

3.6.2 Structural design policy

There are no uniform standards for structural designs in Indonesia, however there are certain code of practise being prepared for future legalization and being enforced through administrative guidance of the Government of Indonesia. Therefore, the structural designs will be prepared, paying due consideration to the said code of practise as basic requirements. The degrees of external forces and assumed loads affected on the buildings will be determined in accordance with said code of practise, together with due consideration for local climates, soil conditions, the purposes of the buildings and the construction work conditions at the sites. With regard to allowable stress of structural materials, Japanese applicable standards corresponding to local conditions will be applied. Calculation of stress on sectional areas will be made in accordance with Japanese standards.

3.6.3 Assumption of external forces and loads

In accordance with the above described policy, external forces and loads to set upon the buildings will be assumed as follows :

1. Live loads

The live loads as specified by the code of practise of Indonesia will be used with modifications if necessary to conform to the actual conditions.

2. Seismic forces

Seismic intensity $k = 0.1 - 0.2$

3. Wind load

Wind load will be determined to conform to the actual conditions.

4. Soil bearing capacities

Soil bearing capacities will be determined in accordance with results of the soil investigations.

5. Concrete strength

Basic design strength $F = 210 \text{ kg/cm}^2$

3.7 Utilities planning

3.7.1 Basic policy

Utilities planning will be in accordance with the overall basic policy for this project and particularly in terms of the following requirements :

1. All the building utilities will be such that, after completion, they can be easily maintained.
2. Water supply, drainage, plumbing and electric installations in each laboratory will be so versatile as to be able to conform to different experimental subjects.
3. Indonesian practices will be employed to the maximum extent in performing the installation works.
4. Machinery equipment and fixtures manufactured in Indonesia will be used to the maximum extent.
5. Machinery equipment and fixtures that are susceptible either to trouble or to fast wear and tear will be accompanied with spare and replacement parts.

3.7.2 Electrical Installations

1. Electricity supply installations

The Government of Indonesia is to install an extra-high voltage substation on the premises of the Study Center Building to supply electric power to this building. As an electric power source for the experiment purposes, the public power system cannot be depended on because of its being susceptible to frequent failures and to voltage fluctuation. Therefore, for experiment purposes, domestic generators will be installed in the Energy Center Building.

The Operation Office for University Forest and University Forest Building will have domestic generators for lighting and outlet as these buildings are expected to be built in areas where no public power supply is available.

Generator : Study Center Building...120 KW...2 units

Operation Office...5 KW...2 units
for University Forest Building

University Forest...15 KW...2 units
Building

Public power : 3 phase , 4 - wire, 380 V/220 V,

50 Hz

2. Lighting fixtures and plug-socket outlet

Lighting fixtures will be mainly fluorescent lamps, except that incandescent lamps or mercury lamps may be partly used where necessary. Lighting fixtures will be of direct-mounting type. Illumination intensity will generally be as follows :

Laboratories and research rooms	500 lx
Electronic computer room	300 lx
Drawing rooms and balance room	500 lx
Conference rooms	300 lx
Administration office	300 lx
Library	300 lx
Toilets, storages and corridors	100 lx

3. Public address system

The Study Center Building will be equipped with a public address system for paging and communication. The amplifiers will be placed in the administration office. A chime equipment will be built in this system with its interconnection to the clock system.

4. Telephone system

The Study Center Building will, for inter-office communication purposes, have a telephone switchboard installed in the administration office, with extension lines connected to individual telephone sets totaling 30 units, each installed in individual rooms. Four (4) circuits to outside lines are expected to be provided.

5. Fire alarm and burglary alarm systems

Generally, heat-sensitive fire alarm systems will be installed with the annunciators installed in the administration office. Further, electric locks will be installed on the doors of laboratories in the Study Center Building, with the annunciators placed in the administration office.

6. Master television antenna system

Master television antenna outlets will be set up as required and reception outlets will be installed respectively in the entrance hall, conference room, director room, division manager room and the administration office in the Study Center Building.

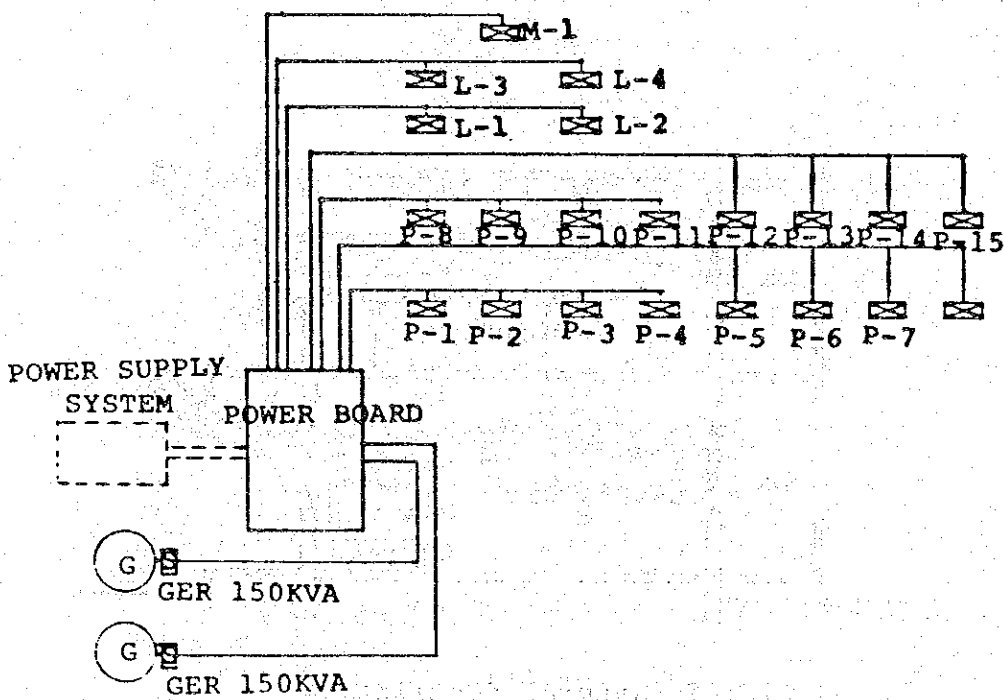
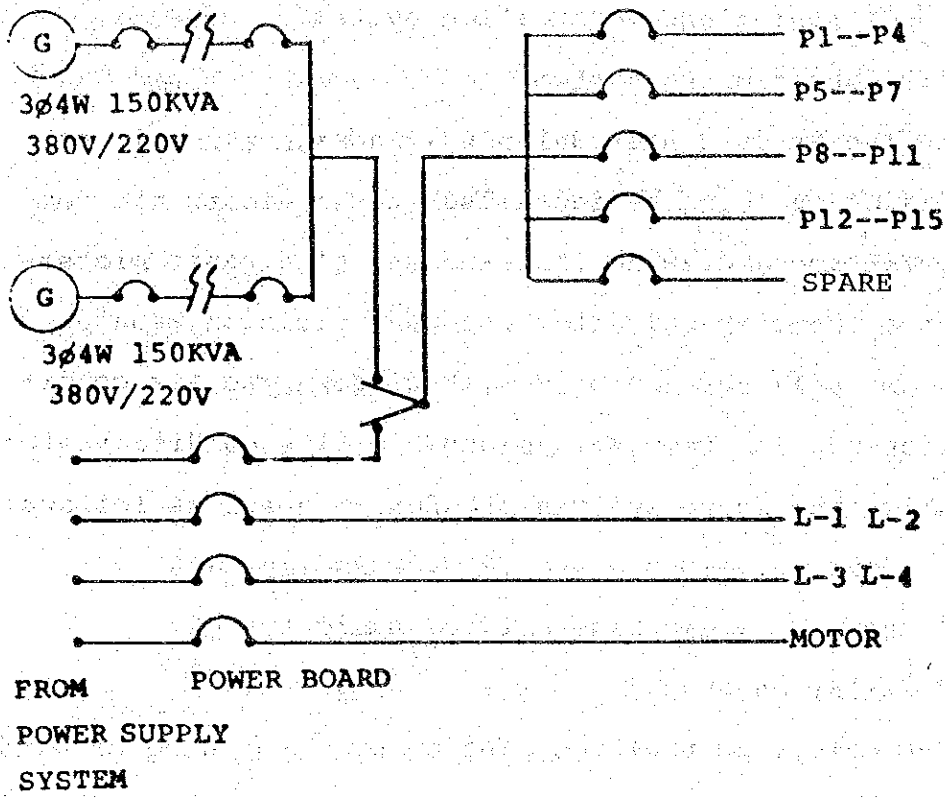


Fig.6 Electric power supply diagram

3.7.3 Air conditioning and ventilation system

1. Air conditioning system

In the Study Center Building, package type air conditioners will be installed in the electronic computer room, drawing room and the electronic microscope room. The director room and division manager rooms will be equipped with window type air conditioners. The temperature and humidity conditions for which the above systems are designed are as follows:

Outdoor.....Temperature 32°C, Humidity 90%

Indoor.....Temperature 26°C, Humidity 60%

2. Ventilation system

Basically, natural ventilation by the opening of windows will be designed. The laboratories where offensive smells may be generated will be equipped with wall type fans.

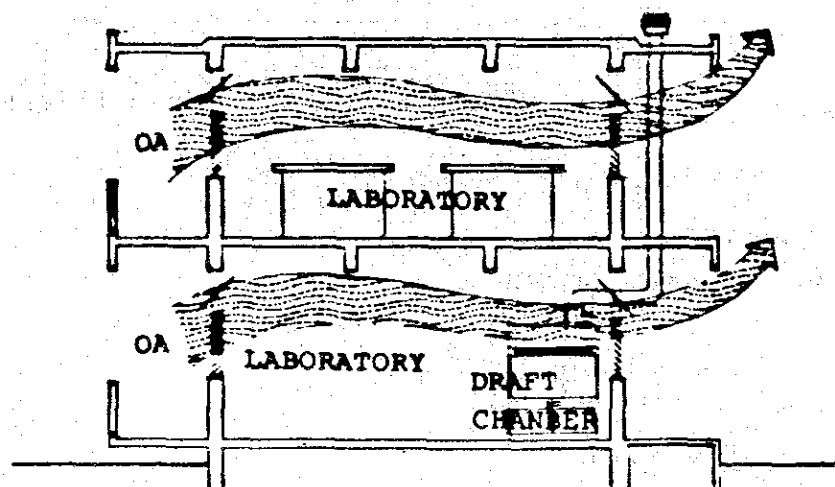


Fig. 7 Natural ventilation

3.7.4 Water supply, drainage, sewer and plumbing systems

1. Water supply

1. Study Center Building

A water main of 150 ϕ is expected to be installed along the municipal road on the northwest side of the site. A service pipe line of 65 ϕ will be branched off from this main up to the water reservoir on the campus premises. The installation of the service pipe line will be made at the expense of the Government of Indonesia. From the water reservoir, which will be installed under this project, the water will be pumped up to the elevated water tank in the vicinity of the Energy Center Building. Considering the requirements for the population of the building with the addition for fire extinguishing, the capacity of the water reservoir will be 30 m³. The elevated water tank will be 6 m³ in capacity and be placed at 18 meters higher than the ground floor level of the Study Center Building.

Emergency shower units will be provided just above the entrance doorway of each laboratory, ready for use in case of research being contaminated with chemicals.

The water reservoir and elevated water tank will be fabricated of F.R.P. and water pipes will be of steel or PVC.

2. Operation Office for University Forest and University Forest Building

The Government of Indonesia is expected to provide a well and install pipes from the well up to the water reservoir. From the water reservoir, water will be supplied through a filter and a sterilizer into a pressure tank.

2. Hot water supply

Propane fueled instantaneous water heaters will be installed in laboratories, kettle rooms and shower rooms of respective buildings. Hot water for drinking will not be provided.

3. Drainage and sewer

The Study Center Building will have three (3) drainage systems, namely laboratory drainage system, sewage system and rainwater drainage system. Laboratory drain water, after being treated in chemical treatment facilities will be drained into the confluence with the Government main. Sewage from individual toilet fixtures will be led through sewage treatment facilities and be discharged into the confluence with the Government main, where mixed with rainwater drains. P.V.C or concrete Hume pipes will be used for drainage systems.

4. Fire hydrants

The Study Center Building will have a fire hydrant system. Fire pumps, interconnected for automatic actuation with the fire alarm system, will be installed in the Energy Center Building. The capacity of the pumps will be 800 lit.per minute.

5. Gas facilities

Propane gas cylinders with rubber and copper pipes will be installed in such locations as chemical laboratories and kettle rooms where required.

6. Sanitary fixtures

Local style, flush-type watercloset bowls will be mainly used, and in each toilet one (1) European style watercloset bowl will be installed. Urinals will be of a wall type.

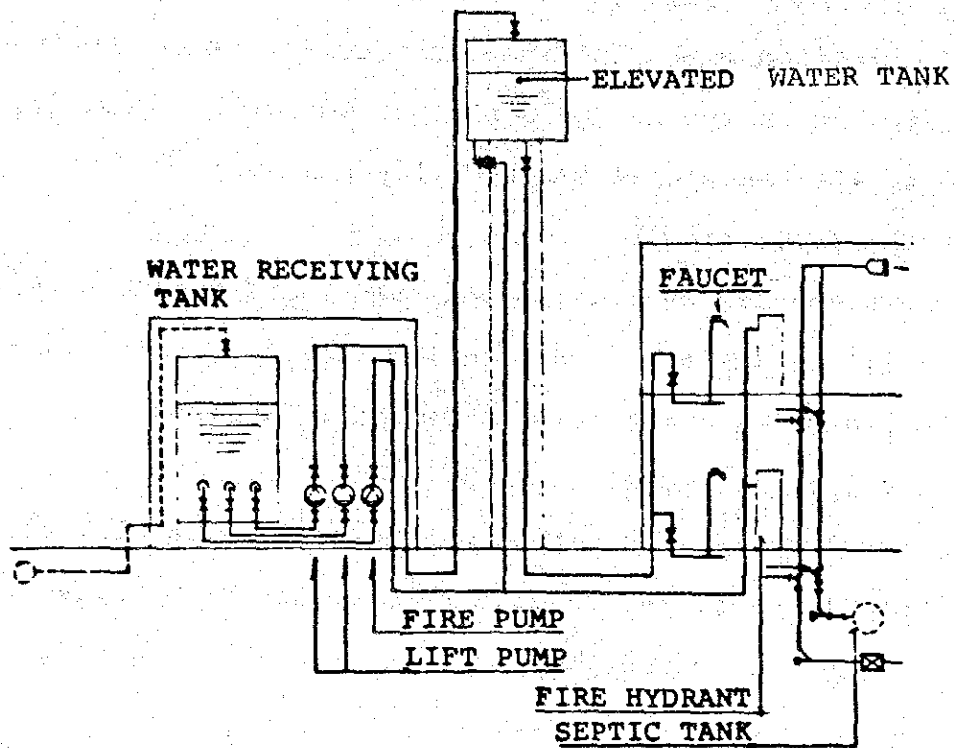
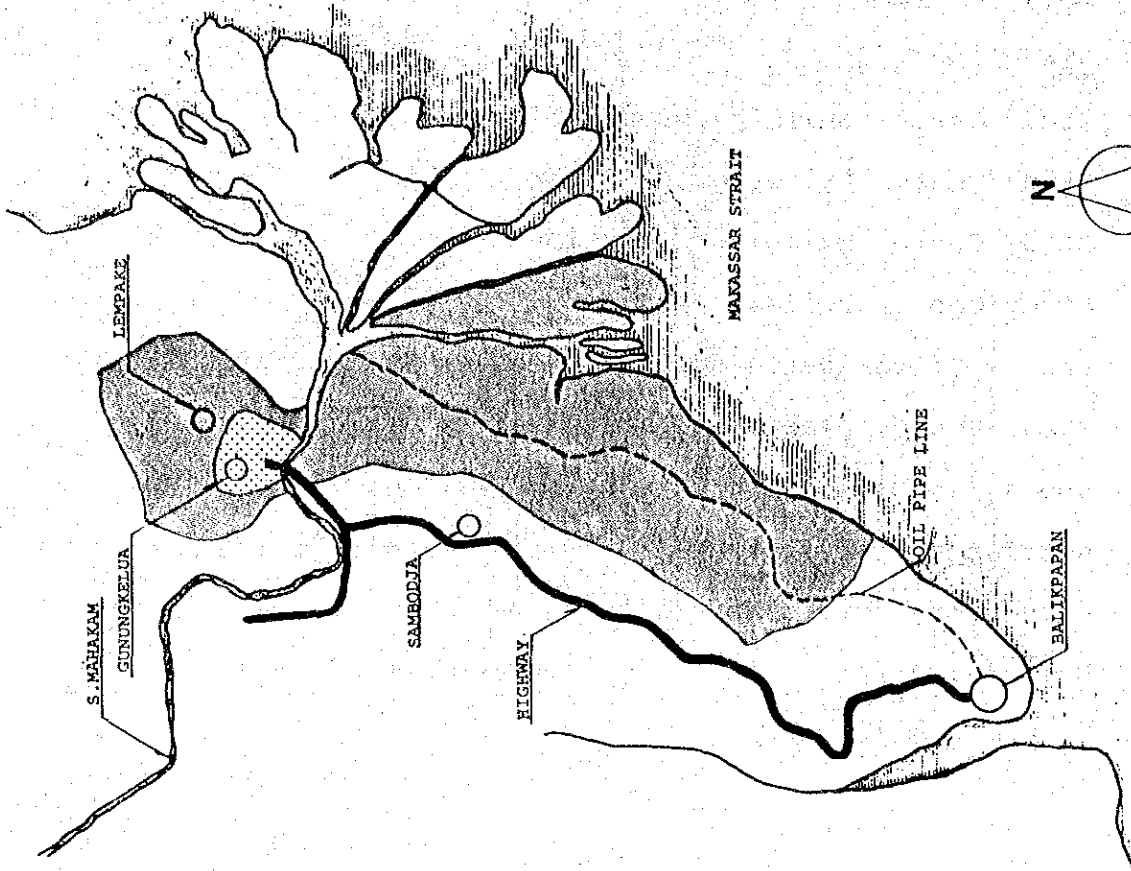


Fig. 8 Sanitary system

3.8 Basic design drawings

1. Location map - 1
2. Location map - 2
3. Site plan
4. Study Center Building, ground floor plan
5. Study Center Building, 1st floor plan
6. Study Center Building, elevation
7. Study Center Building, section
8. Energy Center Building, plan, section and elevation
9. Shade House, plan, section and elevation
10. Operation Office for University Forest Building, plan, section and elevation
11. University Forest Building, plan
12. University Forest Building, section and elevation

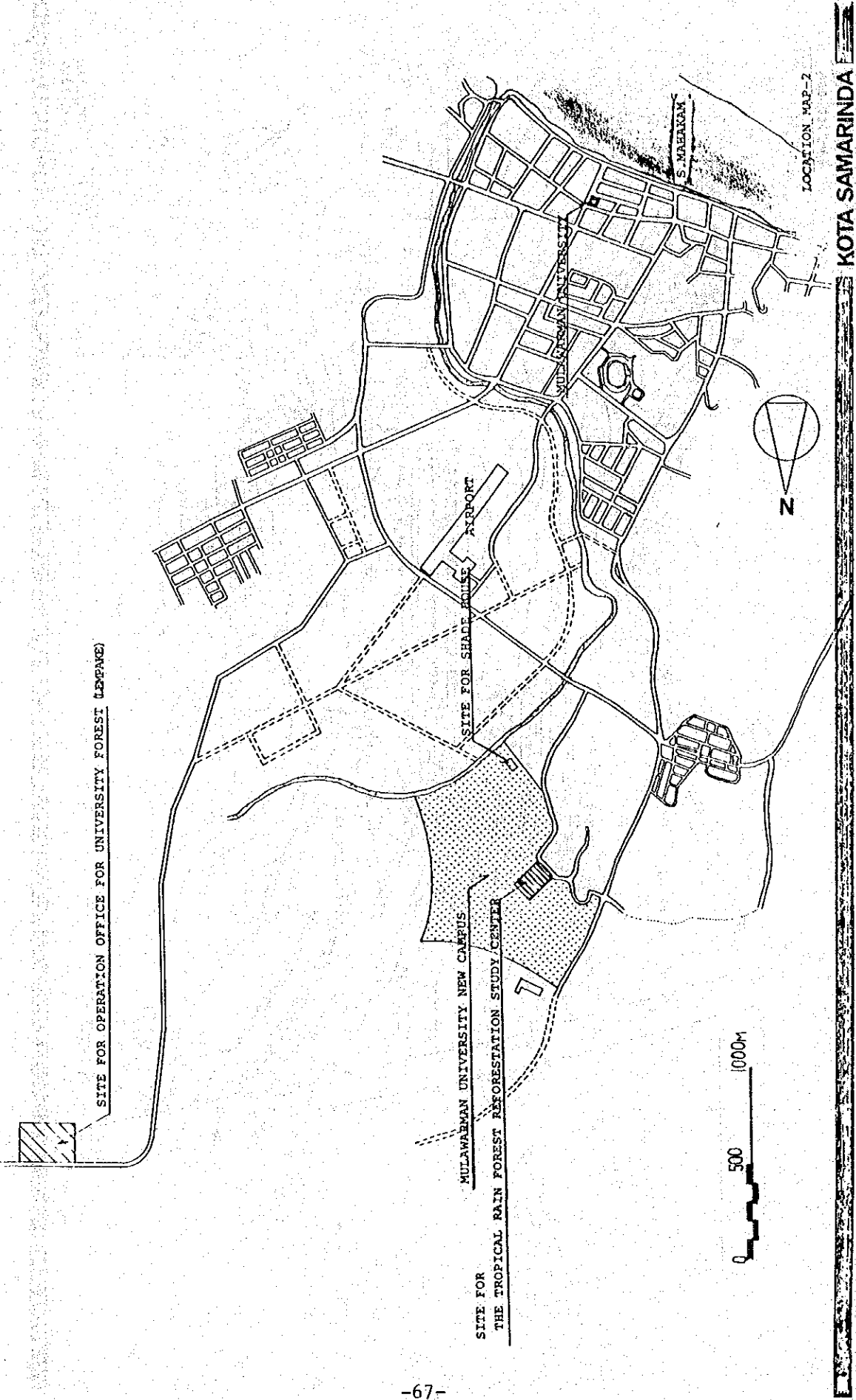


[Stippled Box] KOTAMADYA SAMARINDA
 [Dotted Box] KOTA SAMARINDA



LOCATION MAP-1

KOTAMADYA SAMARINDA



SITE FOR OPERATION OFFICE FOR UNIVERSITY FOREST (LEPAWE)

SITE FOR
MULAWARMAN UNIVERSITY NEW CAMPUS
THE TROPICAL RAIN FOREST REFORESTATION STUDY CENTER

SITE FOR SHARAFULLAH AIRPORT

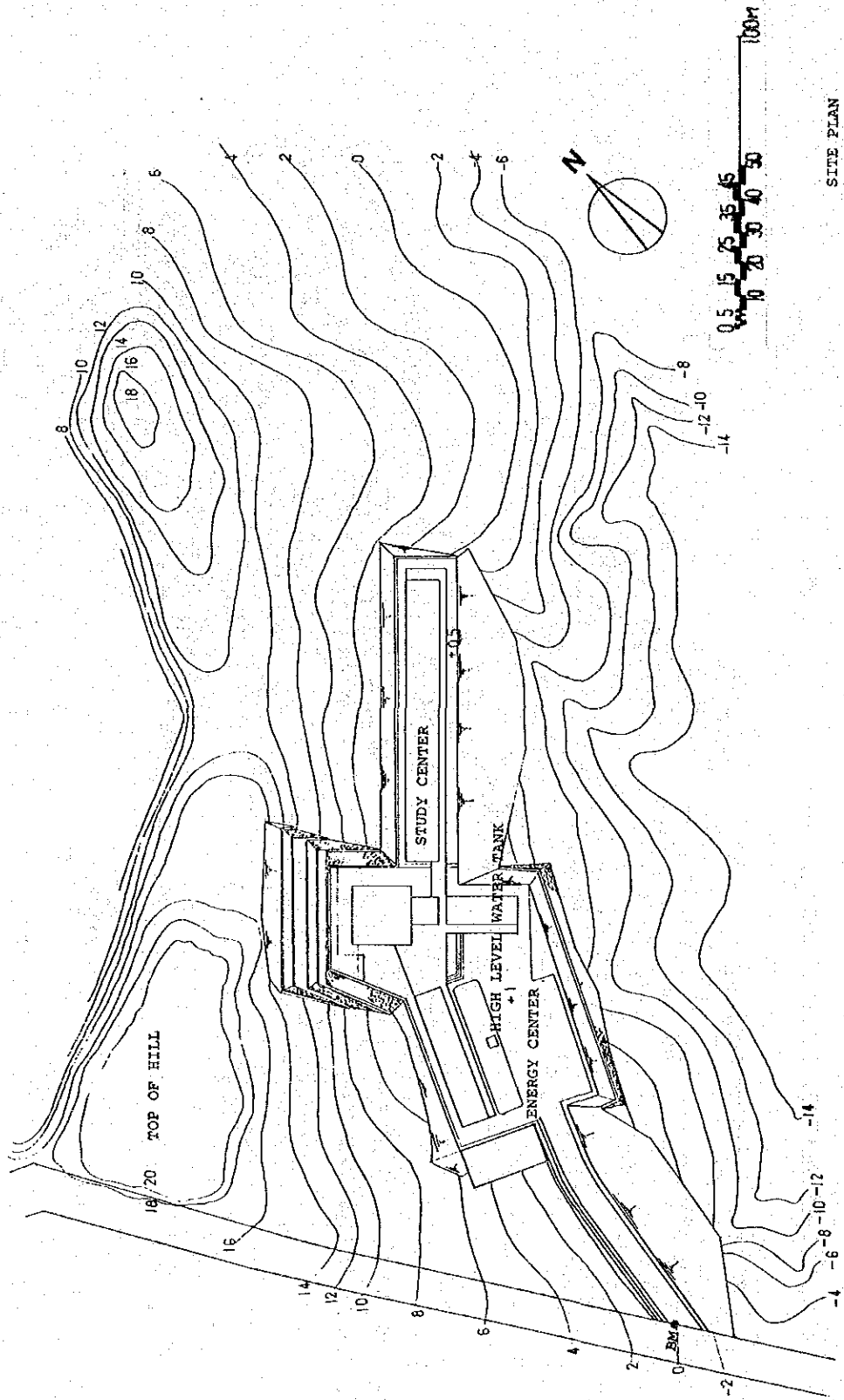
JUDHARSIAN UNIVERSITY

S. MAHARAJA

LOCATION MAP-2

KOTA SAMARINDA

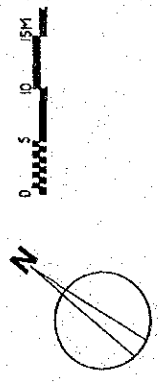
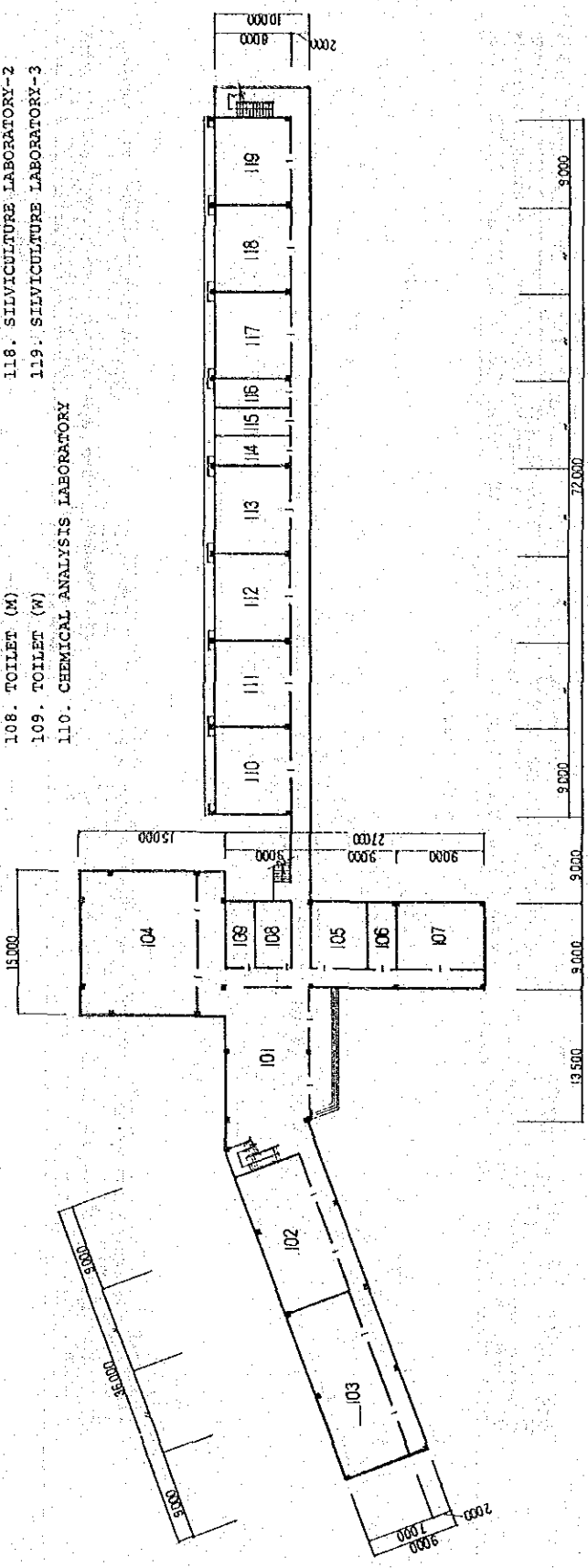




SITE PLAN

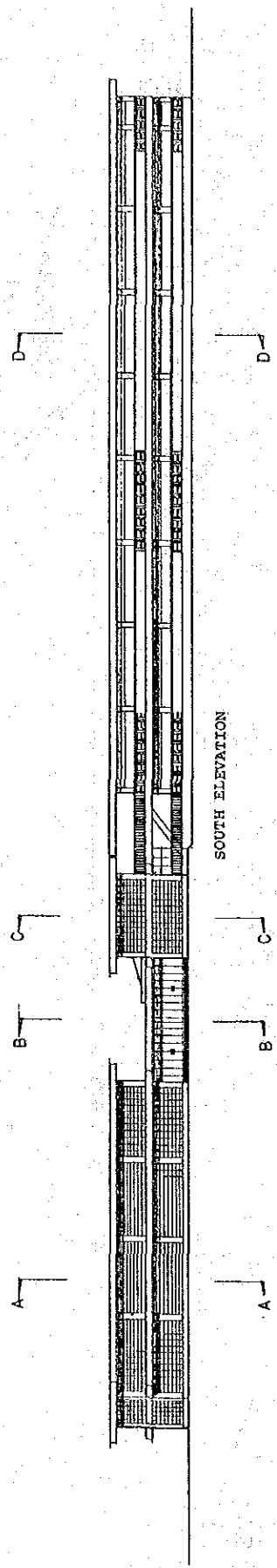
GUNUNG KELUA

- 101. ENTRANCE / EXHIBITION HALL
- 102. ADMINISTRATION OFFICE
- 103. LIBRARY
- 104. SEMINAR / MEETING ROOM
- 105. STORAGE-1
- 106. SUBDIVISION HEAD ROOM
- 107. MACHINERY WORKSHOP
- 108. TOILET (M)
- 109. TOILET (W)
- 110. CHEMICAL ANALYSIS LABORATORY
- 111. PROTECTION LABORATORY-1
- 112. PROTECTION LABORATORY-2
- 113. PROTECTION LABORATORY-3
- 114. SUBDIVISION HEAD ROOM
- 115. STORAGE-2
- 116. SUBDIVISION HEAD ROOM
- 117. SILVICULTURE LABORATORY-1
- 118. SILVICULTURE LABORATORY-2
- 119. SILVICULTURE LABORATORY-3



GROUND FLOOR PLAN

STUDY CENTER : GUNUNGKEJUA



SOUTH ELEVATION



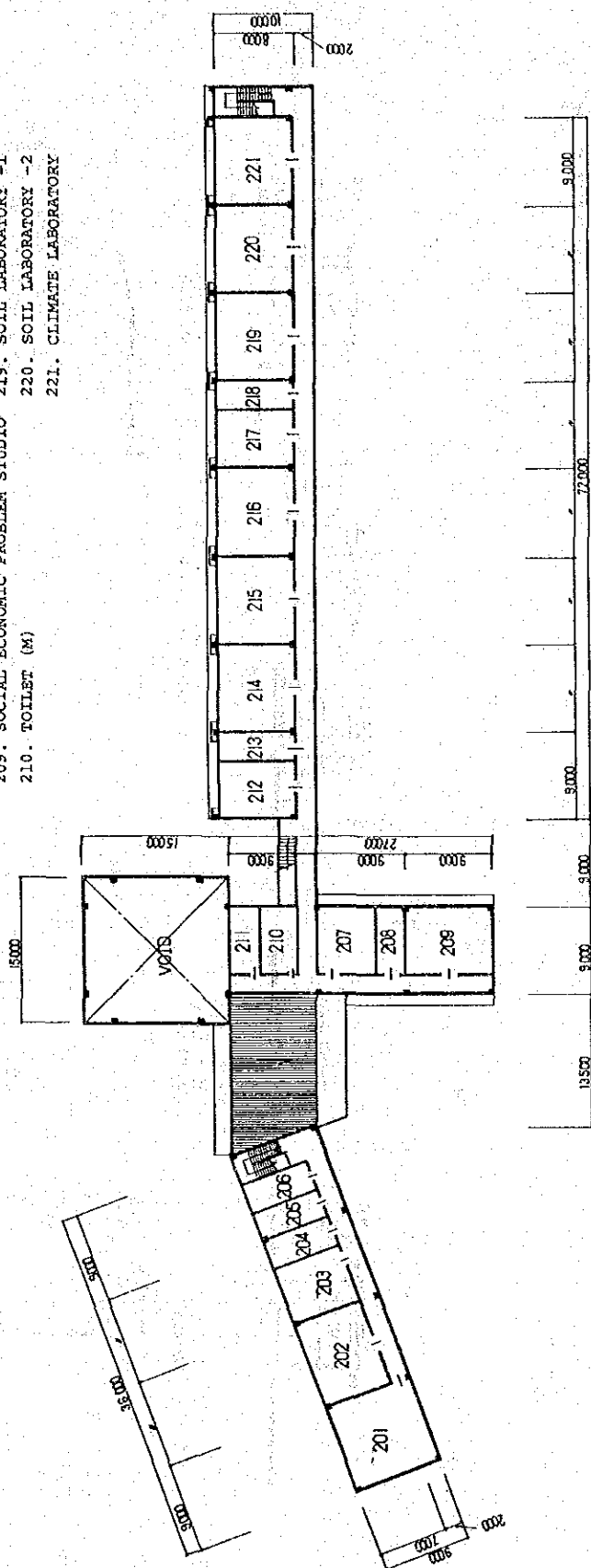
NORTH ELEVATION



ELEVATION

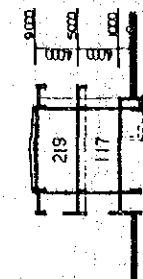
STUDY CENTER : GUNUNGKELUA

- 201. MEETING / BOARD OF CONSULTANTS
- 202. EXPERTS ROOM
- 203. DIRECTOR ROOM
- 204. DIVISION MANAGER ROOM-1
- 205. DIVISION MANAGER ROOM-2
- 206. DIVISION MANAGER ROOM-3
- 207. OPERATION ROOM FOR FORESTRY
- 208. SUBDIVISION HEAD ROOM
- 209. SOCIAL ECONOMIC PROBLEM STUDIO
- 210. TOILET (M)
- 211. TOILET (W)
- 212. CONSTANT ROOM FOR TEMP. & HUMIDITY
- 213. DARK ROOM
- 214. DRAWING ROOM
- 215. ELECTRON MICROSCOPE ROOM
- 216. PHYSICS LABORATORY
- 217. COMPUTER ROOM
- 218. SUBDIVISION HEAD ROOM
- 219. SOIL LABORATORY -1
- 220. SOIL LABORATORY -2
- 221. CLIMATE LABORATORY

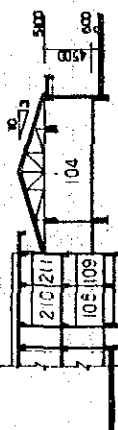


1st FLOOR PLAN

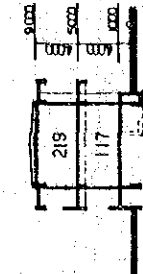
STUDY CENTER : GUNUNGKELUA



A - A
SECTION

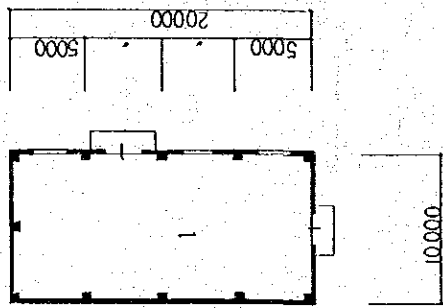


B - B
SECTION



C - C
SECTION

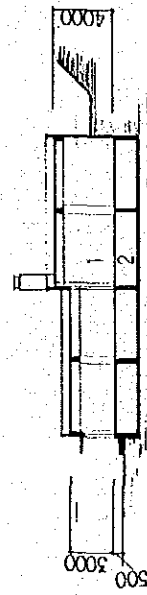




PLAN

1 GENERATORS and PUMPS ROOM

2 WATER TANK



SECTION



SOUTH-EAST ELEVATION

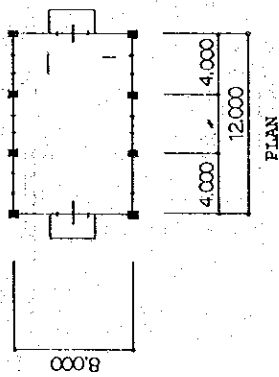


PLAN

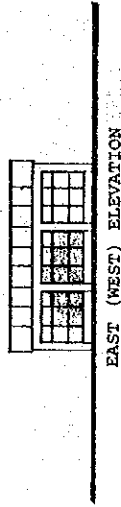
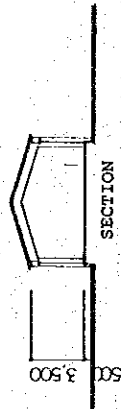
SECTION

ELEVATION

ENERGY CENTER : GUNUNG KELUA

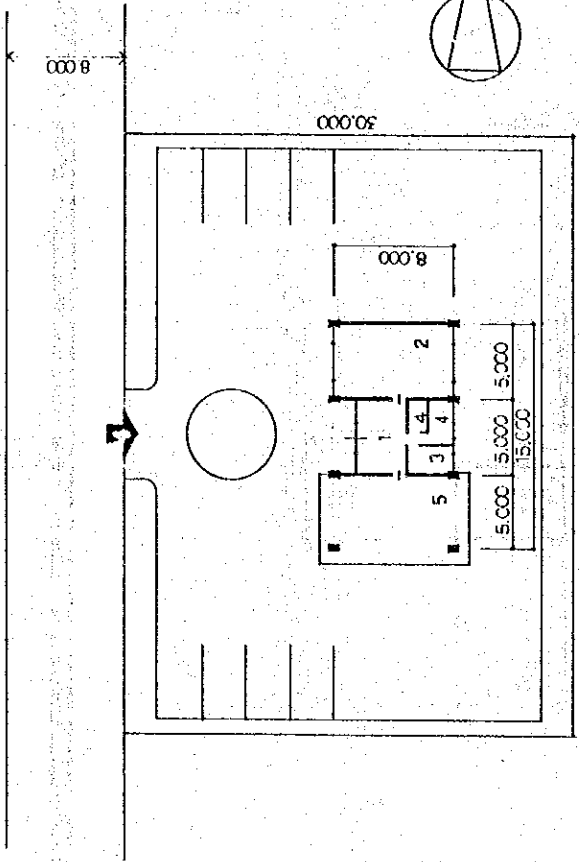


10
3



PLAN
SECTION
ELEVATION

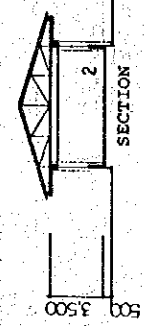
SHADE HOUSE : GUNJUNGKELUA



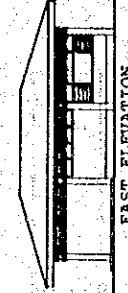
- 1. ENTRANCE HALL
- 2. OFFICE
- 3. KETTLE ROOM
- 4. TOILETS
- 5. COVERED SPACE



40,000 PLAN



SECTION

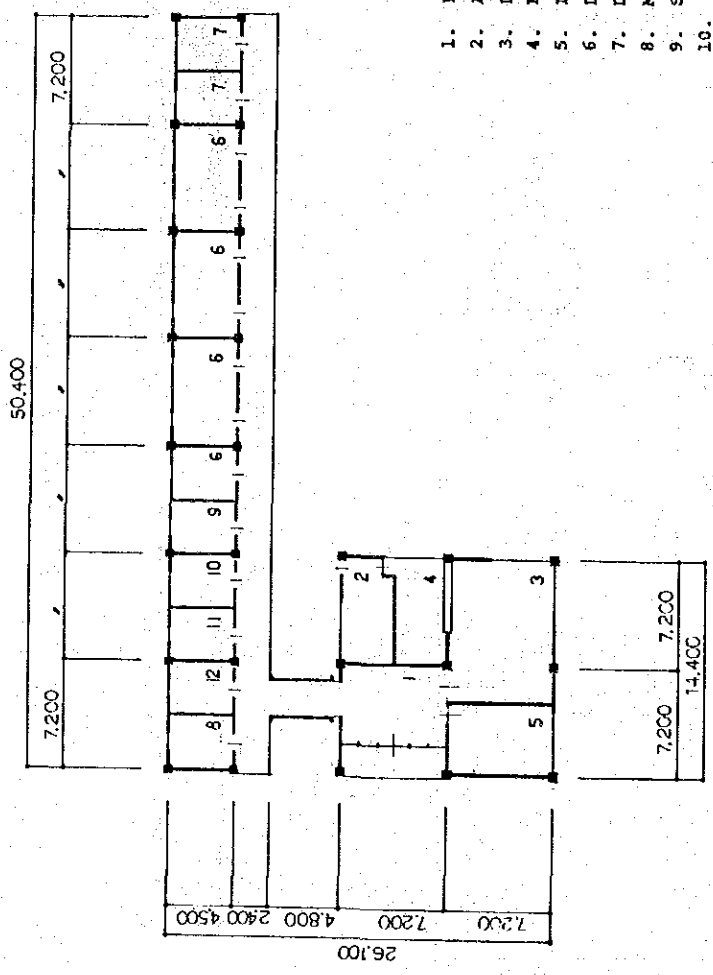


EAST ELEVATION

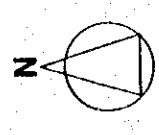


PLAN
SECTION
ELEVATION

OPERATION OFFICE FOR UNIVERSITY FOREST : LEMPAKE



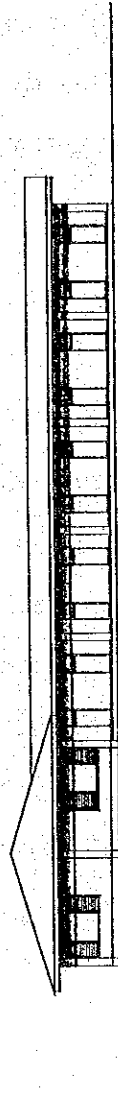
1. ENTRANCE HALL
2. ADMINISTRATION OFFICE
3. DINING ROOM & LECTURE ROOM
4. KITCHEN
5. LABORATORY
6. DORMITORY-1
7. DORMITORY-2
8. MACHINE ROOM
9. SHOWER ROOM
10. WASH ROOM
11. TOILETS
12. STORAGE



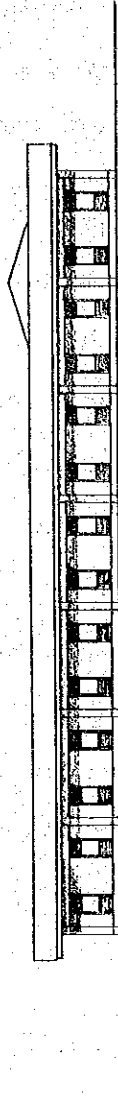
PLAN

PLAN

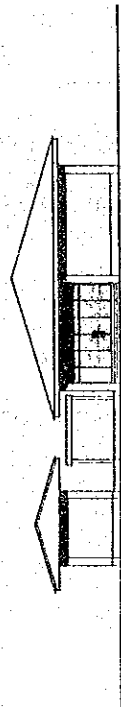
UNIVERSITY FOREST BUILDING : SAMBODJA



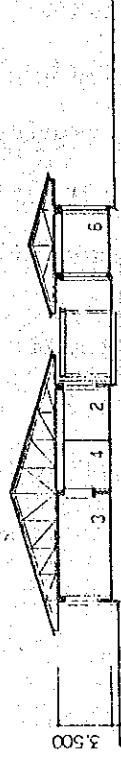
SOUTH ELEVATION



NORTH ELEVATION



WEST ELEVATION



SECTION

ELEVATION
SECTION



UNIVERSITY FOREST BUILDING : SAMBODJA

Chapter 4 LABORATORY EQUIPMENT PLANNING

4.1 Basic policy

Scope of equipment considered in this planning covers such items of equipments, apparatus and tools as are mainly required in the Study Center Building and the University Forest Building. These equipments shall be durable and meet the versatile requirements of the forestry study.

4.2 Repair and maintenance

Since the laboratories and experiment facilities of other universities and of the Forestry Public Corporation in Indonesia have had their activities considerably limited on their present status of scanty supplies and equipment, the new plan for the Mulawarman University Project should incorporate in its scope a scheme for affluent budgetary appropriations enabling them to continue repair, maintenance and replacement of its laboratory equipment for years after completion. The operation personnel for the electronic computer and microscope of the University, however will require a few months of technical training in Japan.

4.3 Shipment and customs clearance

Cargo liners are being operated on a schedule basis between Japan and Indonesia in accordance with the

regulations of Japan-Indonesia Shipping Association. These cargo liners usually do not call at Samarinda Port but call at Balikpapan Port. However, if necessary formalities are followed, a ship may call at Samarinda Port where bonded warehouses can be used. Samarinda Port has a 15 ton mobile crane for unloading and its unloading capacity is 3,000 m³/t weekly. The pier is 300 meters long with its water a depth of 15 meters at low tide. Therefore, a ship of approximately 5,000 tons is able to call at this port.

4.4. Testing and inspection

Testing and inspection of the equipment will be made at the manufacturers' factories in Japan in the presence of persons concerned and also upon delivery thereof in Indonesia in accordance with the specifications.

4.5 List of laboratory equipments, apparatus and tools

Description	Quantity
1. Computer for Technical Calculation	1
2. Electronic scanning Microscopes	1
3. Stereo Plotting Instrument	1
4. Direct Reading Table Balance	22
5. Mechanical Convection Drying Oven (L)	1
6. Automatic Muffle Furnace	1
7. Heating Mantle	1
8. Water Bath	1
9. Low Temperature Thermostat	1
10. Automatic Control Water Thermostat	1
11. Ultra Deep Freezer	1
12. Mechanical Convection Drying Oven (S)	6
13. Reciprocating Shaker	2
14. Plastic Desicator	2
15. Desicators	3
16. Rotary Vacuum Pump	1
17. Electronic Pen Recorder	1
18. Electronic Pen Recorder	1
19. Auto Centrifuge	2
20. Homogenizer	2
21. Soil Sedimentation Apparatus	2
22. Soil Tensiometer Sets	10
23. Soil Hardness Tester	2

	Description	Quantity
24.	Soil Exchange Capacity Determination Apparatus	5
25.	Soil Membrane Pressure Apparatus	1
26.	Electrode PH Meter	1
27.	Ion Meter Tester	1
28.	Magnetic Stirrer	10
29.	Filter Apparatus	5
30.	Soil Analysis Sieve Set	3
31.	Agate Tester	5
32.	Blast Burner	2
33.	Stainless Steel Tank	2
34.	Micrometer	3
35.	Aspeleter	2
36.	Demineralizer	1
37.	Water Still	2
38.	Soil PF Measuring Centrifuge	1
39.	Soil Sampling Cylinder	50
40.	Soil Sedimentation Apparatus	1
41.	Soil Sieve Set	10
42.	Cutting Mill	1
43.	Mechanical Analysis Stirrer	1
44.	Spectrophotometer Double-Beam	1
45.	Flame Photometer	1
46.	Atomic Absorption Flam Spectrophoto Meter	1

	Description	Quantity
47.	Nitrogen Water Still	4
48.	Kjeldahl Distillation Apparatus	4
49.	Mag Mill	2
50.	Emission Spectroscope	1
51.	Darkroom Instrument	1
52.	Agricultural Meteorological Meter	1
53.	Grating Infrared Spectrophotometer	1
54.	Evapo-Transpiration Amount Measuring Instrument	1
55.	Green Leaf Area Meter	1
56.	Plant Moisture Potential Tester	1
57.	High Pressure Air Compressor	1
58.	Percolation Meter	1
59.	Thermostatic Germinator	1
60.	Paraffin Embedding Oven	1
61.	Paraffin Embedding Instrument	1
62.	Microscope	2
63.	Mechanical Convection Drying Oven	1
64.	Lux.Meter	2
65.	Low Temperature Thermostat	2
66.	Practice Microscope	10
67.	Zoom Microscope	10
68.	Sliding Microtome	3
69.	Rotary Microtome Sliding	1

Description	Quantity
70. Automatic Microtome Polish Instrument	1
71. Paraffin Spreading Warmer	1
72. Microscopes Camera	2
73. High Pressure Soil Sterilizer	1
74. Automatic Hot Air Sterilizer	1
75. Hand Sugar Refractometer	2
76. Aseptic Box	2
77. Burner for Aseptic Box	2
78. Incubator	2
79. Turf Trimming Machine	4
80. Sterilizing Diffuser	4
81. Chain Saw	4
82. 7 tons Dump Truck	1
83. Buldozer	1
84. Fork Lift	1
85. Equipments of Experimental Plantation	1
86. Jeep	1
87. 4 tons Dump Truck	1

Chapter 5 SCHEDULE AND COST

5.1 Rough estimates of construction cost

1. Construction cost	¥ 1,045,000,000
2. Laboratory equipments, apparatus and tools	¥ 305,000,000
3. Detail design & supervi- sion fee	¥ 150,000,000

Total ¥ 1,500,000,000

5.2. Scope of construction work

5.2.1. Works included in 5.1.

1. Study Center Building and Energy Center Building

1. Buildings, elevated water tank and supporting structure.
2. Porches and berms, etc. for the buildings.
3. Water supply, drainage, sewer and sanitary installations and electrical installations.
4. Laboratory equipment, apparatus and tools

2. Shade House

1. Building
2. Porches and berms, etc. for the building.
3. Water sprinklers.

3. Operation Office for University Forest (Lempake)

1. Building
2. Porches and berms for the building.
3. Water supply, drainage, sewer sanitary and electric installations.

4. University Forest Building (Sambodja)

1. Building
2. Porches and berms for the building.
3. Water supply, drainage, sewer, sanitary and electrical installations.

5.2.2. Works not included in 5.1.

1. Purchase of the land and demolition and removal of obstacles.
2. Topographic survey and soil investigations of the sites.
3. Clearing and levelling of construction site
4. Construction of access roads
5. Electricity supply and substation
6. Water supply up to the receiving tanks
7. Outdoor drainage works
8. Sewage treatment facilities and garbage disposal facilities
9. Telephone wiring
10. Paving and parking lots within the sites
11. Gates and fences
12. Exterior lighting
13. Retaining walls
14. Landscaping and planting
15. Furnitures, drapes and rugs
16. Legal formalities for land and construction
17. Dormitory

5.3 Construction schedule

The following schedule was worked out for the project for completion by the end of March 1980

