DGHE is responsible for the administration and execution of the Project.

8. The Team explained the Japan's Grant Aid System and the Indonesian authorities concerned have understood its procedure and condition.

9. The Indonesian authorities concerned will take necessary measures listed in Annex IV, on condition that the grant aid by the Government of Japan is extended to the Project.

10. The Indonesian authorities concerned and the Team basically agreed on the guideline for the equipment selection and distribution among the target universities and their engineering faculties and departments proposed by DGHE as shown in Annex V.

11. After the study, the Team prepares the draft final report containing a list of major equipment and its description for each target university and its faculty and department together with rationale behind the selection of the equipment for each of them. Fifteen copies of the final draft report are thought to arrive at DGHE one week before the meeting in Indonesia for the explanation of the result of the study and for discussions to follow. Twenty five copies of the final reports shall be prepared for DGHE. In addition to these, thirty copies of the list of the equipment for each target university has to be prepared extracting from the final report for distribution to DGHE and to target universities.

ANNEX I : TARGET UNIVERSITIES

1. University of Syiah Kuala

2. University of Sumatera Utara

3. Nommensen University

4. Dharma Agung University

5. University of Medan Area

6. The Islamic University of Sumatera Utara

7. Andalas University

8. University of Sriwijaya

9. University of Lampung

10. University of Tanjungpura

11. University of Lambung Mangkurat

ANNEX II : FIELDS OF ENGINEERING

1. Civil Engineering (including Architecture Engineering)

2. Electrical Engineering

3. Mechanical Engineering

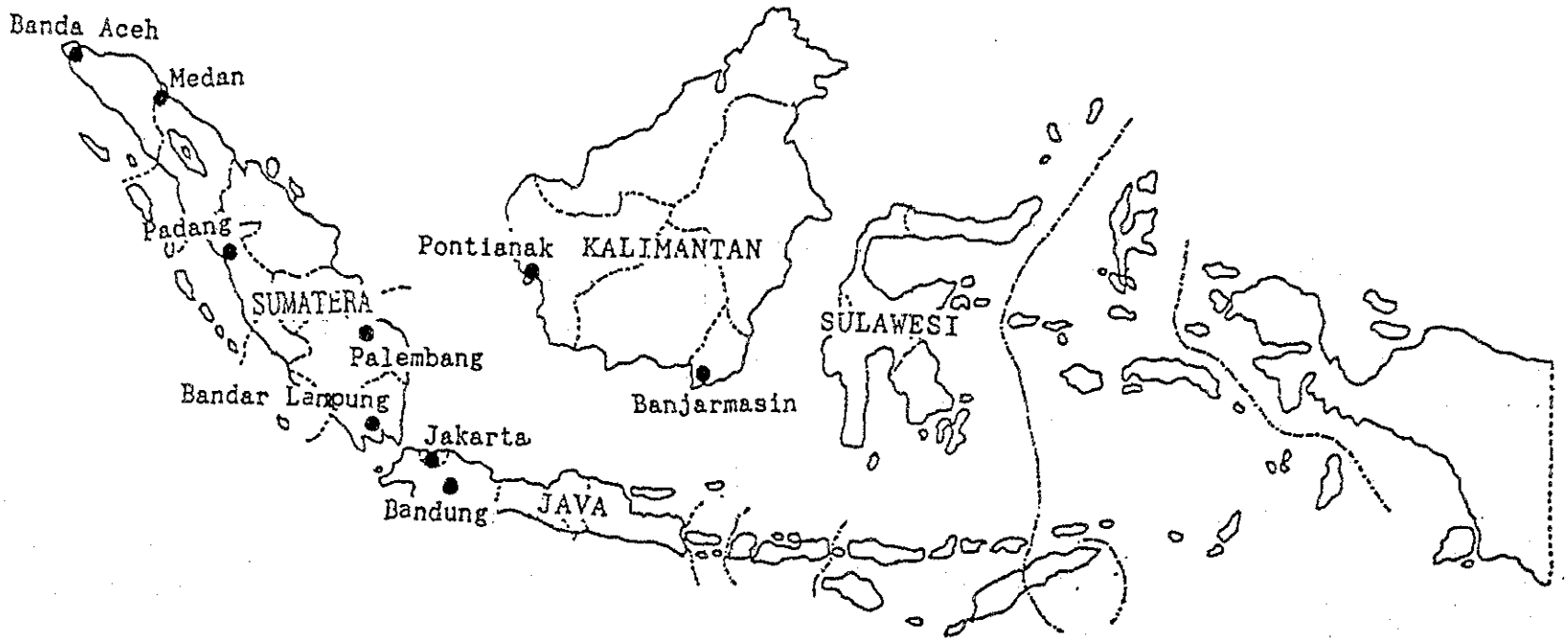
4. Chemical Engineering

5. Mining Engineering

6. Production Engineering

ANNEX III Basic Design Study on the Project for Providing the Equipment for the Higher Education Development Support Project in the Republic of the Indonesia

Map of Location



City	University	City	University
Banda Aceh	University of Syiah Kuala	Padang	Andalas University
Medan	University of Sumatera Utara	Palembang	University of Sriwijaya
	Nommensen University	Bandar Lampung	University of Lampung
	University of Medan Area	Pontianak	University of Tanjungpura
	Dharma Agung University	Banjarmasin	University of Lambung Mangkurat
	The Islamic University of Sumatera Utara		

ANNEX IV : ARRANGEMENT TO BE TAKEN BY THE GOVERNMENT OF INDONESIA

Following arrangements are requested to be taken by the Government of Indonesia, on condition that the grant aid by the Government of Japan is extended to the Project:

1. To prepare appropriate space for installation of the equipment and necessary utilities such as electricity, and water and gas supplies.

2. To ensure prompt unloading, tax exemptions and custom clearances at ports of disembarkation in Indonesia, and prompt inland transportation therein of the equipment procured by the grant aid of the Project.

3. To exempt Japanese nationals engaged in the Project from custom duties, internal taxes and other fiscal levies which may be imposed in Indonesia with respect to providing the equipment and the services under the verified contracts.

4. To accord Japanese nationals whose services may be required in connection with providing the equipment and the services under verified contracts such facilities as may be necessary for their entry into Indonesia and stay therein for the performance of their work.

5. To bear the banking commission to the Japanese foreign exchange bank for the banking services based on the banking arrangement.

6. To bear local expenses other than those to be bone by the grant, necessary for the execution of the Project.

7. To maintain and use properly and effectively the equipment procured by the grant of the Project.

ANNEX V : GUIDELINE FOR SELECTION AND DISTRIBUTION OF EQUIPMENT

1. The equipment to be used for S_1 degree (undergraduate) program and for improving the management of the universities and the faculties of engineering is to be procured. To select the equipment for the S_1 degree program, syllabi should be major references.

2. Duplication with the equipment presently available and expected from other aid projects in the near future must be avoided except the cases where the quantity is not sufficient for expected use of the equipment.

3. The priority should be given to the equipment for the public universities.

4. The availability of service and/or facilities for the maintenance of the equipment should be considered properly.

5. Shipment of the equipment procured outside Indonesia must be directed to the closest port to each target university. Equipment procured in Indonesia must be shipped directly to the target university.

Major items discussed between DGHE and Consultant Team

September 4th, 1990.

The consultant team expressed their views to proceed further with the basic design study and discussed with DGHE.

1. The project for provision of equipment for 11 target universities under the Higher Education Development Support Project shall be executed in two phases considering conditions of related facilities in the target universities.

2. According to the site survey, 11 target universities are classified into three groups considering their characteristics.

   A Groups (UNSYAH , U S U, UNSRI), B Groups (UNAND, UNILA, UNTAN, UNLAM) and C Groups (NOMNENSEN, UMA, UDA, UISU)

   In this connection, priority in term of allocation in the provision of equipment under the Higher Education Development Support Project shall be placed in order of A to C.

3. Regarding the priority order of each department and/or laboratory in a university shall be in accordance with the basic guideline as specified in the site survey report.

4. Equipment to be provided by the Japanese Grant aid will include basic but major laboratory equipment to be used for the S-1 degree course together with small equipment to be used commonly in wide range of laboratory work, spare parts and important consumables etc.

5. Regarding the P/C computer, P/C shall be regarded as a basic laboratory equipment in the engineering curriculum.

6. The ratio of provision of equipment to private universities to state universities shall be decided by the DGHE by the middle of September.

7. The provision of the equipment to the Nommensen University shall be done in to the second phase due to some internal difficulties.

8. Common use of the equipment in the Medan Area may be required further study due to lack of time in the site survey.

MINUTES OF DISCUSSIONS
ON
THE PROJECT FOR PROVIDING THE EQUIPMENT
FOR
THE HIGHER EDUCATION DEVELOPMENT SUPPORT
IN THE REPUBLIC OF INDONESIA

In response to the request of the Government of Indonesia for providing the equipment for the Higher Education Development Support Project, the Government of Japan decided to conduct a basic design study and entrusted the study to the Japan International Cooperation Agency. Japan International Cooperation Agency sent to the Republic of Indonesia the basic design study team headed by Prof. Dr. Fumio Nishino of the University of Tokyo from 14th August to 6th September, 1990.

As a result of the study, Japan International Cooperation Agency prepared a Draft Final Report and dispatched a team to explain and discuss the Report from 21st to 30th November, 1990.

The team and the Indonesian authorities concerned had a series of discussions on the Report and both parties have agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

28th November 1990

Prof. Dr. Fumio Nishino
Leader,
Basic Design Study Team,
Japan International
Cooperation Agency

Prof. Dr. Sukadji Ranuwihardjo
Director-General for Higher
Education,
Ministry of Education and Culture,
Republic of Indonesia

1. The Indonesian side principally agreed to the basic design proposed in the Draft Final Report.

2. The Indonesian side understood the Japanese Grant Aid System and confirmed that the necessary arrangement would be taken by the Indonesian side which was manifested in the minutes of discussions on the Project for Providing the Equipment for the Higher Education Development Support (hereinafter refereed to as the Project) signed on 24th August, on condition that the grant aid by the Government of Japan would be extended to the Higher Education Development Support Project.

3. It has been agreed that, in case that the total budget is not enough to provide each target university with equipment which satisfies the minimum requirements for S1 degree education, it is necessary to select priority target departments to be strengthened among the 11 target universities.

4. In each public university, one or two departments are to be selected as model departments which are expected to become relatively complete with equipment for S1 degree education upon receiving the equipment under the Project. Similarly, one department, the discipline of which differs from each other, is to be selected at each of the four private target universities, all of which are located in the Medan area.

5. The criteria agreed upon by both parties for the selection of departments at the public universities are :
a) departments that are the sole department among the target universities, and
b) departments which need less equipment to make the department relatively complete for S1 degree education.

Selection of a department at each of the four private universities, to which the equipment granted to Directorate General for Higher Education (hereinafter referred as DGHE) would be leased, is based on the recommendation of DGHE and agreed by the team.

The departments selected by the above criteria are as follows:

Civil Engineering Department of UNSYIAH
Electrical Engineering Department of USU
Industrial Engineering Department of USU
Chemical Engineering Department of UNSRI
Mining Engineering Department of UNSRI
Mechanical Engineering Department of UNAND
Civil Engineering Department of UNAND
Civil Engineering Department of UNILA
Electrical Engineering Department of UNTAN
Civil Engineering Department of UNLAM
Electrical Engineering Department of UNOM
Mechanical Engineering Department of UMA
Industrial Engineering Department of UDA
Civil Engineering Department of UISU

6. It has been agreed that equipment list proposed in the Draft Final Report shall be modified in consideration of priority as shown in the above items 4 and 5, and the degree of sophistication.

7. This priority for providing equipment to the departments of the above item 5 does not mean the amount of the budget, but aims to attain the relative completeness in the availability of equipment used for S1 degree education of each department.

8. It has been agreed that a procurement of the Project shall be divided into two phases depending on the construction schedules of buildings and facilities of the three target universities as specified in the Draft Final Report.

9. DGHE has agreed that the execution body of the Project is DGHE and an implementation body in the DGHE including a local implementation organization in each target university is established before the two Governments sign Exchange of Notes.

10. DGHE has agreed to provide goods and services necessary for the Project including the supply of utilities, preparation of foundation for installing equipment, installation of furniture and appliance etc. and other procedural works as specified in the Draft Final Report.

11. Both parties have agreed that efficient management of university administration helps to increase efficiency of education including that of the faculty of engineering and that it is essential in Indonesia to create models of office automation by systems which are cheaper to maintain and easier to develop programs and operate. For this purpose, personal computer systems are provided as a part of this grant aid in addition to the provision of personal computers for engineering education to each department. Another purpose of this provision is program development and dissemination of the developed programs to other appropriate universities in Indonesia. Program development is better to be made independently at more than one university to meet the general need of complex operations of various universities. Because of the limited resources, it has been agreed to provide the systems to two universities. It has been further agreed to provide one system each to UNILA and UNSYIAH. Each system consists of a number of personal computers with sufficiently large memories and storage. The selection of the above two universities are based on their past experience in computer oriented management, availability of personnel for program development, eagerness for office automation and most importantly the insufficient capability of the present expensive systems.

APPENDIX 4. LIST OF PERSONS INTERVIEWED

APPENDIX-4 List of Persons Interviewed

1. UNSYIAH

- Vice Dean	Thanthawi Jauhari
- Chief of Accounting Div.	Mohd. Jacob Yusuf
- Chief of Mechanical Engg. Dept.	Bustam Husin
- Chief of Chemical Engg. Dept. and Chief of Soil Mechanics Lab.	Ali Ismail
- Secretary of Civil Engg.	Said Myrdin
- Teaching Staff of Mechanical Engg.	Iksan Santoso. A
- Teaching Staff of Mechanical Engg.	Husaini
- Dean of Engg. Faculty	Ir. Bukhari
- Staff of Mechanical Engg.	Vature Hussini

2. USU

- Deputy Rector, in charge of Academy	Prof. Bachtiar Agus Salim
- Deputy of Engg. Faculty	Ur. Syarif Uddin Harahap
- L.P.I.U.	Dr. Chailullah Rangkuti
- Lecturer	E.B. Sianturi
- Secretary	Hakim Bangun
- Head of Electrical Machine Lab.	Sumantri Z
- Head of Testing Lab.	Bonggas Tobing
- Secretary of Industrial Management	A. Rahim Matondang
- Staff of Soil Mechanics Lab.	Selesai Perangin-angin
- Secretary of Mechanical Engg.	Mulfi Harwi
- Head of Basic Electrical Engg.	Mustafrin LBS
- Head of Civil Engg. Dept.	Azhar Lubis
- Head of Chemical Engg. Dept.	Merele Sembiring
- Head of Highway Lab.	Walden H.S. Napitu
- Head of Soil Mechanics Lab.	E.B. Sianturi
- Head of Geology Lab.	Selesai Perangin-angin
- Head of Highway Lab.	Walden H.H. Napitu
- Head of Hydraulics Lab.	Azhar Lubis
- Head of Electrical Engg. Dept.	Ir. Sugin Sarto Yusuf
- Chief of Electrical Machinery Lab.	Ir. Sumantri Zulkarnain
- Chief of High Voltage Lab.	Ir. Bonggas Tobing

- Chief of Electronics Lab.	Ir. T. Barnauli
- Secretary of Electrical Engg. Dept.	Dahlan Shinombing
- Dean of Industrial Management Engg. Dept.	Dahlan Shinombing
- Lecturer of Industrial Management Engg. Dept.	Suhaimi Simatupang
- Lecturer of Chemical Engg. Dept.	Rukihati
- Lecturer of Chemical Engg. Dept.	Merek Sembiring
- Lecturer of Mechanical Engg. Dept.	Mufti Harwi
- Head of Mechanical Engg. Dept.	Dr. Fauzi Alhar
- Dean of Mechanical Engg. Dept.	Dr. Syarifuddin Harahap
- Head of Electrical Engg. Dept.	Dr. Usman Baafi

3. NOMMENSEN

- Owner of the University	Dr. F.H. Siaofar
- Teacher of Engg. Faculty	Ir. F. Siahaan Mip.
- Secretrary under Dean of Engg. Faculty	M.A. Simanjuntak MTH. Ma.

4. UMA

- Vice Rector	Syahnem Razali
- Vice Dean II	Ir. Maryam Amim
- Head of Electrical Engg. Dept.	Dr. Usman Baafi
- Lecturer of Engg. Faculty	Ir. Hari Y
- Lecturer of Engg. Faculty	Ir. Evawani
- Secretary of Industrial Dept	Ir. Kamil Mustafa
- Lecturer of Engg. Faculty	Alex Totani
- Lecturer of Engg. Faculty	Akbar Siregar
- Lecturer of Engg. Faculty	Rudi Tarigan
- Head of Industrial Management Dept.	Ir. Usman Harahap
- Head of Energy Conversion Lab.	Ir. Aria Suprapto
- Head of Basic Electronics Lab.	Ir. Yance Syarif
- Head of Electrical Dept.	W. Syarifudin Srg
- Head of Architecture Dept.	Ir. Amir Hutagaol
- Head of Chemical Engg. Dept.	Dra. Trina Siregar
- Head of Industrial Management Dept.	Dra. Yustinon
- Head of Hydraulic Power Lab.	Ir. Surya Keliat
- Head of Elctrical Engg. Dept.	Ir. M. Akhir
- Head of Elctrical Engg. Dept.	Ir. Jairi Tavip
- Lecturer of Electrical Engg. Dept.	Ir. Iwan
- Lecturer of Mechanical Engg. Dept.	Tugiman K

- Head of Mechanical Engg. Dept.	Edy. H
- Lecturer of Civil Engg. Dept.	Husin U. Siregar
- Lecturer of Engg. Faculty	Nurhayati Siregar

5. UDA

- Dean of Engg. Faculty-I	Ir. A. Hutabarat
- Dean of Engg. Faculty-II	Ir. Ch. R. Sinaga
- Vice Dean of Engg. Faculty	Prof. Dr. Ir. J.A. Napitupulu Msc
- Member of General Administration	Ir. N.S. Meliala
- Staff of ISTP	Prof. A.T. Barus Msc
- Staff of Civil Engg. Dept.	Ir. Richard Napitupulu
- Staff of Electrical Engg. Dept.	Ir. Berlin Saragih
- Staff of Mechanical Engg. Dept.	Ir. T. Hasballah
- Staff of Civil Engg. Dept.	Ir. B. Sinaga
- Staff of Civil Engg. Dept.	Ir.A. Hutabarat
- Staff of Mechanical Engg. Dept.	T. Hasballah
- Staff of Mechanical Engg. Dept.	Ir. Japoirman
- Staff of Mechanical Engg. Dept.	Ir. N.S. Meliala
- Staff of Electrical Engg. Dept.	Bangun Mulia
- Staff of Electrical Engg. Dept.-	S. Ginting
- Staff of Electrical Engg. Dept.	L.P. Siahaan
- Staff of Civil Engg. Dept.	B. Saragih
- Staff of Civil Engg. Dept.	Ch. R. Sinaga
- Staff of Electrical Engg. Dept.	B. Bangun mulia
- Staff of Mechanical Engg. Dept.	N.S. Meliala
- Staff of Mechanical Engg. Dept.	Ir. J. Uunthe
- Staff of Civil Engg. Dept.	Ir. A. Hutabaratq
- Staff of Mining Engg. Dept.	M. Syhdar D.H.

6. UISU

- Rector	Dr. H. Mustafa Majnu, Msc
- Vice Rector	H. Sanwani Nasvltion SH
- Dean of Engg. Faculty	Ir. Syofyan A. Siregan
- Vice Dean of Engg. Faculty	Ir. Hasan Basri Siregan

7. UNAND

- Rector	Prof. Dr. h. Jurnalis Kamli
- Dean of Engg. Dept.	Fachri Ahmad
- Staff of Civil Engg. Dept.	Ahmad Mahyaddin
- Staff of Mechanical Engg. Dept.	Zaidir
- Staff of Mechanical Engg. Dept.	Adjar Pratoto

8. UNSRI

- Rector	Amran Halim
- Vice Rector-I	Machmud Hasjim
- Vice Rector-II	Ali Fasya Ismail
- Vice Rector-III	A.F. Ramdja
- Dean of Engg. Faculty	Dr. M. Nawawi Machmud
- Director of Computer Center	Dr. Muchjin Akip
- Lecturer of Mechanical Engg. Dept.	Valentino CH
- Lecturer of Mechanical Engg. Dept.	Zainal Abidin
- Head of Mechanical Engg. Dept.	A.R. Fachry
- Head of Electrical Engg. Dept.	A.S. Siregar
- Head of Mining Engg. Dept.	Syaiful Anwar
- Lecturer of Mining Engg. Dept.	W. Akib
- Lecturer of Mining Engg. Dept.	M. Nawawi Machmud
- Head of Chemical Engg. Dept.	Djamilus Zainuddin
- Head of Civil Engg. Dept.	M. Nizom A.
- Staff of Engg. Faculty	Dr. Abuamat Hak
- Lecturer of Electrical Engg. Dept.	Ir. Zaimuddin N.
- Lecturer of Electrical Engg. Dept.	Ir. Pono Budi
- Lecturer of Electrical Engg. Dept.	Ir. Ansyori
- Lecturer of Electrical Engg. Dept.	Ir. Alimin Nurdin
- Lecturer of Electrical Engg. Dept.	Ir. Bambang Tutuko
- Lecturer of Mechanical Engg. Dept.	Dr. Hasan Basri
- Lecturer of Mechanical Engg. Dept.	Ir. Zainal Abidin
- Lecturer of Mechanical Engg. Dept.	Ir. Valentino CH.
- Lecturer of Mechanical Engg. Dept.	Ir. Darmawi Bayin
- Lecturer of Mechanical Engg. Dept.	M. Zahri Kadir

9. UNILA

- Vice Rector	Dr. Bambang Sumitro
- Dean of Chemical Engg. Dept.	Ir. Siti Sujalmi, MS
- Vice Dean I/Civil Engg.	Ir. C. Niken
- Vice Dean II/Civil Engg.	Ir.Kartini Susilowati
- Vice Dean III/Civil Engg.	Ir. Susetyo Hartanto
- Head of Civil Engg. Dept.	Drs. Wayan Diana
- Secretary of Civil Engg. Dept.	Ir. Geleng Perangin-asngin
- Head of Surveying and Mapping Lab.	Drs. Entoh Suhana
- Head of Soil Mechanics Lab.	Ir. Idharmahadi
- Head of Hydraulic Lab.	Ir. Surya Sebayang
- Head of Construction and Material Lab.	Ir. Drs. Sumicharni

10. UNTAN

- Vice Dean I of Electrical Engg. Dept.	Poni Sedianingsih
- Lecturer of Electrical Engg. Dept.	Eddy Suryanto
- Head of Electrical Engg. Dept.	Abang Razikun
- Lecturer of Geodetic Engg.	Sutarto U.M
- Lecturer of Engg. Faculty	Fachruddin Lubis
- Lecturer of Engg. Faculty	Dsril
- Lecturer of Tranportation and Port Engg.	Wahyu Sudrajat
- Administrator	Maris Sinambela
- Vice Dean III	Bambang Suwarto
- Lecturer of Hydraulic and Water Resources Engg.	G. Zulkifli Mulki
- Head of Civil Engg. Dept.	Syahruddin
- Dean of Civil Engg. Dept.	Rijanto
- Secretary of Electrical Engg. Dept.	Jumaidi
- Vice Dean III of Civil Engg. Dept.	Kartini

11. UNLAM

- Dean of Engg. Dept.	Ir. Mahyar Diana
- Vice Dean of Engg. Dept.	Ir. H. Fathurrazie Shadig
- Vice Dean of Engg. Dept.	Ir. Rusdi H.A.
- Vice Dean of Engg. Dept.	Ir. M. Noor Azidin
- Director of Administrative, in charge of Project Management	Drs. H. Mirhanuddin

12. Directorate General of Higher Education, Ministry of Education and Culture

- Director of Private University	Prof. Dr. Yuhara Sukra
- Executive Director of HEDS Project	Dr. Margono Slamet
- Program Coordinator of HEDS Project	Dr. Ir. Jajat Jachija
- Chief Advisor of HEDS Project	Yaoi Hidetoshi
- Coordinator I of HEDS Project	Miyake Seifu
- Coordinator II of HEDS Project	Osugi Chieko
- Expert for Educational Administration	Koga Masato

13. Embassy of Japan

- First Secretary	Ohta Shin'ichi

14. JICA Jakarta Office

- President of JICA Indonesia Office	Kitano Yasuo
- Staff of JICA	Yoneda Kazuhiro