REPORT ON BASIC DESIGN
of
THE CENTER FOR REFORESTATION STUDIES IN THE TROPICAL RAIN FOREST MULAWARMAN UNIVERSITY
in
THE REPUBLIC OF INDONESIA

March,1979

JAPAN INTERNATIONAL COOPERATION AGENCY

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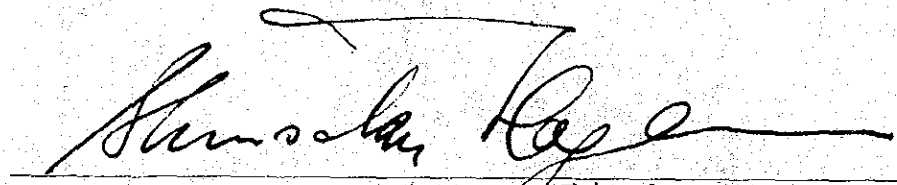
Preface

The present report is based on the result of the Basic Design Survey conducted by the Japan International Cooperation Agency in November 1978 following the request of the Government of the Republic of Indonesia to the Government of Japan for the establishment of a Center for Reforestation Studies in the Tropical Rain Forest of Mulawarman University.

The Center is designed to conduct reseach in the sustained yield of the forest resources in Kalimantan,which is rich in tropical rain forests. The Center is expected to make a great contribution to the solution of the reproduction problem of forest resources not only in Indonesia but also in other parts of Southeast Asia, Latin America and Africa.

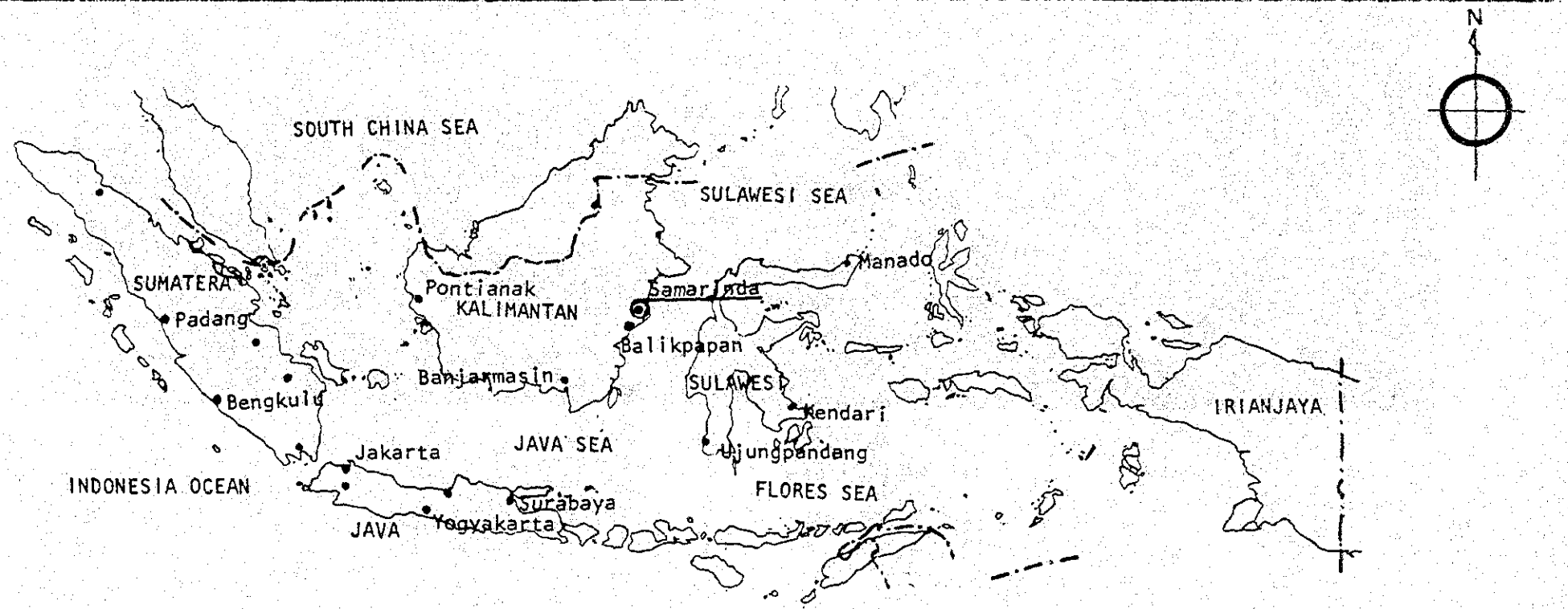
Samarinda City in East Kalimantan, where this center will be established, is one of the biggest tropical timber supply bases and many Japanese timber-related enterprises are operating there.This cooperation project,when realized, is expected to contribute greatly to the expansion of the relationship between Japan and this area in the field of forestry. I hope that this report will, serve as a guide for the realization of the plan.

I wish to express my sincere appreciation to officials concerned of the authorities in Indonesia for their close cooperation extended to our survey team.



Shinsaku Hogen
President
Japan International
Cooperation Agency

INDONESIA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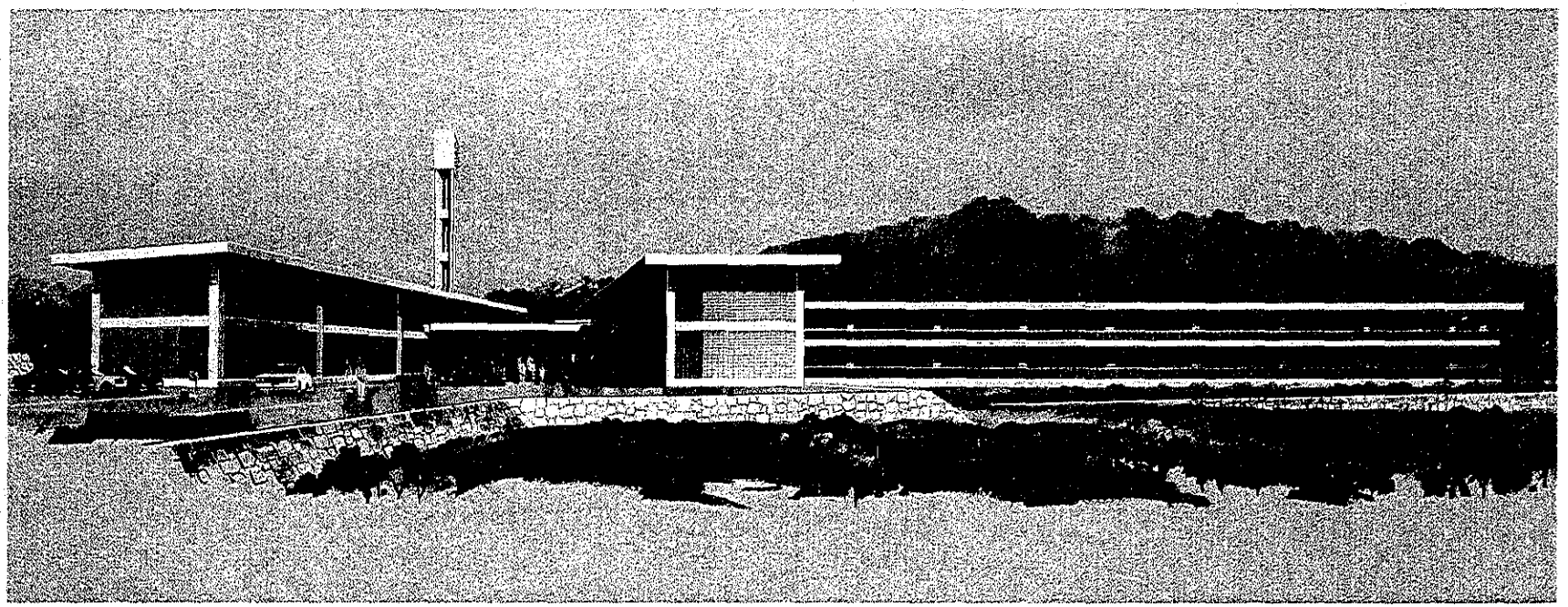
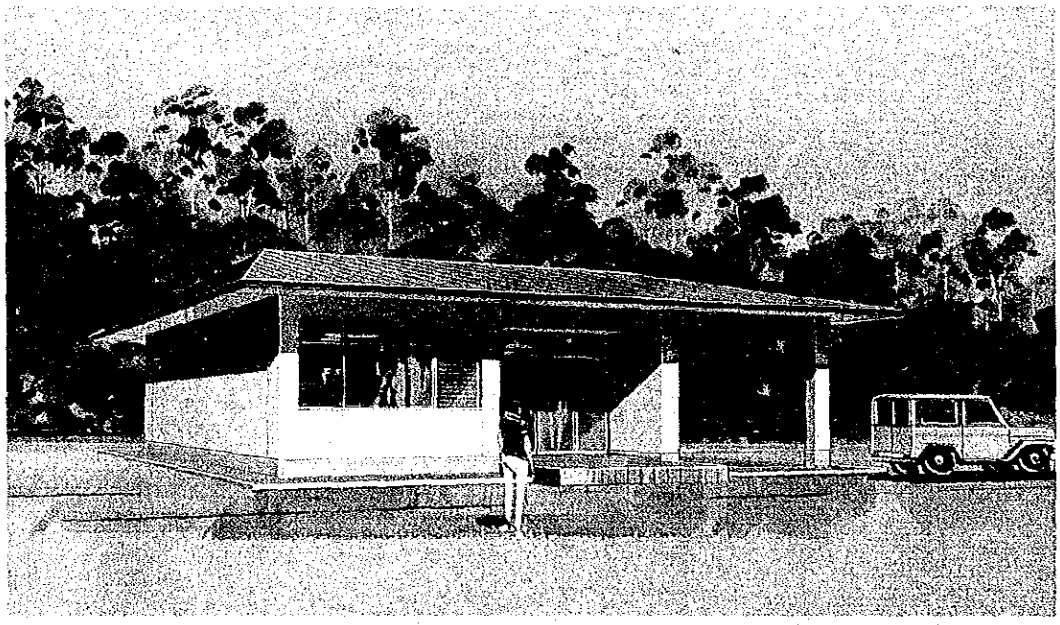
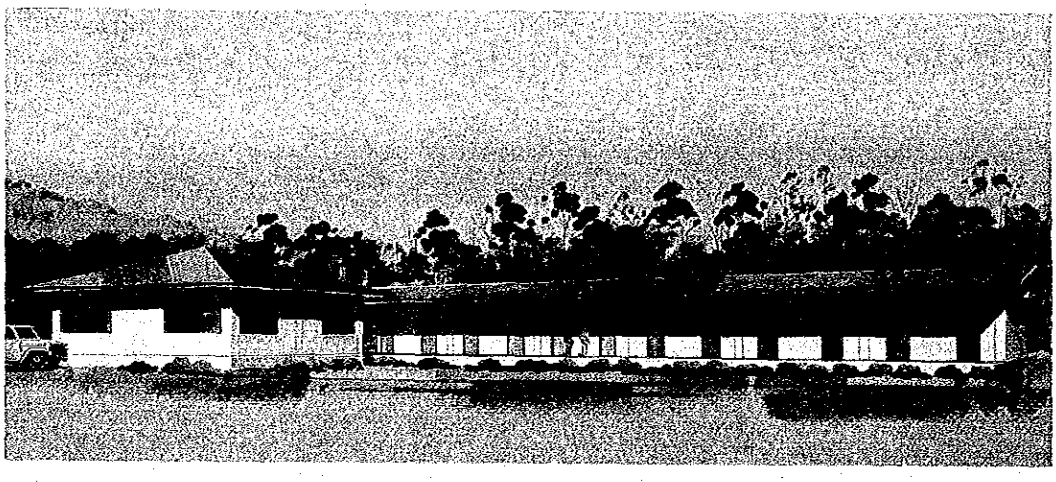


SOUTH VIEW OF THE STUDY CENTER BUILDING



WEST VIEW OF THE OPERATION OFFICE
FOR UNIVERSITY FOREST (LEMPAKE)



SOUTH VIEW OF THE UNIVERSITY
FOREST BUILDING (SAMBODJA)

CONTENTS

Chapter 1 PURPOSE AND OUTLINE OF SURVEY

1.1. Purpose of survey

The Government of the Republic of Indonesia has requested assistance of the Government of Japan in establishing the Center for Reforestation Studies in the Tropical Rain Forest, Mulawarman University, and the Government of Japan has made Japan International Cooperation Agency conduct a basic design survey in order to facilitate the Government of Japan in reviewing this project as a subject of its Grant Aid.

1.2. Organizations of survey team and itineraries

1.2.1. Preliminary survey team

Leader, general :	Akira Kawana Professor, Faculity of Agriculture Tokyo University of Agriculture and Technology
Member, cooperative planning :	Tomoo Aoyagi Second Economic Cooperation Division Ministry of Foreign Affairs

Member, laboratory facilities planning :	Minoru Ueda Chief, Machinery Section Forestry and Forest Products Research Institute Ministry of Agriculture, Forestry and Fisheries
Member, experimental plantation planning :	Kikuo Haibara Assistant, Faculty of Agriculture Tokyo University of Agriculture and Forestry
Member, general affairs :	Takashi Fujiwara Forestry Development Division JICA

1.2.2. Basic survey team

Leader, general :	Akira Kawana Professor, Faculty of Agriculture Tokyo University of Agriculture and Technology
Member, deputy general :	Masaru Hayashi Chief, Planning Division Tokyo District Forestry Office Ministry of Agriculture Forestry and Fisheries

Member, general affairs :	Yuji Kashiwara Grant Aid Division JICA
Member, building designing :	Chuichi Yamakawa Deputy General Manager Azusa Sekkei Inc.
Member, building designing :	Keiji Shimura Superintendent Azusa Sekkei Inc.
Member, materials & equipment planning :	Tadao Kawamoto Mechanical Engineer Azusa Sekkei Inc.
Member, university forest planning :	Yooichi Minagawa Forestry Civil Engineering Consultants
Member, forest road planning :	Kozo Ohira Forestry Civil Engineering Consultants

1.2.3. Itineraries of servey team

1. Itinerary of preliminary survey team

The Survey was conducted during the period of 20 days from Aug. 8, 1978 to Aug. 26, 1978.
The main activities of the survey team were as follows:

Date	Activities
Aug. 8th Tue	Leave Tokyo 10:55 (JL 711) and arrive in Jakarta via Singapore (Messrs. Kawana, Aoyagi, Ueda, Haibara, Fujiwara).
9th Wed	Complimentary visit to Japanese Embassy and BAPPENAS.
10th Thu	Complimentary visit to Director General of Higher Education, Ministry of Education and Culture. Meeting to establish work schedules and basic policies.
11th Fri	Complimentary visit to Director General of Forestry.
12th Sat	Complimentary visit to Forestry Department of Bogor Institute of Agriculture.
13th Sun	Leave Jakarta 11:15 (GA 548) and arrive in Samarinda. Member for cooperative planning leaves on return trip.

Aug.	14th Mon	Conference with Mulawarman University Personnel
	15th Tue	Visit and inspect Lempake University Forest site.
	16th Wed	Visit and inspect Faculty of Forestry, Mulawarman University.
	17th Thu	Conference with University Personnel. Leave Samarinda 14:00 and arrive in Balikpapan.
	18th Fri	Visit and inspect experimental forest of B.F.I. (Balikpapan Forest Industry)
	19th Sat	Leave Balikpapan 10:15 and arrive in Jakarta.
	20th Sun	Conference by members of the survey team.
	21th Mon 22th Tue 23th Wed	Conference with officials of Director General of Higher Education
	24th Thu	Report to Japanese Embassy.
	25th Fri	Report to Jakarta Office of JICA. Leave Jakarta 18:50 (JL 712) and arrive in Tokyo.

2. Itinerary of basic design survey team

The basic design survey was conducted during the four weeks from Oct., 29 1978 to Nov., 25 1978.

Date	Activities
Oct. 29th Sun	Leave Narita 10:55 (JL 711) and via Singapore arrive in Jakarta (Messrs. Kawana, Hayashi, Kashiwara, Yamakawa, Shimura, Kawamoto, Ohira, Minagawa).
30th Mon	Complimentary visit to Japanese Embassy and JICA with brief explanation of the survey. Meeting to work out survey schedules.
31th Tue	°Inspect Bogor Botanical Garden. °Inspect facilities of Bogor Institute of Agriculture °Briefly explain outline of the survey to Director General of Higher Education and BAPPENAS. °Conference on schedules and drafts of minutes. °Explain the mechanism of Japanese Grant Aid.

Nov.	1st Wed	Leave Jakarta 11:15 (GA 548) and arrive in Samarinda (Messrs. Kawana, Hayashi, Kashiwara, Yamakawa, Shimura, Kawamoto, Ohira, Minagawa).
	2nd Thu	°Conference with rector and staff of Mulawarman University °Inspect the Gunung Kelua site for Study Center Building. °Investigate construction unit prices. °Explain the mechanism of Japanese Grant Aid to the University personnel.
	3rd Fri	°Inspect the Sambodja site for University Forest °Commence topographic survey of the Lempake site for University Forest.
	4th Sat	°Inspect the Lempake site for University Forest, and confer on location of Operation Office for University Forest. °Confer on Gunung Kelua soil test, boring positions and site preparation work plan.
	5th Sun	°Inspect the Sambodja University Forest site °Inspect facilities of Mulawarman University, Faculty of Forestry.

Nov.	6th Mon	Leave Samarinda 06:00. Leave Balikpapan 09:40 (GA 547). Arrive in Jakarta (Messrs. Kawana, Hayashi, Kashiwara, Yamakawa, Shimura, Kawamoto). Study the contents of the Minutes.
	7th Tue	Confer on the Minutes at Director General of Higher Education
	8th Wed	°Leave Jakarta 08:30 (GA 460) °Arrive in Bandung City (Messrs. Yamakawa, Shimura, Kawamoto) °Confer on the new campus at Bandung Institute of Technology and inspect their facilities.
	9th Thu	Investigate laboratory equipment agents in Jakarta.
	10th Fri	°Exchange and sign minutes of meeting with Director General of Higher Education °Report to Japanese Embassy and JICA. °Inspect Bogor Forestry Laboratory °Leave Jakarta 19:50 (JL 712) and arrive in Tokyo (Mr. Kawamoto).
	11th Sat	°Inspect construction sites in Jakarta.

Nov.	12th Sun	°Leave Jakarta 13:45 (SQ 203) and arrive in Singapore (Messrs. Kawana, Hayashi, Kashiwara). °Leave Jakarta 07:00 (GA 560) and arrive in Samarinda (Messrs. Yamakawa, Shimura).
	13th Mon	°Confer on site inspection itinerary with Mulawarman University personnel. °Inspect Samarinda Port. °Investigate construction unit prices in Samarinda.
	14th Tue	°Topographic survey and trial excavation at the site in Gunung Kelua.
	15th Wed	°Conference at Public Works Department °Meeting on local construction material costs at Building Information Center. °Conference at Water Supply Corp. °Conference at Electric Power Corp.
	16th Thu	°Conference at Telephone Corp. °Investigation at Meteorological Observatory. °Investigate construction mateirals in Samarinda.

Nov.	17th Fri	°Topographic survey of the Lempake site for Operation Office Building for University Forest. °Investigate local construction materials costs at construction sites in Samarinda.
	18th Sat	°Leave Samarinda 09:45 (GA 547) °Arrive in Jakarta (Messrs. Yamakawa, Shimura)
	19th Sun	°Inspect existing buildings in Jakarta.
	20th Mon	Investigate laboratory equipment agents in Jakarta
	21th Tue	Report to JICA
	22th Wed	°Report to Director General of Higher Education °Report to Japanese Embassy
	23th Thu	Check and arrange data and information
	24th Fri	°Investigate laboratory equipment and building materials in Jakarta. °Leave Jakarta 18:50 (JL 721)
	25th Sat	°Arrive in Narita 07:30

1.3 Outline of survey

This report describe the accomplishments of the two(2) basic design survey teams dispatched as aforementioned. Analytical and master planning was done from the technical view point of forestry study and higher education in forestry mainly by the members of the preliminary design survey team headed by Prof.Kawana.
The basic building design and the laboratory equipment designing were prepared by Azusa Sekkei Inc. on the basis of the preliminary survey.

Items of survey:

1. Site location
    1. Position of this Project in Samarinda Urban Planning.
    2. Connection of this Project with Mulawarman University New Campus Planning.
    3. Access from main roadways.
2. Site condition
    1. Areas and configurations of construction sites.
    2. Views, sunshine, winds and environments.
3. Soil condition

4. Urban utilities

    1. Water supply
    2. Sewer system
    3. Rainwater drainage
    4. Electric power supply
    5. Telephone connections
    6. Gas supply

5. Traffic and transportation

    1. Port facilities
    2. Means of transportation
    3. Traffic volumes
    4. Urban planning road and street networks

6. Estimation of necessary amounts of basic infrastructure improvement.

    1. Site clearing and levelling
    2. Drainage systems within the site
    3. Utilities and sewage treatment (electricity supply, water supply, sewer and telephones)
    4. Construction of access roads.

7. Laboratory equipment

    1. Capability for repairs and parts supply
    2. Custom clearance and procedures.
    3. Installations and management of other research institutions.

4. Availability of special gases for chemical experiments.

8. Construction costs

1. Building unit costs
2. Construction materials
3. Labor wages
4. Taxes

1.4. Exchange of Minutes

Upon completion of the first site investigations of the basic design survey team has summarized the report of investigations after discussions with the Indonesian members.

The Minutes of the meeting have been exchanged between Prof. Kawana, leader of Japanese survey team and Director General of Higher Education and Rector of Mulawarman University.

The full contents of the Minutes are shown on the following pages.

MINUTES OF THE CONSTRUCTION PROGRAM OF THE CENTER FOR REFORESTATION STUDIES IN THE TROPICAL RAIN FOREST, MULAWARMAN UNIVERSITY EAST KALIMANTAN THE REPUBLIC OF INDONESIA

At the request of the Government of the Republic of Indonesia for assistance in establishing the Center for Reforestation Studies in the Tropical Rain Forest, Mulawarman University, (hereinafter referred to as "THE CENTER"), the Government of Japan through Japan International Cooperation Agency (hereinafter referred to as "JICA") has sent a survey team headed by Dr. Akira KAWANA, Professor of Tokyo University of Agriculture and technology to conduct a basic design survey on the program for fifteen days from October 29, 1978.

The team held a series of discussions and exchanged views with the Indonesian Authorities concerned on the construction and establishment of THE CENTER.

Final Draft Report will be expected to be submitted to the Indonesian Authorities in February, 1979.

As a result of the survey and discussions both parties have agreed to recommend to their respective Governments to take the necessary measures toward establishing THE CENTER, according to Minutes of the Discussions are attached herewith.

10 November 1978
Jakarta, Indonesia

Dr. Akira KAWANA
Team Leader
The Japanese Survey Team

R. Sambas WIRAKUSUMAH
Rector
Mulawarman University

Prof. Ir. Sidharta PRAMOETADI
for
Director General of Higher Education

MINUTES

1. The proposed sites for the Center are in Samarinda and Kutai, East Kalimantan.

2. The objectives of the Center are to develop researches in reforestation of the tropical rain forest so as to contribute to sustaining of wood resources and maintenance of environment in East Kalimantan which is one of the most important regions of the tropical rain forest in the world.

3. The Center will consist of a main building, annex buildings, and a dormitory aiming at researches of five fields (Abiotic, Silviculture, Protection, Machinery and Social) by twenty staff members and thirty technicians.

4. The Government of Japan is likely to take necessary measures to provide such buildings and facilities of the Center as listed in Annex I.

5. The Government of the Republic of Indonesia will taken necessary measures as follows:

   (a) To provide data and information necessary for the construction, including topographic survey, soil boring test and other geological survey reports.

   (b) To secure necessary lands for the construction.

   (c) To clear and level the site before the start of the construction.

   (d) To construct access road to the site before the start of the construction.

   (e) To provide other items listed in Annex II.

ANNEX I.

1. Main Building
   - A. Administration office
   - B. Rooms for staff
   - C. Extension room
   - D. Library
   - E. Meeting rooms
   - F. Laboratories
   - G. Drawing room

2. Annex Building
   - A. Energy Center
   - B. Green house
   - C. University Forest building
   - D. Operation office for university Forest

3. Dormitory

ANNEX II.

Items whose cost should be borne by the Republic of Indonesia.

Infra-structures

a. Power supply
b. Water supply
c. Drainage and sewage
d. Landscaping
e. Preparation of University Forest (including forest roads therein)
f. Gateway, fence work, exterior lighting and pavements
g. Furniture, rugs and drapes

Chapter 2 BACKGROUND , SIGNIFICANCE AND MASTER PLANNING OF THE PROJECT

2.1. Significance of Tropical Rain Forest Reforestation Study

The natural tropical rain forests in West Africa, in the Amazonian Basin of South America and on the islands of Southeast Asia have been very important lumber supply sources of the World together with the coniferous forests. As the result of the fast global exploitation of lumber in the recent years, Kalimantan, Indonesia, besides the Amazonian Basin, is now a very precious remaining storage of tropical rain forest resources of the World. In this area, however, development activities are progressing steadily, and Samarinda, where this Project is being planned, is one of the base stations of such development activities. In the meantime, the experiences in the early exploited areas such as West Africa tell us that in the present tropical rain forest reforestation technology there are some areas that have not yet been explored completely and this could be a serious hindrance to the continuous development of forestry in the future. If, under these circumstances, a Reforestation Study Center is established in Mulawarman University to perform comprehensive research in tropical rain forest reforestation technology, it will not only mean much to the future lumber production and exportation of Indonesia

that occupy a large part of the country's economy but also contribute to the solution of the contemporary problems concerning the reproduction of the World's tropic rain forest resources.

2.2. Position of this project in reinforcement of Higher Education of Indonesia

In the meantime, the Government of Indonesia, according to its master plan for reinforcement of higher education on islands other than Jawa Island, it is scheduled to strengthen and establish in various provinces colleges and universities which are characteristic of such provincial localities.

The improvement of the Faculity of Fishery of Hasanuddin University, Ujung Pandang, Sulawesi and the reinforcement of the Faculty of Forestry of Mulawarman University, Samarinda are some such examples. The conceptions of the center for reforestation studies in the tropic rain forest are in line with this policy of the Indonesian Government and this center will play the main role in the improvement and promotion of the higher education facilities in East Kalimantan.

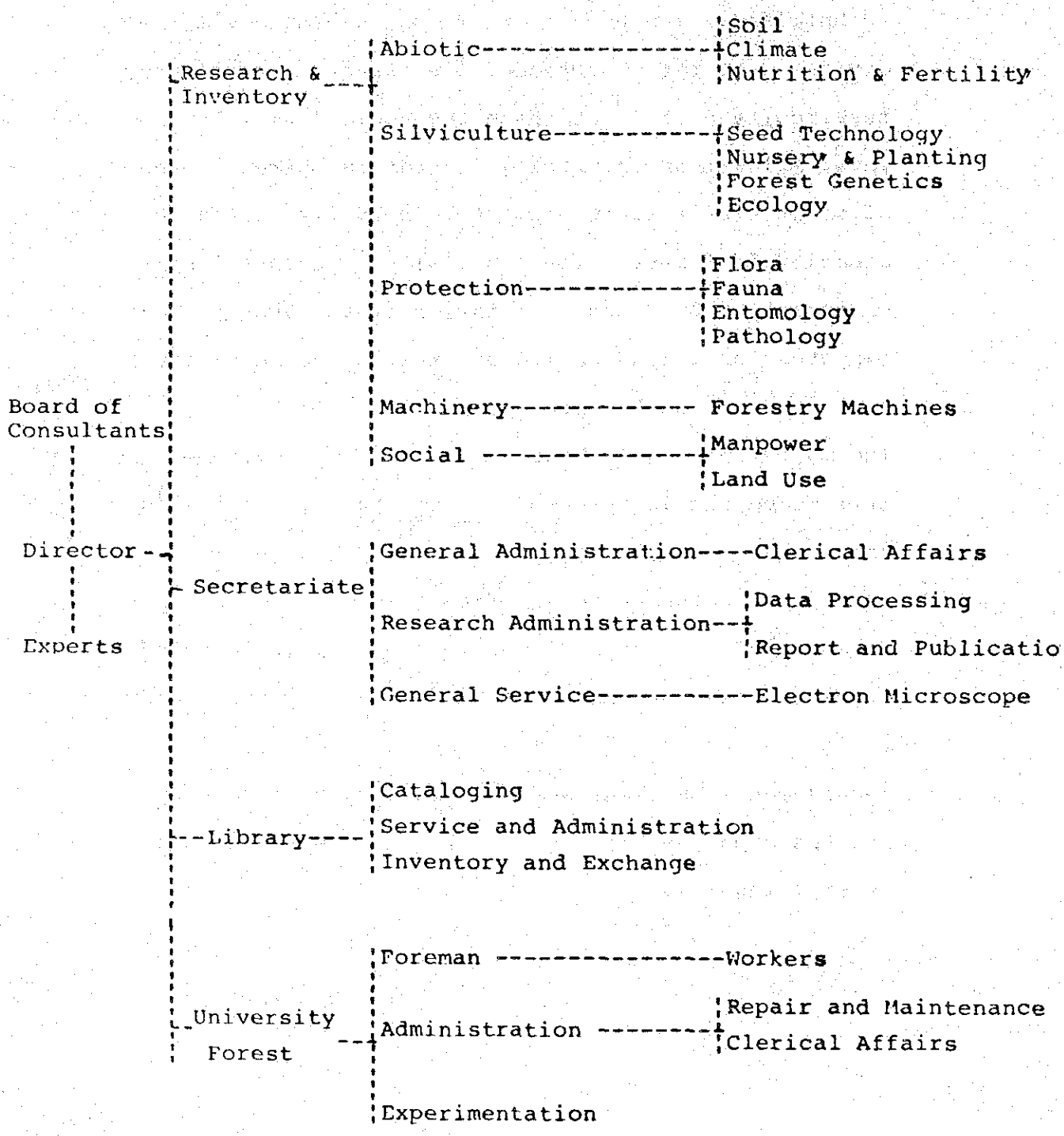
2.3. Master plan of the Center for Reforestation Studies in the Tropical Rain Forest.

According to the plan proposed from the Indonesian side, the Center for Reforestation Studies in the Tropical Rain Forest will have Research, General Affairs, Library and University Forest Divisions under the control of the director. The term of the office of the director, who will be elected from the Faculty of Forestry, is four years. The heads of the Research and General Affairs Divisions will be additional posts held by professors of Faculty of Forestry, and the head of the Library Division and the University Forest Division will be full-time posts. The Research Division will be divided into five sections, i.e., biological research, afforestation research, protection research, machinery research and social science research. The positions of chief of each section will be held for a period of two years by the staff of Faculty of Forestry. Full time technicians will be assigned to each section, and will be in charge of maintenance, control and operation of machinery and equipment. The General Affairs Division will be divided into three sections, i.e., general affairs, research control and services. The positions of chiefs of the first two sections will be held for two years by the Faculty of Forestry, and four full-time technicians will be in charge of operation of these sections.

The Library Division is operated by three full-time technicians. The University Forest Division will be divided into three sections, i.e. labor, control and research, and at least three technicians will be appointed. Thus, Mulawarman University intends to operating the afforestation research institute by fully utilizing the capacity of forest science division. Because dispatch of experts from Japan in rotation of one year periods is expected for a long period of time, it is necessary for Japan to meet such expectations.

The master plan will bear fruit if proper equipment is introduced and is operated satisfactorily. The plan of the research institute was prepared on the basis of the request from the university and accommodation on the Japanese side through discussions on realistic scientific problems based on the basic philosophy regarding afforestation in the tropics. The plan outlines the minimum requirements, and was agreed upon by the university and the Japanese side as the plan that satisfies the general conditions.

2.4. ORGANIZATION CHART OF REFORESTATION STUDY CENTER



Chapter 3 BASIC DESIGN OF BUILDING

3.1 Design principles

This basic design is prepared on the basis of the results of the preliminary survey of August 1978 and the results of the basic design survey conducted in November 1978 for " The Establishment of the Center for Reforestation Studies in the Tropical Rain Forest of Mulawarman University in the Republic of Indonesia ".

This basic design has been worked out with due consideration to those items of work which should be provided by the Government of Indonesia and by the grant aid by the Government of Japan.

The construction costs and the construction schedule were evaluated based on the results of the survey of local construction material costs, labor wages, local contractors, terms and cost elements of material transportation and local building code and regulations.

The construction costs were calculated based on the rate of material and labour costs before November 15th. 1978.

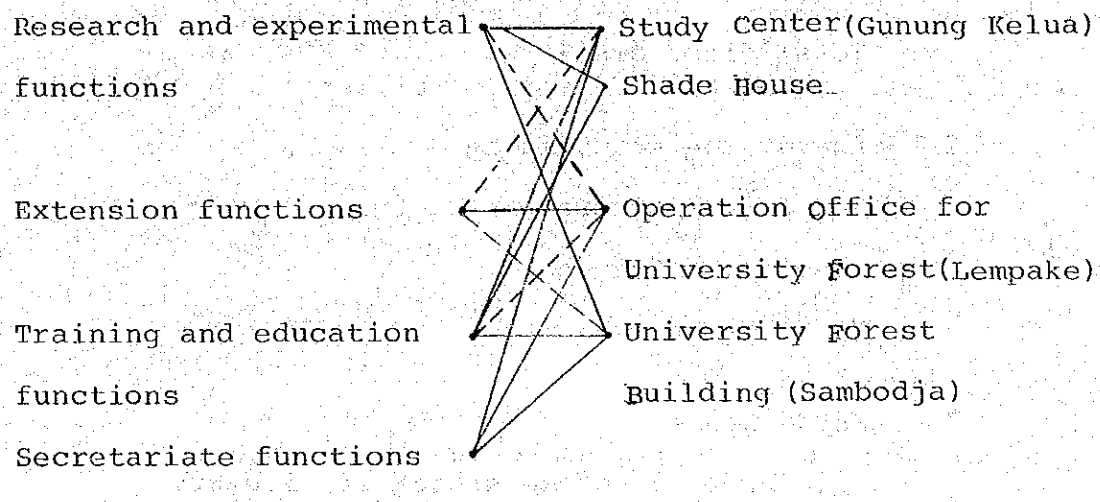
3.2 Outline of basic design

The basic design covers the following facilities and equipment :

(1)	Study Center Building	1 Block
(2)	Energy Center Building	1 Block
(3)	Shade House	1 Block
(4)	Operation Office for University Forest	1 Block
(5)	University Forest Building	1 Block
(6)	Laboratory Equipments, Apparatus and Tools	

3.2.1 Functions of the buildings

The basic functions of the buildings can be classified into four categories and they are organically combined as follows :



3.2.2 Building structures and sizes

1. Study Center

Reinforced concrete structure, 2 stories

Gd.floor floor area: 1,725 M2

1st.floor floor area: 1,353 M2

Total floor area: 3,078 M2

2. Energy Center Building

Reinforced concrete structure, 1 story

steel roof framing

Total floor area : 200 M2

3. Shade House

Reinforced concrete structure, 1 story

Total floor area.: 96 M2

4. Operation Office for University Forest (Lempake)

Reinforced concrete structure, 1 story

steel roof framing

Total floor area : 120 M2

5. University Forest Building (Sambodja)

Reinforced concrete structure, 1 story

steel roof framing

Total floor area : 446 M2

3.3 Basic Policy

The basic design was made on the basis of the following principles:

(1) The intents of the user side should be considered to the maximum extent.

(2) The natural environmental conditions of the sites should be considered sufficiently.

(3) The designs should be such that they are compatible with the local conditions and allow easy maintenance and controls.

(4) The local construction techniques should be taken into consideration.

(5) Basically, the design should be based on materials locally procurable except that materials may be shipped from Japan only when such deviation is unavoidable or if such deviation will bring about an exceptionally favorable advantage.

(6) The building structures should be such that they can flexibly meet future changes in the purposes or requirements of the buildings.

(7) The building codes, laws, regulations and standards not provided in Indonesia, abide by those of Japan.

3.4 Site conditions

3.4.1 Site location

1. Study Center Building and Energy Center Building.

Samarinda City is situated at the east end of Kalimantan Island and is the capital city of the province of Kalimantan Timur, which opens upon the straits of Makassar. Its geographical position is lat. 0°30' S and long. 117°00' E. The population is approximately 250,000. The site for the Study Center Building is located approximately 6 km to the northwest of Samarinda on the top of hill which is approximately 40 meters above sea level with its ridgeline extending north and south. The exact position proposed by the Government of Indonesia for the Study Center Building and Energy Center Building is on a sloping land area approximately 250 m long north and south and approximately 150 m east and west and is nearly at the center of the site for construction of the new campus of Mulawarman University.

2. Shade House

The site for this building is within the flat area proposed for the Shade House approximately 200 m to the south of the Study Center Building.

3. Operation Office for University Forest (Lempake)

The site for this building is in a flat area of approx. 40 m x 30 m alongside the new national road (the work is now in progress) and situated within the proposed University Forest (Lempake) approx. 12 km to the north of Samarinda City.

4. University Forest Building (Sambodja)

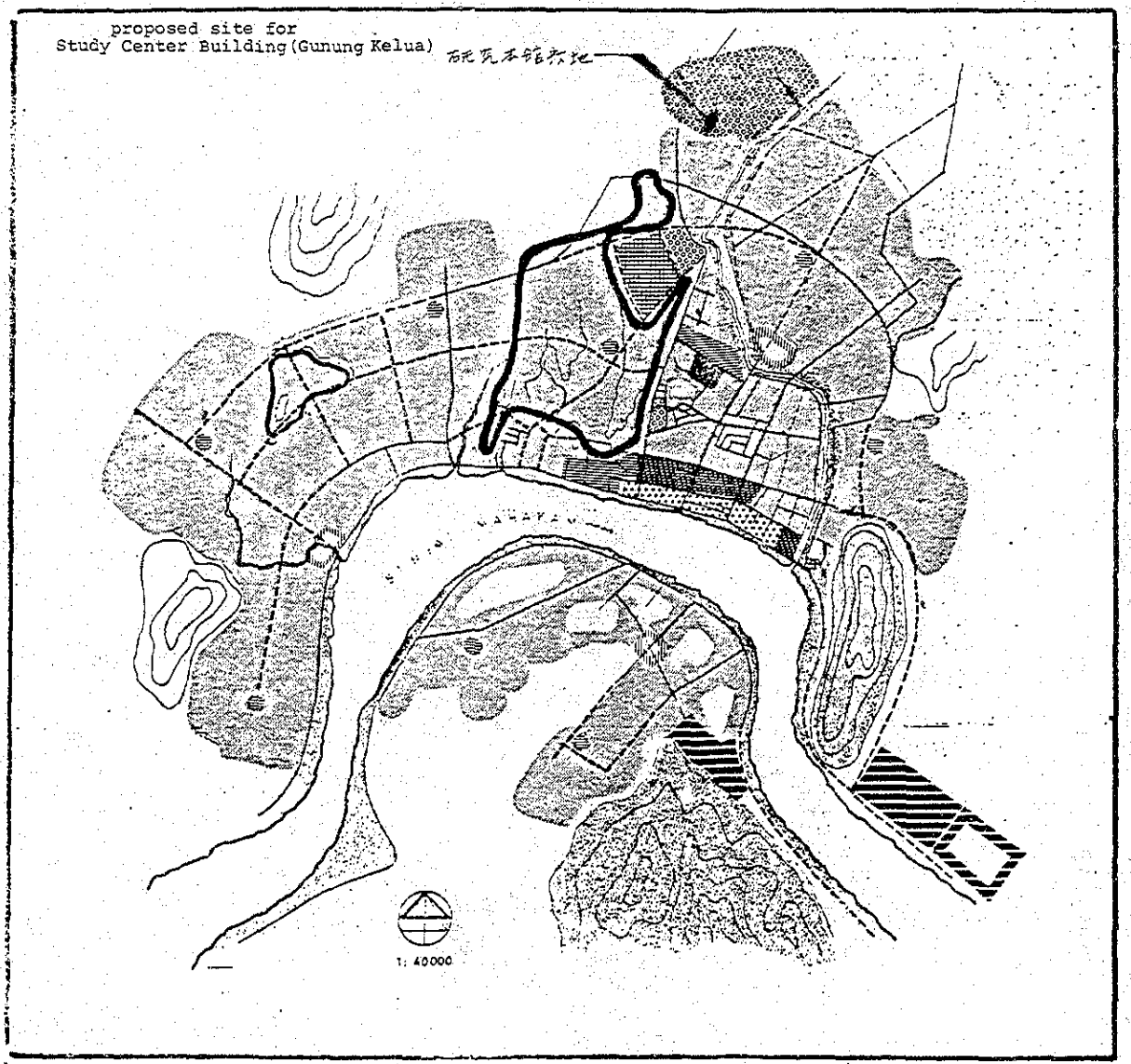
The site for this building is a flat area of approx. 150 m x 80 m, a part of the proposed University Forest (Sambodja) approx. 19,000 Ha situated 60 kilometers from Samarinda via Samarinda - Balikpapan Highway.

PROPOSED GUNUNG KELUA SITE (VIEW FROM THE SOUTH)

PROPOSED SAMBOJA SITE (VIEW FROM THE SOUTH)

3.4.2 Relationship with urban planning

Samarinda, which is the capital city of Kalimantan Timur Province, has played an important role as a port of lumber exportation. In order to improve the city functions, urban planning had been debated recently, and a master plan for urban development was worked out by the municipality of Samarinda. According to this plan, the campus area will be situated in its northern area. Therefore, the subject construction project is being planned in line with the said master plan. *(see fig. 1)*



サマリンダ市 1970年度 都市計画土地利用図

KOTA SAMARINDA

PETA
RENCANA TATA GUNA TANAH
RENCANA GARIS BESAR KOTA 1970
(D.T.K.D)

- PUSAT PERDAGANGAN 商業地域
- PUSAT PEMERINTAHAN 官庁地域
- PERUSAHAAN 会社地域
- PUSAT DISTRIK 地区センター
- KAMPUS キャンパス地域
- RUMAH SAKIT 病院地域
- LAPANGAN OLAH RAGA スポーツ地域
- JALUR HIJAU (GREEN) 緑地帯
- BOTANICAL GARDEN 植物園
- PUSAT LINGKUNGAN 集団地域
- DAERAH PERUMAHAN 住居地域
- DAERAH PERUMAHAN KHUSUS 特別住居地域
- DAERAH INDUSTRI 工業地域
- PELABUHAN 港湾地域

RESEARCH CENTER BAGIAN ARSITEKTUR
FAK. TEKNIK UNIVERSITAS GADJAH MADA

Fig. 1

3.4.3 Climatic conditions

Samarinda City East Kalimantan, belongs to the tropics. Its average atmospheric temperatures are between 22°C & 30°C in daytime, the temperature and humidity rises up to about 33°C and over 80% respectively. The city, therefore, is within a high temperature and humidity zone. According to the past records, the annual rainfall is approximately 3,000 mm. There is no clear distinction between rainy season and dry season. The largest one day rainfall recorded during the past four years is 300 mm. Usually, rain is accompanied by thunder. In June and July the wind sometimes exceeds 15 m/sec, but in other months, the mild south - southeast wind with velocity of 1m/sec. to 2 m/sec dominates.

Table 1 Climate condition in Samarinda

Atmospheric temperature	:	day average	DB 27°C
		day highest	DB 33°C
		day lowest	DB 22°C
Humidity	:	day average	RH 84%
		day maximum	RH 99%
		day minimum	RH 80%
Rainfall	:	annual rainfall 2,700 mm	
		maximum rainfall 200 mm/20 min per hour	
Wind	:	average velocity 1-3 m/s S and direction	
		maximum velocity 17 m/s W and direction	
Atmospheric pressure	:	average pressure 1,011.7 millibars	
Insolation ratio	:	monthly average 62% insolation ratio	

3.4.4 Soil conditions

Topography : The construction sites for this project are rather hilly areas.
However, judging from the geological formation that are disclosed at a nearby construction field, the geological formations seem to be generally uniform.

Soil : The test excavation performed at the Study Center Building site on the occasion of the basic design survey disclosed that the foundation is made of greyish clay which will allow an excavation perpendicular from the ground surface.

The engineer of the Public Works Department was of the opinion that the soil deeper than 3 - 4 m from the ground surface is sandy materials of reasonable strength.

The Study Center Building is a two-story reinforced concrete structure. It seems, therefore, that this building can be supported directly by the bearing capacity of the existing foundation soil deprived of its top soil. The foundation details, however, will be finalized on the basis of the results of the soil tests which have been requested

TEST EXCAVATION 3 m DOWN AT GUNUNG KELUA SITE

STRATA : BLACK SOIL - 10 cm FROM SURFACE

LOAM SOIL - BELOW 10 cm (PERCENTAGE OF WATER CONTENTS : 70%)

to the Indonesian Government on the occasion of the Basic Design Survey.

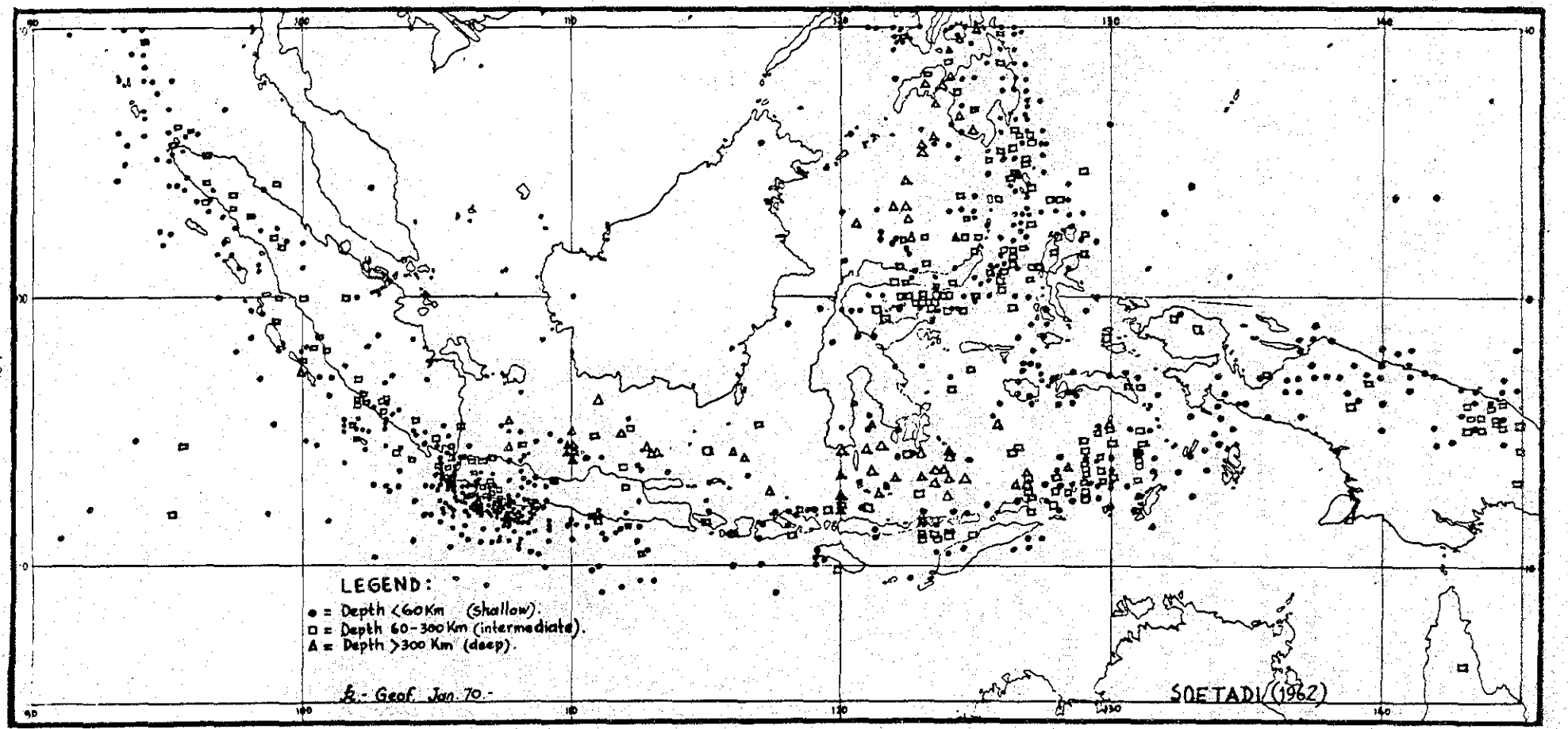
3.4.5 Earthquakes

The Indonesian Archipelago belongs to an active seismic zone of the world and as a matter of fact there have been many earthquakes in the past.

Fig. 2 shows the epicenters of the past earthquakes throughout all territories of Indonesia as classified into three groups according to their depths. As can be understood from this map, there have been no earthquakes that had their epicenters in Samarinda, Kalimantan.

Fig. 3 shows the seismological zonings that were adopted in determining the building design earthquake loads of the Building Construction Code of Indonesia (draft). According to these data, Kalimantan Timur including Samarinda which is situated near the equator, belongs to a high earthquake area.

Fig. 2 MAP OF EPICENTERS



EARTHQUAKE MAP

G. — ACCELERRATION OF GRAVITY

— MAX. 0.4G

— Max. 0.1G

— MAX. 0.05G

— NON EARTHQUAKE

○ — WEAK EARTHQUAKE

◎ — MID EARTHQUAKE

● — STRONG EARTHQUAKE

☼ — DEEP EARTHQUAKE

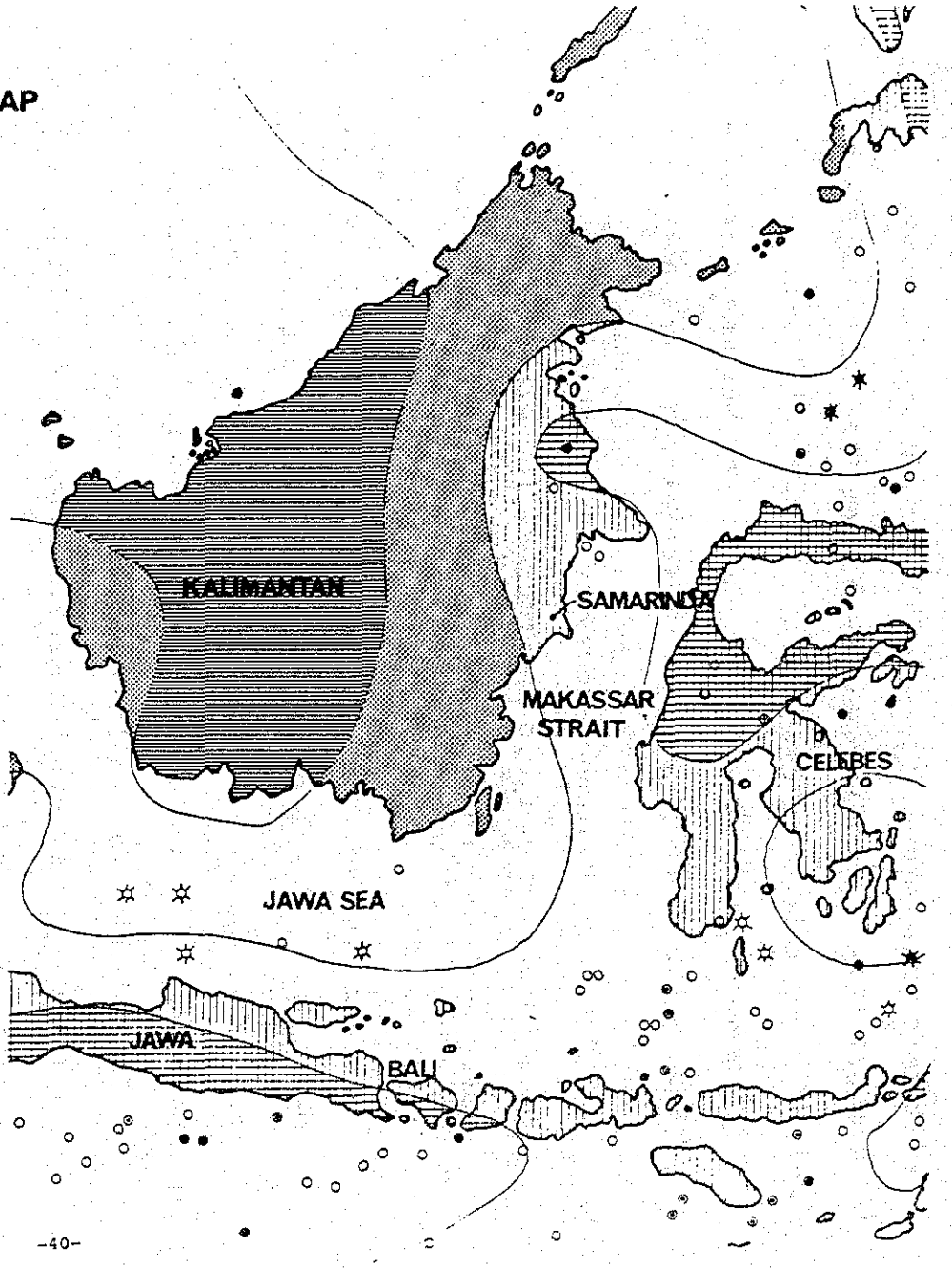


Fig. 3

3.4.6 Electric power supply and telephone installations

At present, the electric power supply capacity of Samarinda is only 70% of its total demand. By 1980, the capacity is expected to be increased up to 90% of the total demand.

Electricity, generally, is being supplied in 380 V/220 V 3 phase 4-wire.

Telephone facilities are not enough yet but may be expanded as the Urban Planning is meterialized.

3.4.7 Water supply, drainage and sewer installations

At present, the work is in progress for extension of the water purification and water supply facilities of Samarinda.

This work is expected to be completed by the fall of 1979. The purity of water is to be controlled on the basis of the World Health Organization standards. The municipality has a drainage and sewer line construction plan but there is no schedule yet to launch it. Generally, sewege is now treated by simplified septic tanks to be discharged eventually for natural filtration.

3.4.8 Urban fuels

Urban fuels now used are kerosene, light oil, gasoline and propane gas (L.P.G.) of which kerosene is generally used in private houses. At present, urban fuel gas supply utilities are not being planned.

3.5 Building design

3.5.1 Study Center Building

1. Land use and access road planning

The site for this building is situated on a hill commanding the whole view of Samarinda. There is a paved public road approximately 800 m to the southeast of this site and another paved public road approximately 400 m to the southwest of this site. At present there is a 6 meter wide unpaved access road from the southeast public road to the site. A new access road is being contemplated in connection with the new campus project of the Mulawarman University. The Government of Indonesia is considering an access to the center building from the southwest public road. (See : Location Map 2)

2. Layout of the building

This building is to be placed on the sloping ground east of the hill ridge where less soil movement is expected.

The layout of the building is decided to meet with the contour of the slope and to face the south direction with axis of east to west, and also to command the view of Samarinda city.

The site shall establish around elevation 15 meters below the top of the hill. This is intended to provide a distant spectacular view of buildings surrounded by green half way up the hill, when seen from Samarinds city.

3. Block plan

On the construction site which is oblong in the direction of east and west, the following three blocks are laid out, each block bestowed with its respective functions as follows :

Block No. 1

Administration section	:	Administration office, library, director's room, department manager's room, meeting room, etc.

Block No. 2

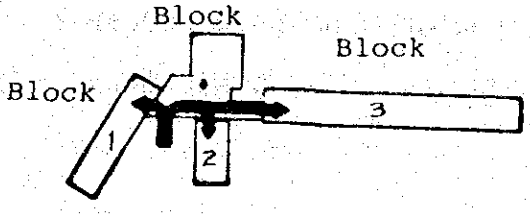
Seminar, conference and study section	:	Quarters where no laboratory equipment is required.

Block No. 3

Research and laboratory section	:	Quarters where laboratory equipment is required.

The above three blocks are connected together with and through the entrance hall, corridors and stairs, and each block is planned, taking into consideration the climatic conditions, the advantage of concentrated layout of laboratory equipment and efficient human movement lines. The entrance hall will function as an exhibition hall, as well as a lounge.

Further, the foyer of the seminar and meeting room will be provided continuously one (1) meter higher than the entrance hall level to create a pleasant space expression.



Block 1.administration section

Block 2.seminar, conference and study section

Block 3.research and laboratory section

Fig.4 Block plan of Study Center Building

The corridors are located on the south sides to intercept solar light and heat.

The module of the laboratory will be 8M x 9M between axis of each column worked out by the typical laboratory table layout.

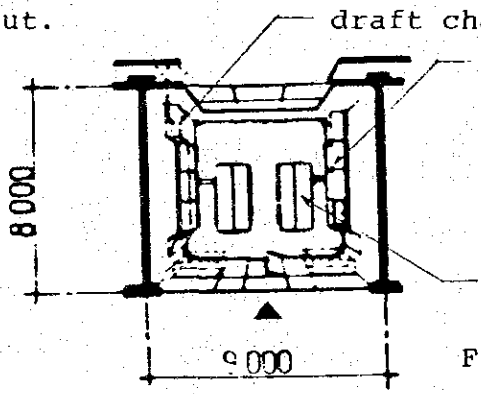


Fig. 5 Module of laboratory

The laboratory layout retains flexibility for future partition changes, etc.

Basically, the chemical laboratory will be laid out at ground floor level and the physics laboratory and the common laboratories at 1st floor level for easier maintenance of the building and laboratory equipment.

4. Energy Center Building

The Energy Center Building will be located apart from the Study Center Building to avoid noise therefrom.

The elevated water tank will be in a reinforced concrete tower 18 meters high above the ground level and this tower will be so designed as to be a symbolic mark of the Study Center.

3.5.2 Other facilities

1. Shade House

The site for Shade House was selected on a flat space at the proposed seed-nursery. This site permits direct access from the existing public road. The Shade House shall designed, so as to be able to facilite its function. Roof and side walls are all glazed and shall provide manually operate top lights and windows for ventilation. Taking into account durability, the structure of the building will be reinforced concrete and will be equiped with sprinklers.

2. Operation Office for University Forest (Lempake)

The site for this building is situated along the new high-way now under construction. The entrance is provided to face the road so that access to the building can be directly from the road. A plaza and a parking area will be provided in front of the building.

This building also provides facilities for exhibitions, introductions and conferences for visitors from other universities and research centers.

Rooms are so designed as to be able to conform to different purposes.

Beside the building, a sheltered space will be provided for equipment to be used for study.

3. University Forest Building (Sambodja)

The site for this building is situated on a flat area at the entrance of the forest and can be approached from the roadway without a difference in level. The building is so designed as is able to fulfill its function as the controlling center of the vast University Forest. The building will be mainly used as a dormitory, and for practical training, research and lectures for students. The building will consist of two (2) blocks namely administration block and the accommodation block. Each block will be furnished with a corridor at south side which will provide a sunshade so that the rooms will be protected from sunlight and heat. The dining room will be used for lectures and selfstudy as well.

3.5.3 Finishing materials

1. Study Center Building

1. Main exterior finishes

Roof :	urethane waterproofing membrane and corrugated asbestos cement sheet
Exterior wall :	concrete, spray tile finished
Doors & windows :	wooden and aluminium sash, clear glass or louver windows
Berm :	graveled

2. Main interior finishes

Corridors :	floor	- terrazzo tiles
	wall	- concrete, painted
	ceiling	- concrete, painted
Ordinary rooms :	floor	- terrazzo tiles
	wall	- mortar, painted
	ceiling	- concrete, painted
Laboratories :	floor	- acid-resistant vinyl tiles
	wall	- acid-resistant paint
	ceiling	- concrete, painted

2. Energy Center Building

1. Main exterior finishes

Roof :	steel truss, corrugated asbestos cement sheet

Exterior wall : mortar concrete painted

Doors & windows : wooden and aluminium or steel sash

Berm : graveled

2. Main interior finish

Floor : mortar trowel finish

Wall : mortar, painted

3.Shade House

1. Main exterior finish

Roof : aluminium frame and clear glass

Exterior wall : aluminium frame and clear glass

Doors & windows : aluminium sash

Berm : graveled

2. Main interior finish

Floor : terrazzo tiles

4. Operation Office Building (Lempake)

1. Main exterior finish

Roof : Steel truss, corrugated asbestos cement sheet

Exterior wall : mortar, painted

Doors & windows : clear glass or louver windows wooden and aluminium sash

Berm : graveled

2. Main interior finishes

Entrance hall : Floor - terrazzo tiles

Wall - mortar, painted

Ceiling - plywood, painted

Office : Floor - terrazzo tiles

Wall - mortar , painted

Ceiling - plywood , painted

5. University Forest Building (Sambodja)

1. Main exterior finishes

Roof - steel truss, corrugated asbestos cement sheet

Exterior wall : - mortar painted

Doors & windows : wooden and aluminium sash, clear glass or louver windows

Berm : graveled

2. Main interior finishes

Hall and corridor :

Floor - terrazzo tiles

Wall - mortar, painted

Dormitory :

Floor - terrazzo tiles

Wall - mortar, painted

Ceiling - plywood, painted

3.6 Structural design

3.6.1 Basic policy

The Study Center Building, Energy Center Building and Shade House will be mainly of rigid frame reinforced concrete structure with shear walls properly positioned. Operation Office Building and University Forest Building will have combinations of locally produced bricks and reinforced concrete walls and top beams with steel truss roofs.

The foundations for each building will be reinforced concrete direct foundations. These will be finalized after obtaining the results of the soil investigations.

The construction sites belong to an area where seismism is the least frequent in the whole of Indonesia. The maximum wind velocity is about 15 meters per second. Therefore, lateral forces that act upon buildings are very small compared with Japan and no particular problem seems to exist on the matter of structural design.

Possible problems, rather, concern the construction operations. In designing, the positions of construction joints of the building must be carefully determined in consideration of the concrete amount that can be poured continuously at one time.