4-3-2 Construction plan

1. View plan

■ Study on the block plan

(1) Block plan of the main building

A number of candidate block plans were examined and compared for producing the final plan when considering the following basic points.

① A road in front of the existing Botanical Gardens will be used as the access road.

② From the point of view of placing importance on the coodination between the functions, all of the units of the attached facilities will be allocated in the area close to the laboratory affiliated to the Botanical Gardens to concentrate each function.

③ The four functions of the Forest Laboratory must be clearly separated. Each of the corresponding facilities shall be in a minimal configuration consisting only of the essential elements.

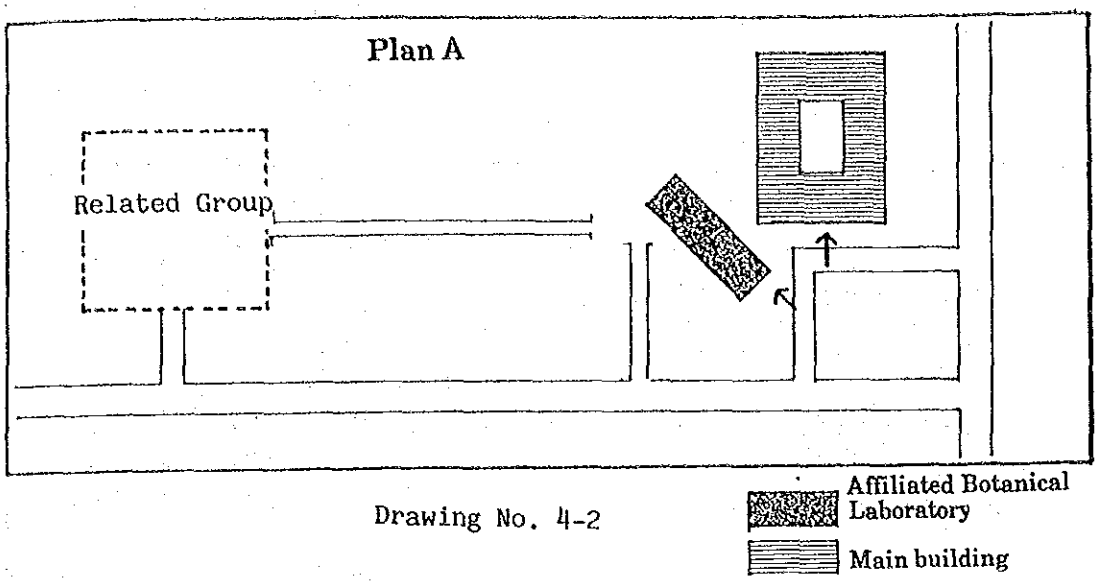
④ As for the outdoor facilities which are accompanied by noise, mechanical vibration, bad odors etc., consideration for taking measures for environment protection as well as for good appearance shall be made and such facilities shall be gathered at one place.

⑤ Dual-level construction shall be adopted to reduce vertical travelling by the staff and also maintenance costs.

⑥ Although longer horizontal travelling is a disadvantage in low-level construction, the building shall be designed so that such a disadvantage may be lessened after studying the traffic flow in the building and the functional linkage between the departments.

⑦ Research rooms shall be laid out and designed so that sunshine and natural ventillation throughout the year may be maintained at a proper level.

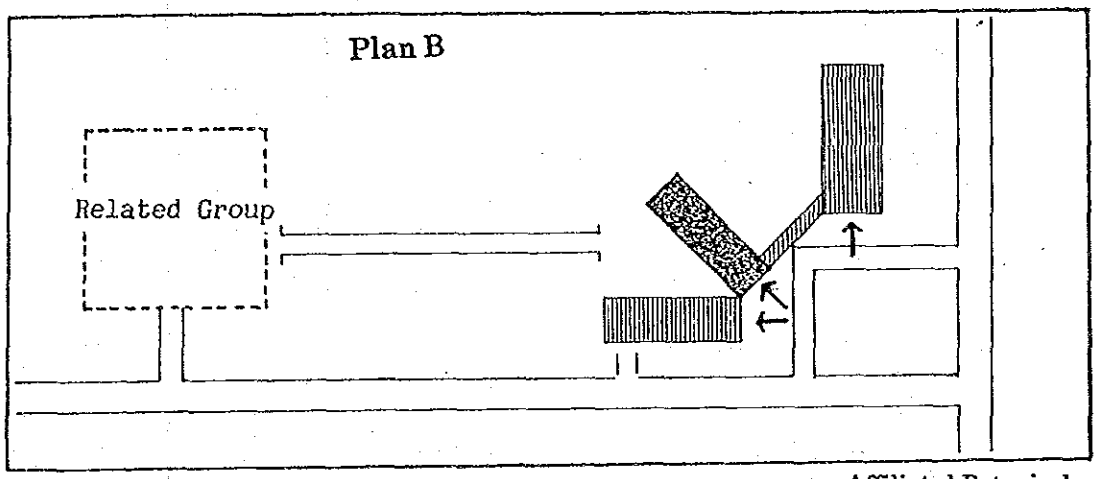
⑧ Extra space for future extension shall be kept around the main building.



Drawing No. 4-2

Affiliated Botanical Laboratory

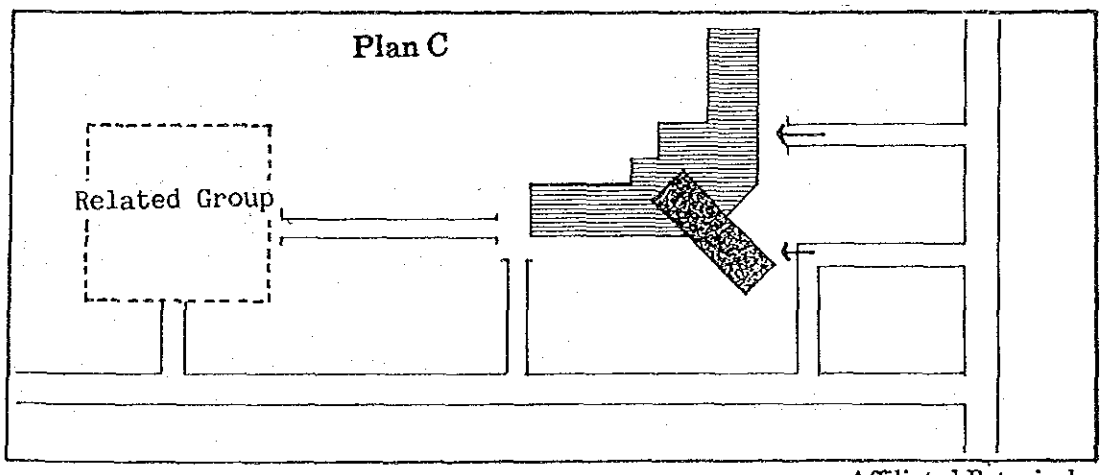
Main building



Drawing No. 4-3

Affiliated Botanical Laboratory

Main building



Drawing No. 4-4

Affiliated Botanical Laboratory

Main building

Table No. 4-1

List of block plans for comparison

	A	B	C
1 Connection between the Experimentation Department and the Research Department	○	△	○
2 Extension plan of the facility	△	○	◎
3 Visitor management/checking system	◎	△	◎
4 Management of the total facilities of the Botanical Gardens	○	△	◎
5 Independence of the Service Departmentand its connections to others	△	○	◎
6 Amenity of the research rooms	◎	○	◎
7 Connections between the Research Department and the annex	△	○	◎
8 Integration of the laboratory affiliated tothe Botanical Garden	△	○	◎
9 Connections between the Management Department and the Research Department	○	△	◎
10 Connection between the General Department and the Research Department	○	○	◎
Total	○	△	◎

As a result from the above table, Plan C is adopted for the best without any faults.

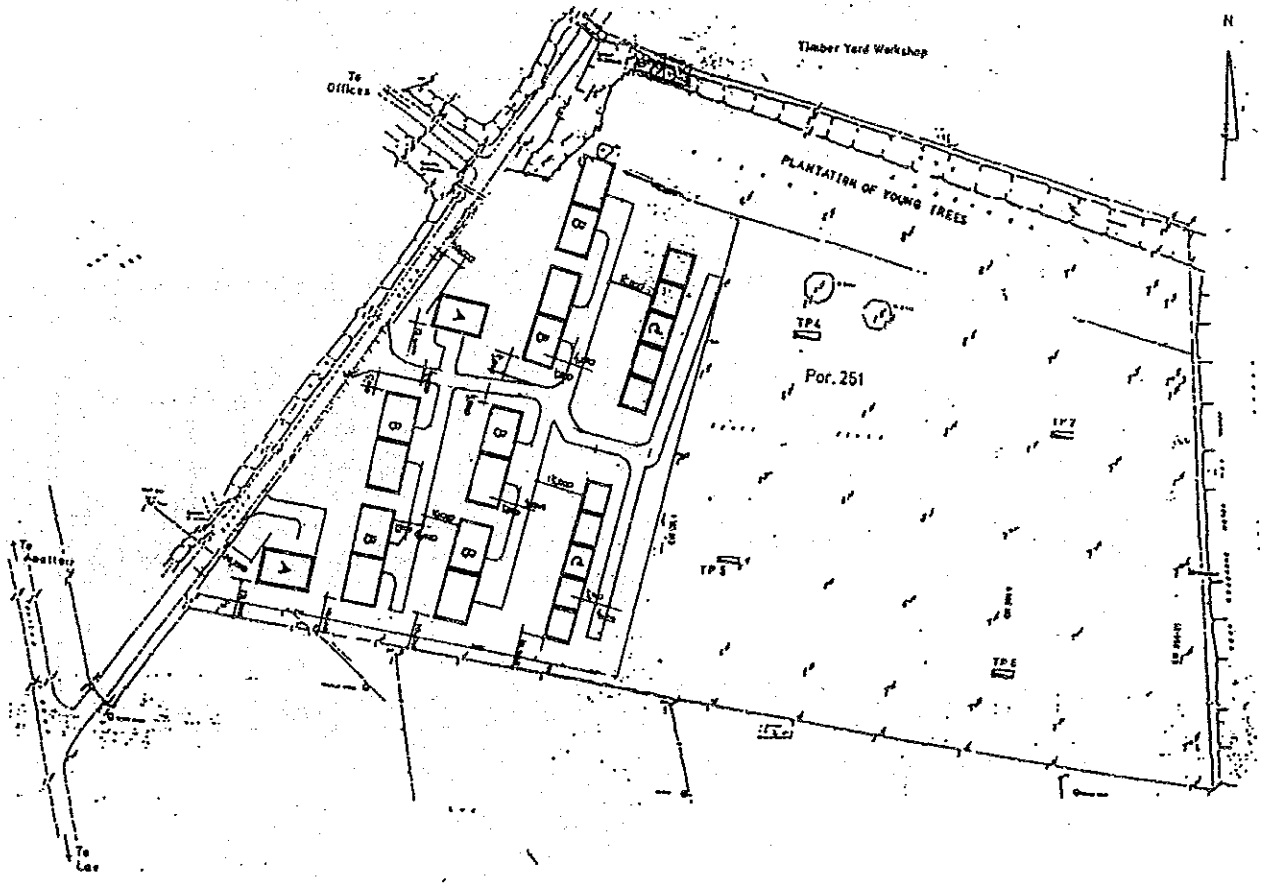
(2) Block plan for the accommodation block

① A clear border line shall be installed around the accommodation blocks which are built on the TITC campus, so as not to interfere with the life of the students there. In parallel, measures to protect the privacy of the residents shall be taken.

② The accommodation blocks shall have spare space for any future extension when the number of accommodations increase

③ A men such as guard rails and/or a fence shall be installed around the accommodation block zone for security purposes.

Drawing No. 4-5

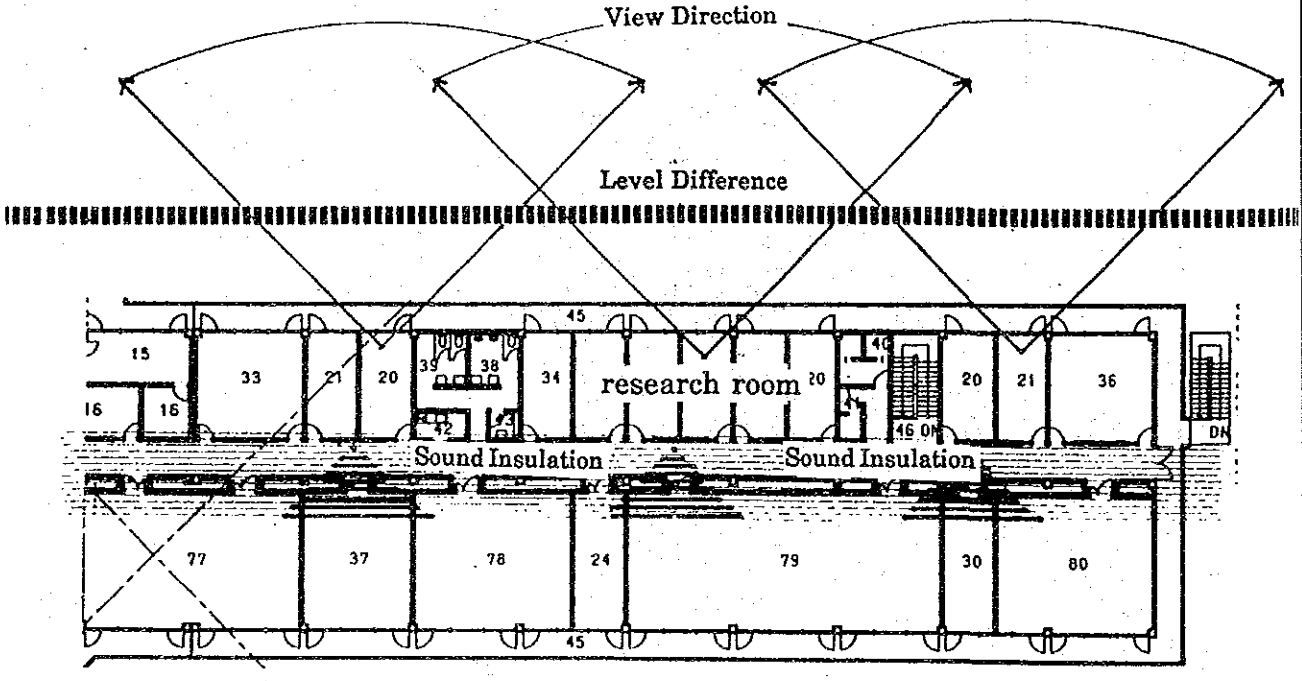


(3) Block plan for research room section

The research room section is designed so that the research rooms of the Branch Head of the department, Section Head and Scientific Officer are allocated in close proximity, the experimentation rooms being allocated at an organically linked distance from the research rooms, and with an equal position of sunshine and scenery for each room and independence of each room should be secured.

The research room section is the section where the highest residential ammenity is required of all the sections in the main building of the laboratory. As a sound-proof measure, it will be designed so that the double-layered wall of the pipe space and the corridor will keep out the noise from the experimentation rooms. In addition, while the experimentation rooms will be allocated on the side of Huon Road and Memorial Avenue, the research rooms are allocated on the opposite sides. It is designed so that one can command a view of the Botanical Gardens from the each research room facing the garden located at the foot of a 10 meter cliff.

Drawing No. 4-6



2. Planning on in-house traffic

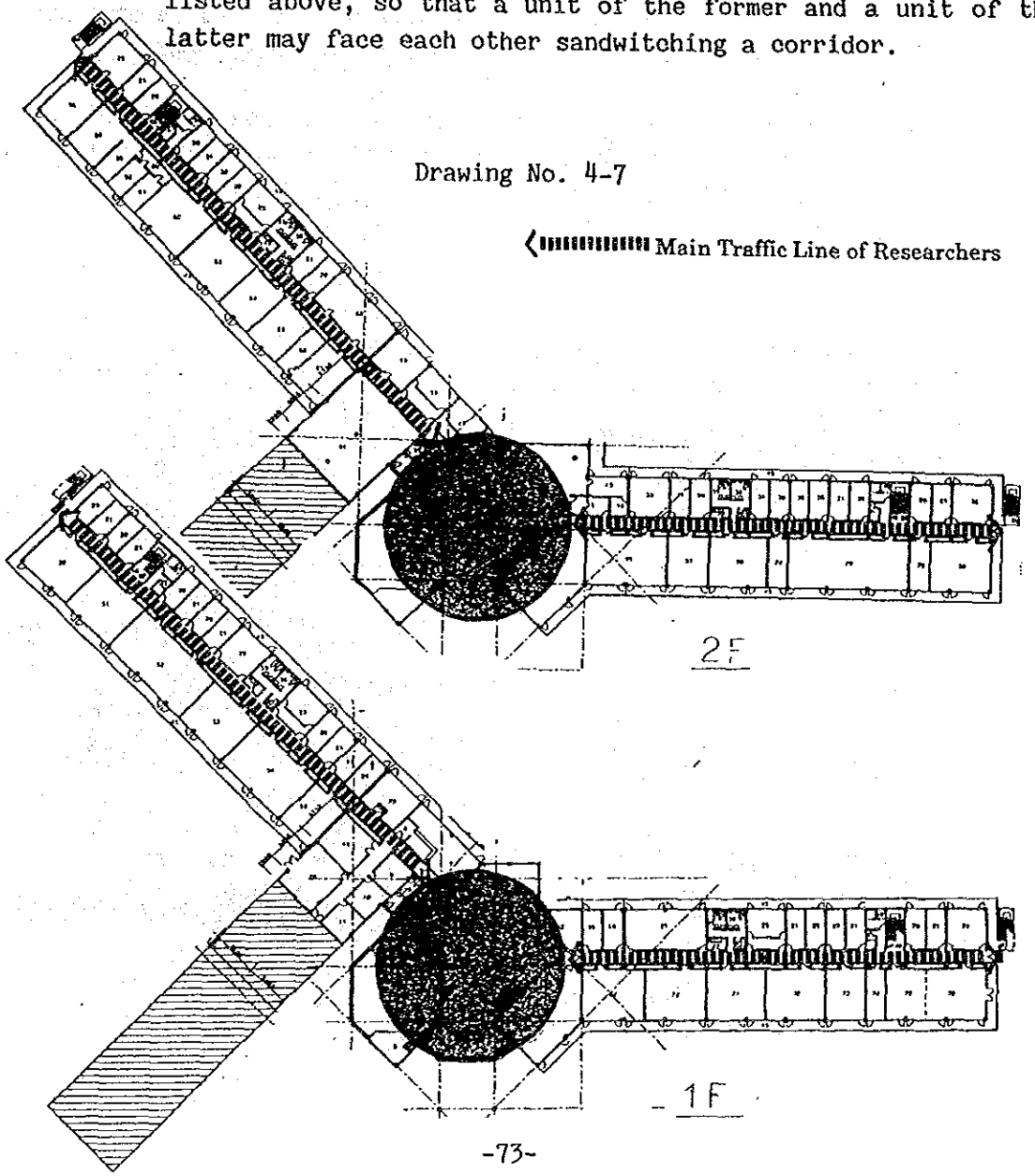
(1) Traffic of researchers

- The Forest Product Department is housed in the North Wing while the afforestation Department and the Forest Protection Department are housed in the West Wing after considering the numbers of resaerch rooms and researchers as well as the traffics.Consequently, the balance in the traffics between both wings will be maintained.

- Furthermore, from the standpoint of comprehensive research in the Forest Laboratory, the library, sample rooms and conference rooms are allocated at the crossing points of the traffic routes of the three wings.

- The experimentation rooms and research rooms shall be allocated in an area close to any one of the traffic routes listed above, so that a unit of the former and a unit of the latter may face each other sandwitching a corridor.

Drawing No. 4-7



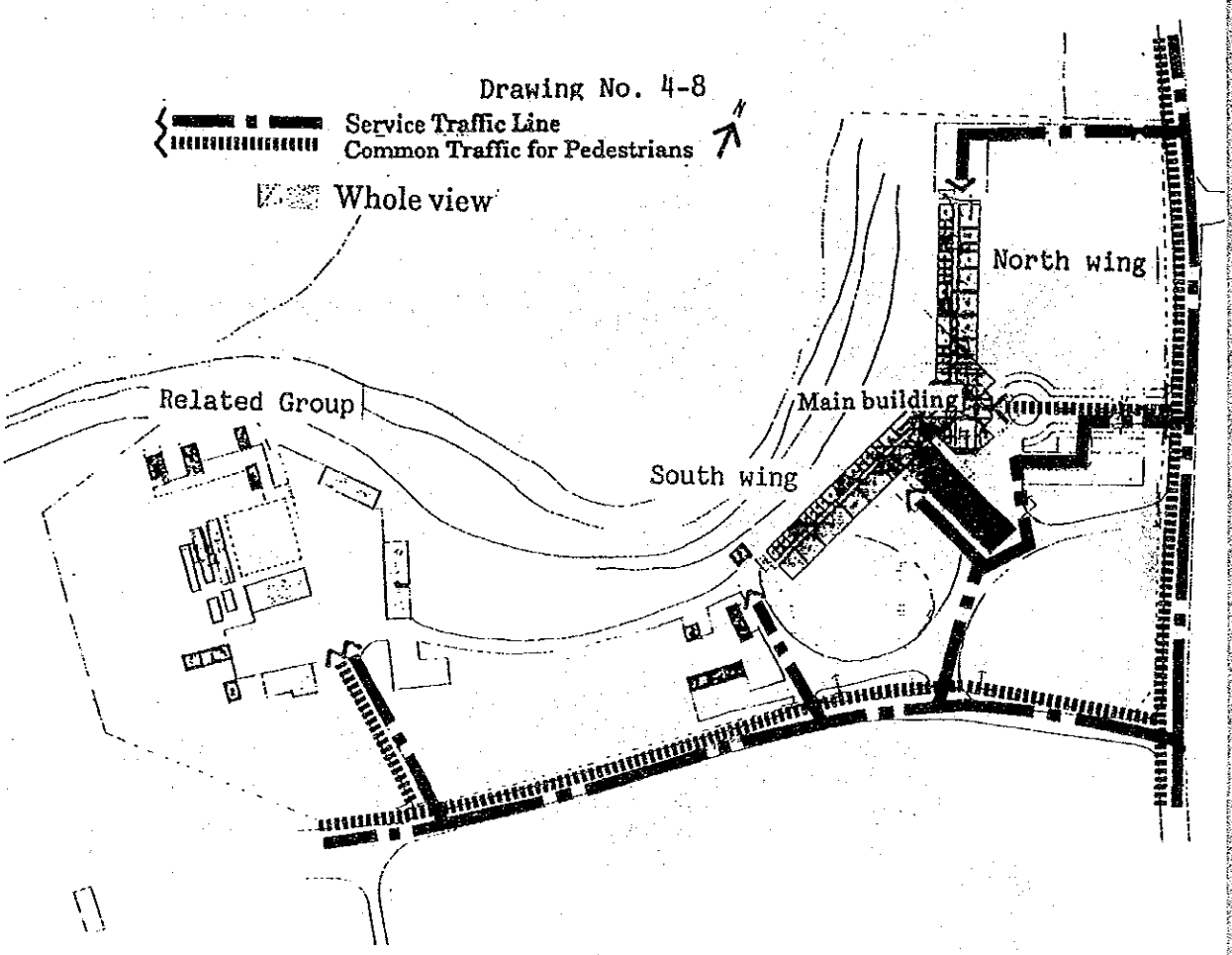
(2) Service traffic

- Experimentation rooms for structure application of the Forest Product Department for timber and sample products shall be installed on the ground floor of the North Wing to make it possible to move the timber in the rooms easily using a transfer unit or device.

- Experimentation rooms using special gases shall be installed on the second floor from the standpoint of safety. On the other hand, there will be an outdoor facility to store inflammable materials and dangerous chemicals in an area close to the end of the South Wing. Those dangerous materials and chemicals will be carried into each experimentation room through a corrider from the end of the wing.

- Electrical rooms and machine rooms shall be installed at the center of each of the three wings of the main building of the Forest Laboratory. Equipment and materials used for facility maintenance will be carried in through those rooms.

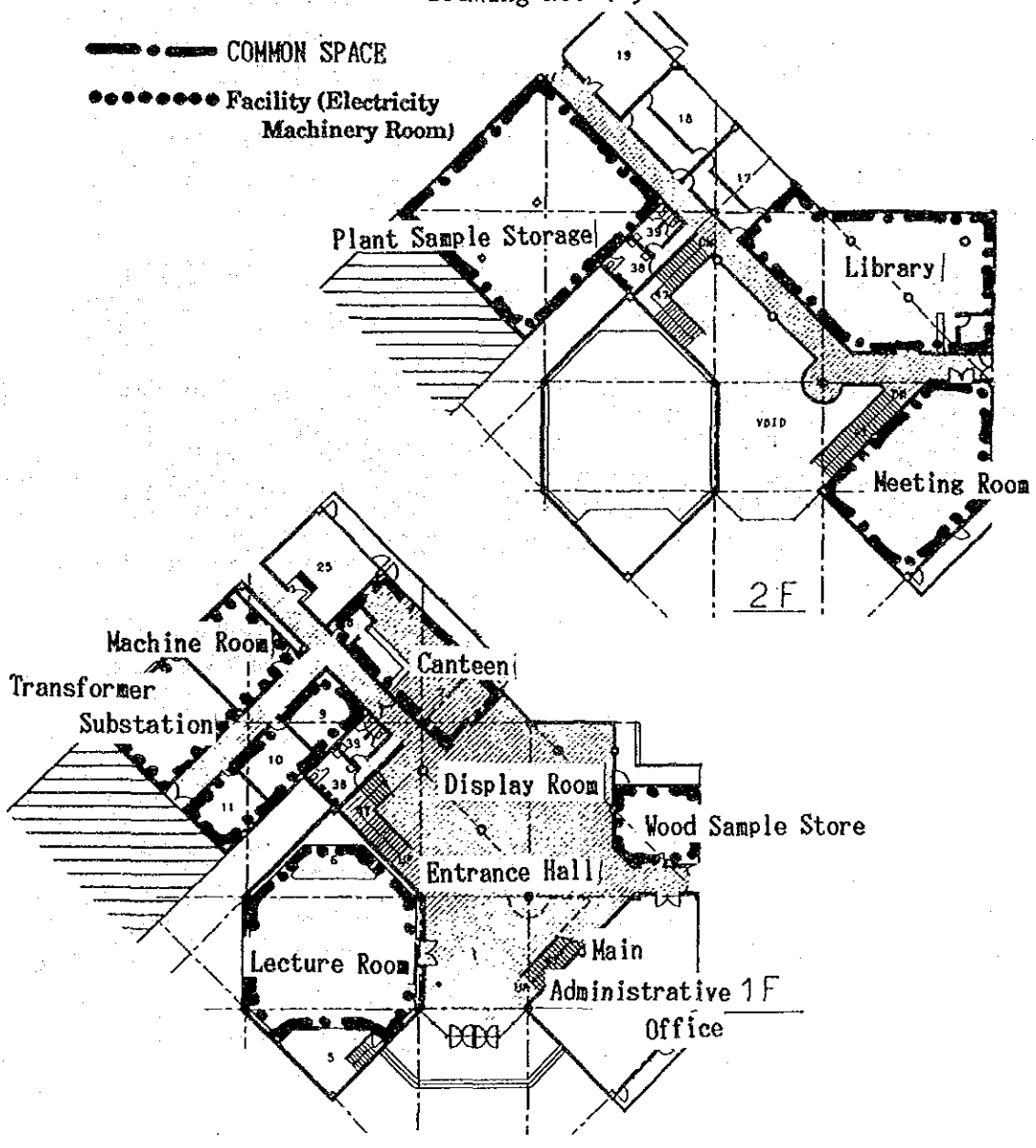
- Other general things related to the Service Dpartment will be carried in through the corridors from the ends of the North and South Wings.



(3) Traffic Line in common use section

- The main entrance and entrance hall shall be installed at the junction of the three wings from the standpoint of operability. Other common facilities which are open to the public such as the library, large conference room, exhibition areas, managerial offices, sample rooms and canteen shall also be placed near the entrance.
- Machine/equipment rooms shall also be placed near the entrance.
- The layout of each building block shall be designed by placing an emphasis on the common corridor running through it.

Drawing No. 4-9

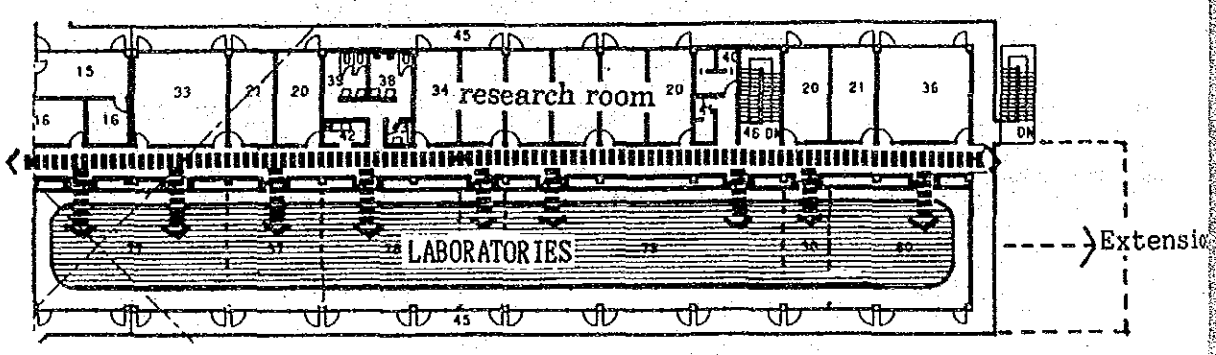


3. Layout planning of each section

(1) Experimentation room section

It is important to provide an adaptability and flexibility to the layout of an experimentation room to meet future changes in the subjects of research to be carried out by the laboratory, by introducing a standardized method. Introduce a system to define one-span experimentation room as the standard unit. It shall be designed so that reorganization of a experimentation room may be done in minimal time. In addition, an energy service area shall be installed on the corridor side of the experimentation room. It must be able to meet any changes in room configuration.

Drawing No. 4-10



(2) Layout of the accommodation section

① Three types of residential unit, A-type, B-type and C-type, shall be installed. The A-type is 3LDK 1flat with a den, B-type is 3LDK 2flat with a den, while the C-type is 1LDK 5flat. A-type resident unit shall be used by the Director and Asst. Director. B-type residential unit shall be used by the Branch Head, Section Head and Long-term stay Japanese research specialists. C-type residential unit shall be used by researchers from a third country or short-term stay Japanese research specialists.

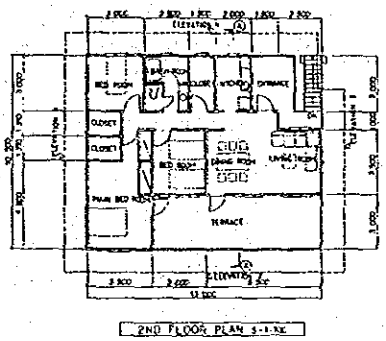
② The 3LDK type of unit shall have a den in the living room area.

③ One of the three bedrooms shall be designated as the master bed room.

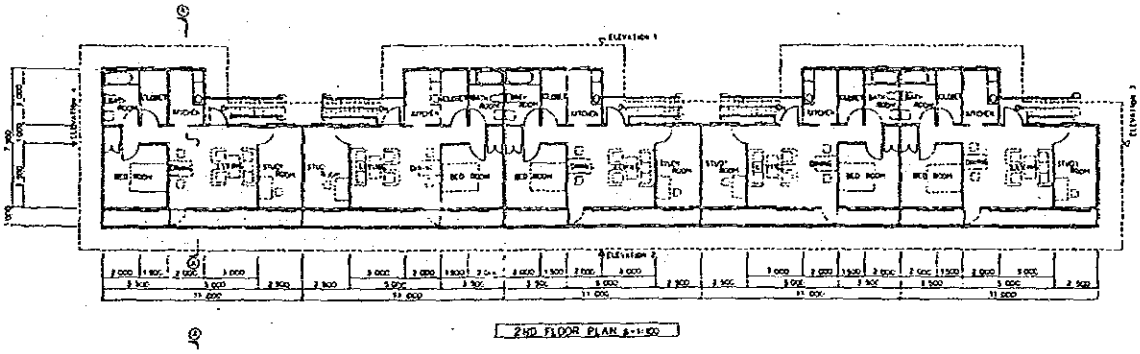
④ The bath room shall be fully-equipped one with both a bath tub and a shower. No component-separated types shall be installed (e.g. no shower rooms will be installed.)

⑤ The standard floor area of a 3LDK residential unit is 81.0 square meters according to the PNG National Standard. This standard shall be introduced as the basis. But an additional area for the den shall be allowed, if necessary. The standard floor areas recommended by unit type, are as follows:

A or B type 3LDK (with den) 81.0 sq.meters



C type 1LDK (with den) 65.7 sq.meters



Drawing No. 4-11

4. Vertical and cross-sectional (three-dimensional) layout

(1) Vertical and cross-sectional (Three-dimensional) layout of the main building

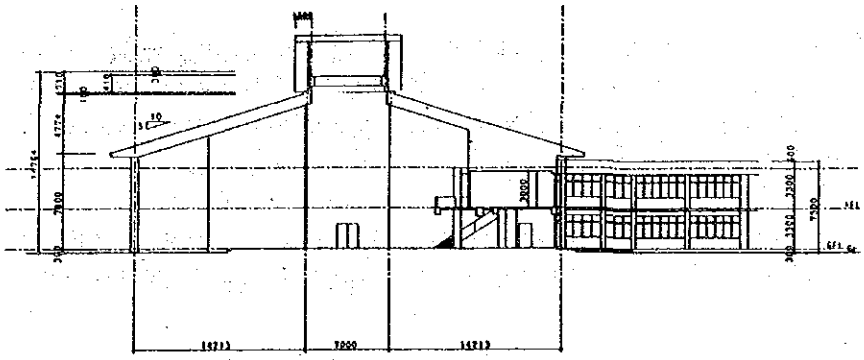
As stated in the above basic policy, it is important to prepare the three-dimensional and cross-sectional layout by taking into consideration complete measures against rain, termites, flying insects etc., and for sunshine and security in PNG country security.

The standard ceiling height of each room on the first floor and the second floor shall be 3.3 meters, The standard ceiling height of the common-use section floor shall be 4.3 meters, the standard ceiling height of the research/experimentation section shall be 3.3 meter. The layout basis level shall be set at the present site level and the first floor level of the laboratory buildings shall be set at a level 30 cm higher than the present site level, considering the fact that most areas of the first floor will be occupied by experimentation rooms and research rooms that will be provided measures against water flooding and heat from ground-reflected sunlight.

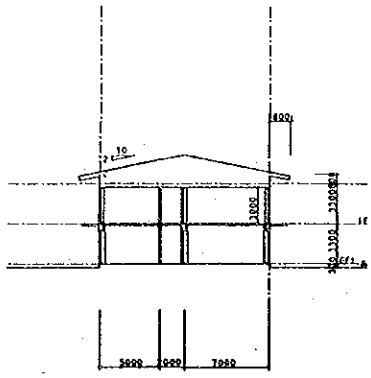
The standard roof slope angle shall be set at 2/10. The roofs shall have structures prepared for a large amount of rain. The roofs shall be covered with metal plates of a light color and/or tone using a complete thermal insulation method. To prevant rain water leaking into buildings the following measures shall be taken. Rain water on a roof shall be guided directed to one point which installed along the outside of the building.

The cross-section of an experimentation room or research room shall be of a design for researchers working at the living corner to get natural ventilation in either the dry or wet season. In addition, as measures to keep a safe and pleasant living environment, lighting and ventilation of a corridor shall be made by introducting natural light and air through windows and holes installed in the wall of the corridor.

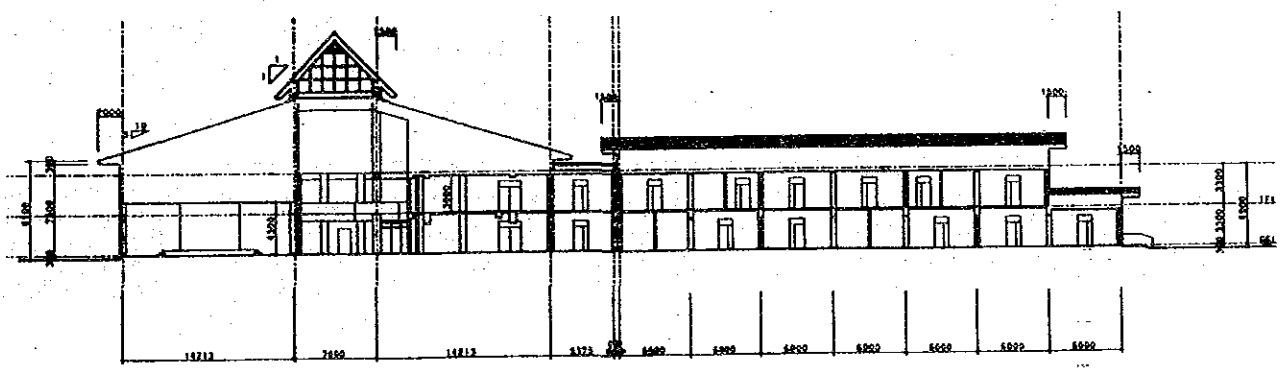
Drawing No. 4-12



B-B SECTION



C-C SECTION



D-D SECTION

(2) Vertical and cross-sectional (Three-dimensional) layout of the accommodation block

① The celing heights of the residential units shall be according to that of the laboratory buildings.

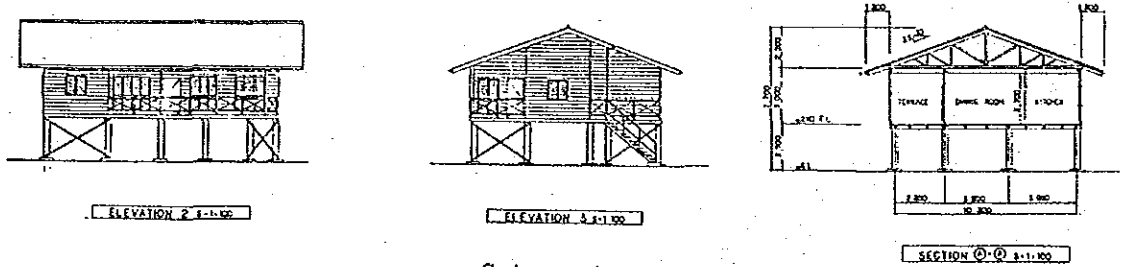
② The ceiling top, which is used as a ventilating space, shall have a structure with good thermal insulation.

③ A high-floor type of unit shall be introduced with a floor height of GL+2500mm. It is possible to use the space below the floor as a car port and for other purposes.

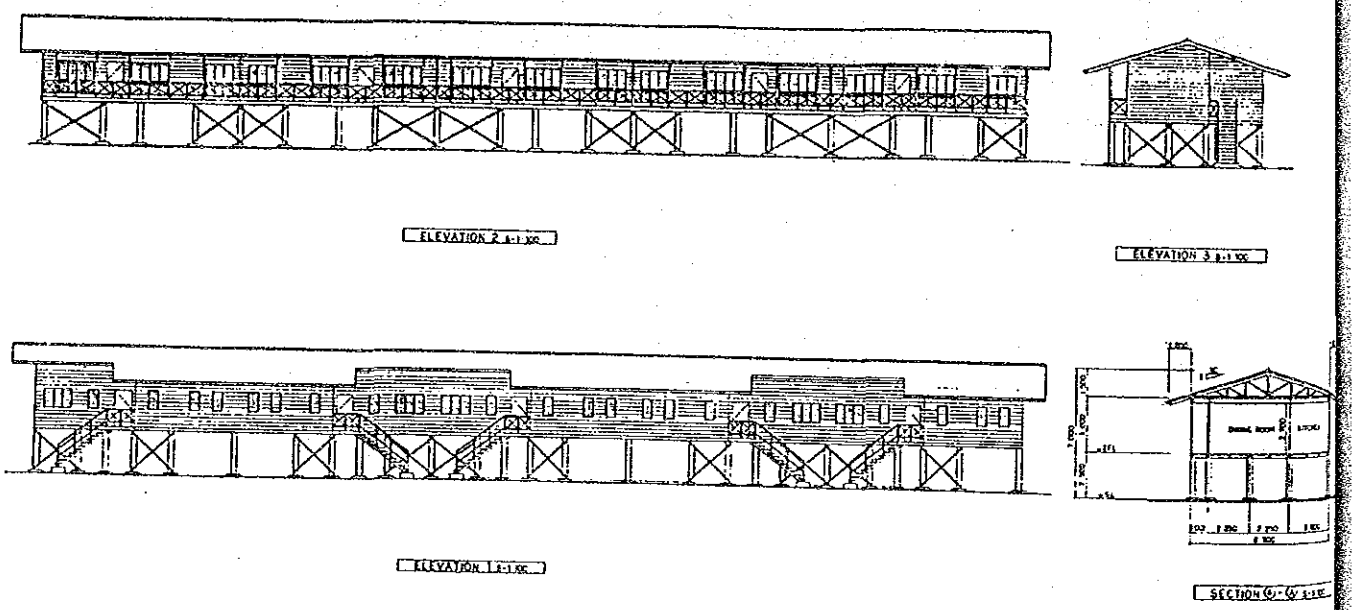
④ In building the fundamental building frame, the method of placing bundles of high-floors in "FLAME TYPE" shall be used. Wooden houses according to the local style shall be placed on the frame.

⑤ For security, louver board shall be placed on window and in addition net shall be placed on it for the protection from insect.

A.B type 3 LDK



C type 1 LDK



Drawing No. 4-13

5. Planning of the structural framework

(1) Policy on the structure design

It is the basic policy that the building shall have a structure that guarantees a sufficient level of safety and cause no problems, which may be caused by bending/shearing forces and/or vibration when a load is applied for a long time or when a heaby load is applied for a short period. The national standard of PNG on building structures shall be applied as the basic standard of the policy. However, the Japanese standards may also be referred to when necessary for the structure design.

(2) Style of structural framework

The layout of the building indicates that the laboratory has an complicate form with a number of long members. That means that it tends to have a local concentration of strain forces. In order to overcome that problem, expansion joints are installed at the end of each wing to make it a simpler structure.

On the other hand, a simple rigid frame structure by rainforced concreate instead of an anti-earthquake wall structure shall be used for constructing the frame of the building to allow freedom on the plan-view layout. However, an iron frame of independent construction shall be installed for the giant roof of the hall. The allowable strain force level method shall be used as the structural design method.

(3) Load

① Live load (According to PNG S1001)

Table No. 4-2

Classification	Live load (unit: kpa)
Assembly room	4.0
Laboratory	3.0
Office	3.0
File room	5.0
Class & lecture room	3.0
Toilet room	2.0
Kitchen	5.0
Dining room	2.0
Corridor	3.0

* 1 kpa = approx. 102kq /sq.m

② Seismic load (According to PNG S1001: Part 4)

$V = C \cdot I \cdot K \cdot Wt$

V : Total horizontal seismic base shear

C : Basic seismic coefficient

I : Importance factor

K : Structural type factor

For the building in question, the following values have been determined.

C = 0.14

I = 1.0 (normal building)

K = 1.0 (regular rigid frame)

Distributing total horizontal seismic base shear is calculated according to the following formula.

$$Fi = \{(Wi \times hi) / \text{sigma} (Wi \times hi)\} \times V$$

Fi : Shear of the No.i layer

Wi : Height of the No.i layer

hi : Height of the No.i layer above ground

③ Design load combinations (According to PNG1001: PART1)

In the case of working stress design, the design loads are defined as follows:

Long term loading D+L

Short term loading

With earthquake D+L+0.8E or

0.7·D+0.8E

With wind D+L=W

D : Fixed load

L : Live load

W : Wind load

④ Materials to be used and their strength

a. Materials to be used

Concrete : Use one having design strength of the following standard value.

Fc'=25MPa

(Equivalent to JIS - FC 240ks/cm^2)

Steel reinforcing bar	:	Grade 410Y(ASB02) ... for main rods of pillar and beam (Equivalent to JIS - SD35) Grade 230R(AS1302) ... for other roads (Equivalent to JIS - SR24)
Steel frame	:	Grade 250(AS 1204)
Block work	:	Concrete blocks Grade 12 (MPa) Grout Corefilling Concrete F/C=15MPa to PNGS 1004 (Equivalent to JIS - SS41)

b. Strength

(a) Concrete

Table No.4-3

1		2	3	4	5	6	7	8	9
Property	Maximum permissible stresses, MPa								
	For any strength of concrete that is in accordance with Section 4	For values of Fc, MPa							
		15	20	25	30	40	45	50	
Compressive stress Fc	0.45Fc	6.75	9.00	11.25	13.50	18.00	20.25	22.50	
in flexure(MPa)	$0.13\sqrt{Fc}$	0.50	0.58	0.65	0.71	0.82	0.88	0.92	
Tension in plain concrete (MPa)	0.35Fc	5.25	7.00	8.75	10.5	14.0	15.75	17.5	
Bearing, prior to application of the factor given in Clause 9.14 (MPa)		11.0	9.5	8.5	7.5	6.5	6.0	6.0	
Modular ratio.									

Note : For short-term loading, multiply the values indicated in Table No. 4-3 by 1.33. (Unit: MPa)

(b) Steel reinforcing bar

Table No. 4-4

1	2	3	4
Type and grade of reinforcement		Maximum permissible stresses	
Designation	Specified minimum yield, or 0.2% proof stress, f_{sy} MPa	Tensile reinforcement, Fs MPa	Compressive reinforcement, Fsc MPa
(a) (i) Plain bars-Grade 230R-AS 1302	230	140	125
(ii) Deformed bars-Grade 230S-AS1302	230	140	125
(iii) Deformed bars-Grade 410Y-AS 1302	410	210	170
(b) Cold-worked bars-Grade 410C-AS 1302	410	210	170
(c) (i) Hard-drawn wire-AS 1303	450	230	170
(ii) Welded wire fabric-AS 1304	450	230	170

(c) F_y=250 MPa 1 MPa=approx. 10kg/sq.cm

⑥ Basic layout

This reinforced concrete two-storied building produces a loading load of approximately 3 ton/sq.meter.

According to a geological survey report, the foundations shall be taken to greater depth of 1.5 to 2.0 m in order to achieve bearing capacities of 100 to 150 kpa. Consequently, it is considered that the ground foundations are strong enough to support the building in question.

The areas where there used to be lakes or ponds, shall be met with the measure to increase the depth benlow the ground level of each corresponding excavation in the areas.

6. Planning on the facilities and equipments

■ Electrical facilities

(1) Power supply facility

- Power receiving facility

a. Install the electric poles in an area on the building site in question to receive the incoming power supply of 11,000 volts, 3-phase, 50HZ via each 4-wire electric power transmission line which runs along the road on the front to the future building site for the Forest Laboratory. Also install a power transforming system at a location on the side of PNG Elcom, to receive the power at a reduced voltage.

b. The power supply lines to the employee accommodation blocks are to be built on the TITC land lot. There will be a branched line from the existing electric pole in the current lot.

PNG Elcom is responsible for installing the transformer and the said electric poles and transmission lines, while the Japanese side is responsible for the construction work on the part after the secondary outlet terminals of the transformer.

- Backup power generation facility

The power supply system of Rae City in PNG country usually has a couple of blackouts every month, each one lasting an average of 15 minutes. They have experienced one that continued for 3 hours which is the record.

A blackout that caused all the key functions of the laboratory to cease could destroy all the research and test results obtained during the past one to two years. In order for preventing such a disastrous situation a backup power generation system which can meet the loads to run the necessary basic equipment in an emergency will be installed as well. The computer systems, special-purpose facilities, firefighting systems etc., are covered as the objects. The capacity of the backup power generator will be 200 KVA.

(2) Illumination equipments

Fluorescent lamps will be used as the basic means of illumination. The desired average illumination intensity of the fluorescent lamps to be installed by building section, is given in the table below.

Table No. 4-5

Desired average illumination by building section

Section	Desired illumination	JIS standard illumination
Study saloon	450	300~750
Laboratory	450	300~750
Office rooms	500	300~750
Conference room	500	300~750
Warehouse	75	75~150
Hall	200	200~500
Corridor	100	100~200
Dining room	300	200~500
Working room	300	150~300
Lecture hall	400	200~500
Toilet	100	100~200
Residence	150	75~150

Note : Fluorescent lamps are installed on the ceiling by means of direct fixing, inlaying or pipe-hanging.

(3) Electric outlets

Not only standard electric outlets but also special outlets for research equipment which uses higher voltages, will be provided as necessary.

(4) Telephone equipment

A digital telephone exchange system is installed in the office of the Administrative Department and is connected to the public telephone line. The telephone exchange system can take care of 10 external telephone lines and 100 extension lines.

The Japanese side shall be responsible for the work after the MDF inclusive. However, the Japanese side is also responsible for the installation work of the piping to accommodate the lines to be connected to the public line.

Each residential building will have a piping system for telephone lead lines, which will be connected onto the building at two certain residence units.

(5) Broadcasting equipments

A broadcasting system with a 10 line switchboard will be installed at the office of the Control Department for inhouse broadcasting. Its output power is 240 watts. Speakers are installed in the corridors in every room and at other places. Each residential unit will also have an atteneta. Each lecture room will have an independent speaker system.

(6) Fire alarm equipment

The monitor board of the fire alarming system will be installed in the office of the Administrative Department. In the case of fire the Department will broadcast the information on the fire. On the top of a fire hydrant, a red display lamp and a switch for the alarm system are installed. A trigger switch to set off the fire alarm system is also installed on the hydrant. The fire sensors will be installed in every room, corridor and at necessary points.

(7) Lightning conductor

A lightning conductor system will be installed at each building block to prevent any damage from lightning shocks.

■ Air conditioning equipment

(1) Designed for outdoor/indoor atmospheric conditions

. Designed for outdoor conditions

Temperature 34 degrees centigrade (D.B.)

Humidity 70% (R.H.)

..Designed for indoor conditions (when the conditioner is in operation)

Temperature 26 degrees centigrade (general residence)

Note: The conditions of the special air conditioning systems are designed separately.

(2) Rooms to be airconditioned and method

Every research room and laboratory room will be equipped with an air conditioning unit. A separate type or package type unit (to be used for cooling only) will be adopted in such cases. For rooms which need control of both temperature and humidity for the purpose of research and/or experiments, a duct type unit will be used. Each room of the accommodation blocks will be equipped with a separate type air conditioner.

(3) Ventilating system

The kitchen will be installed with a mechanical ventilating system using ducts. The ventilation of each research or experimentation room will depend on the natural ventilation effect caused by the structural design of the building. But if it is necessary for research activities, the relevant rooms will be installed with a third class ventilation system.

(4) Temperature/humidity automatic control equipment

An temperature/humidity automatic control equipment will be installed only for rooms which need such a facility for the purpose of research.

■ *Water supply and sewage systems*

(1) Water supply system

a. A main water supply pipe of the National Water Supply has been installed under the road running along the front of the Forest Laboratory lot. This laboratory will receive water from the main pipe via an 80φ pipe by direct connecting supply system.

b. Water supply to the accommodation blocks will be done by making a branch from the existing water supply pipe under the ground of the TITC lot. Each residential unit which has a meter, will receive its water supply directly from the branch pipe.

(2) *Drainage/vent system*

a. A main sewage pipe will be installed by June 1988 along the road running along a side line of the Forest Laboratory lot. The construction is already under way, waste waters and sewage will be drained into the said sewage system. Waste waters and sewage flow separately in the building, but the flows will merge outdoors. Kitchen waste will merge into the other waste flows after passing through a grease trap. Incidentally, special and toxicis waste will be collected in plastic containers and processed separately.

b. Waste water and rain water from the each residential unit is collected in the each residential unit's septic tank, and it is left to a process of natural vaporization and ground absorption to be made in the same lot.

c. The circuit ventilating method is used for the ventilation system.

(3) Septic tanks

There is no possibility of finding a processing facility to which waste water produced from the residential blocks can be discharged. Therefore the waste water will be processed by a process of septic tank system and ground absorption via sewage percolation basin.

(4) Hot water supply system

Each laboratory room will be employed for a gas water heating unit. A solar heating unit will be installed in each hot water supply room, kitchen, shower room etc. But hot water will not be supplied to each toilet. On the other hand, each residential unit of the accommodation blocks will have the solar heating unit.

(5) Sanitary equipment

Western-style toilet bowls will be installed in every regular toilet room. Urinals, wash basins and cleaning sinks etc., will be installed in a place where they are necessary.

(6) Kitchen equipments

Equipment to prepare dinners and drinks will be installed in the kitchen.

(7) Incinerators

An incinerator will be installed to handle rubbish produced from the Forest Laboratory Complex. The processing capacity is 150kg per hour.

(8) Indoor fire defence system

Indoor hydrants will be installed at the necessary points in the building according to the PNG Fire Defense Acts.

7. Planning on building materials

The building materials of each unit must be prepared by considering totally the following factors and take action as following ① and ②: the local climate, the situation of the local building industry, the unique functional requirements of that by building unit, the construction period, building costs and management and maintenance costs.

① Materials for structural frame work

A combination of an iron-reinforced concrete base and concrete block wall, which is commonly used locally, shall be adopted as the standard structural frame work for this project as well. There are no major problems with cement, frame beams or concrete blocks, which are all to be supplied locally.

② Materials for the finishing work

Importance is placed on durability and simplicity of maintenance in the selection of materials for the finishing work. Speaking of the key finishing materials such as for the external wall and roof, products made in Japan whose durability and economy have been already established shall be used. Other materials shall be supplied locally in PNG country in view of easy maintenance.

(1) External finishings

① Roof

The style of the construction base of the main building of the laboratory shall be a combination of reinforced concrete and rigid frame structure. The roof shall have an iron-framed flat structure with an insulating layer made of a layer of asphalt, felt sheet and metal plates and water-proof plywood sheet, in that order.

The air layer of the space above the ceiling plate will work as an insulating layer to prevent a temperature rise in the top floor rooms of the building.

② Exterior wall

That part of the exterior walls exposed to rain shall be made of iron-reinforced concrete for water-proofing. The exterior walls shall be finished with concrete paints while the inside wall where people walk shall be finished with paint.

③ Fixtures and fittings

Aluminum window frames shall be used as the external windows. They require no repainting and have no termite problems, compared with steel windows. Also it is possible to keep a room airtight for air conditioning or to prevent dust from coming in.

(2) Interior finishings

① Floor

Vinyl sheet, which is commonly used locally and polished on the building site, shall be basically used for the residential units and corridors. Concrete trowel finishing may be used partly for fixing. Vinyl sheet has excellent durability and maintainability, while it has smooth surface that is hygienic and easy to clean. It is available locally at a very economical price.

② Interior wall

A paint-sprayed mortar base shall be used as the standard method to finish iron-reinforced concrete and concrete block. A light iron-frame divider shall be used as the room dividing measure for easy and simple alteration of the room size in future. Semi-ceramic tiles shall be used for the walls of rooms in which water is used, such as the toilets, shower rooms and washing rooms.

③ Ceiling

The ceilings of the residential rooms, conference rooms and lecture rooms shall be finished with sound-absorbing rock wool sheets. (Standard method)
The ceiling of the laboratories in the ground floor shall be direct ceiling with concrete paint finishing.

4-3-3 Forest Laboratory Equipment plan

Determination of the quantities by model or type of equipment to be acquired was made according to the following points.

1) This laboratory is founded as an organization under the auspices of the Forest Ministry of the PNG with the purpose of performing research in a unified manner, which is necessary for the development and reinforcement of the forest resources in the country, including research on afforrestation, plant protection, forest products etc. Therefore, the models and quantities of equipment to be introduced, an effective and efficient research system.

2) Upon determining the configuration and specifications of a piece of equipment, it must be considered from the point of view that the introduced equipment can be used effectively and usefully. The status quo of the existing research institutions and facilities of the Forest Ministry must be studied carefully to evaluate the technological level of their staff, so that a proper and reasonable determination of the product models to be acquired may be made. In addition, to reduce as much as possible the need for expert knowledge in routine maintenance work by the resident staff, the number of items of equipment to be introduced shall be only on indispensable equipment.

3) More emphasis shall be put on a model manufactured by an established manufacturer or a product model with a proven higher operational stability with lower maintenance problems on a daily use basis after installation, shall be selected.

4) Equipment which allows easy operation and maintenance at lower cost, shall be selected.

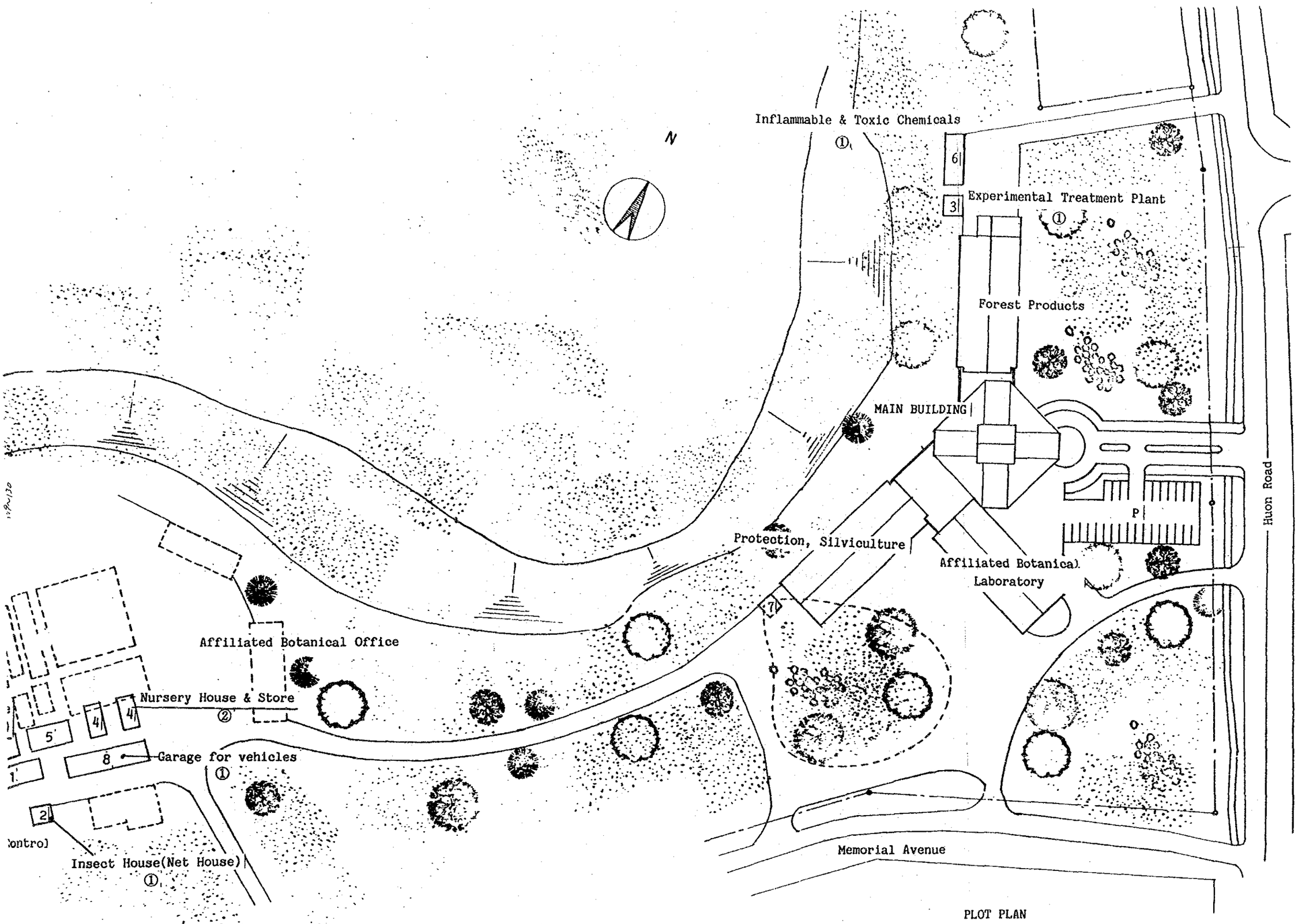
5) The installation of a system to supply consumables and spare parts of equipment for allowing to have easy maintenance, shall be considered with importance.

6) Training and education of the laboratory staffs on the operation and maintenance etc., of the equipment shall be done when the equipment is installed in PNG country.

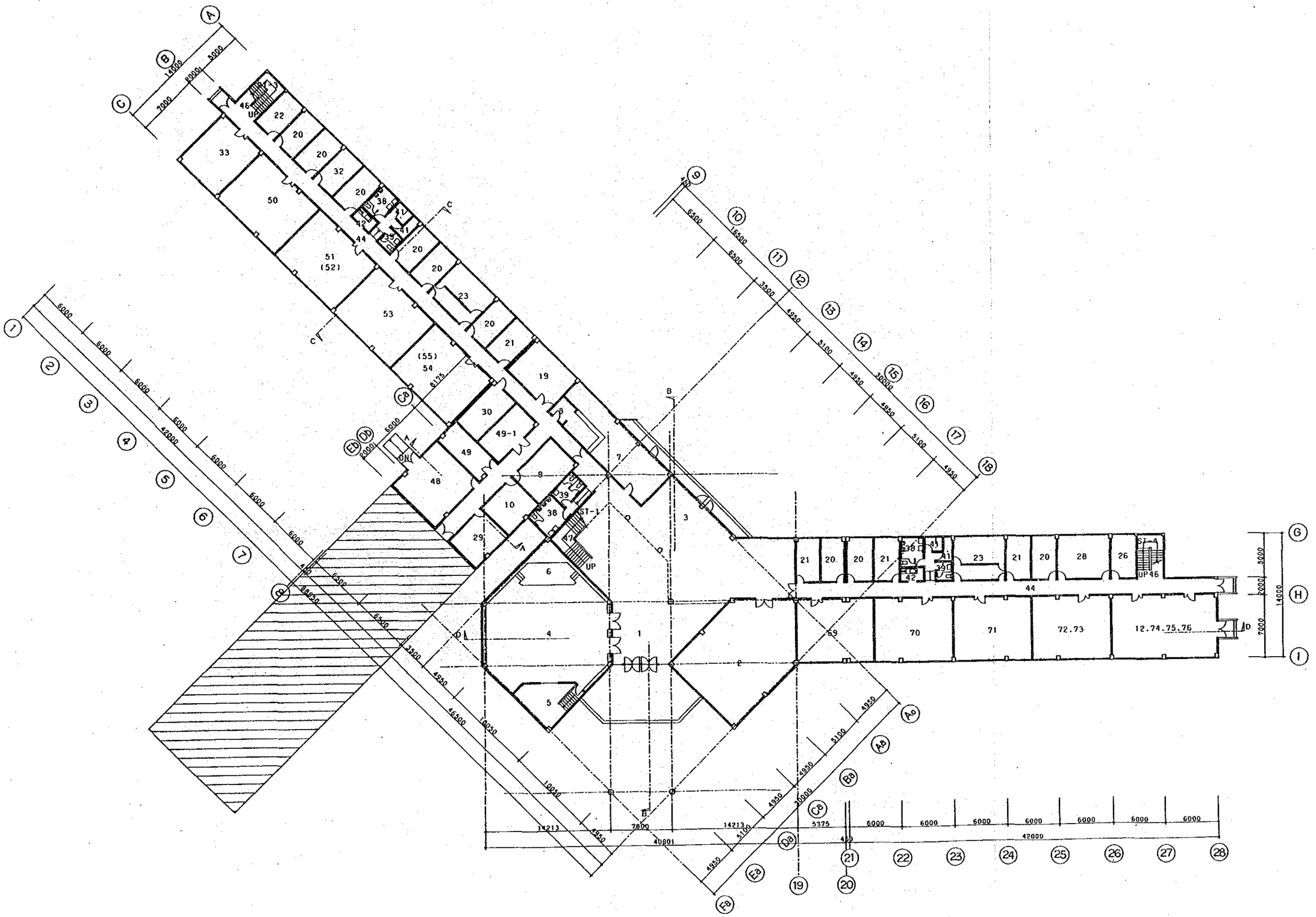
7) Complete manuals on operation and maintenance of the equipment shall be prepared immediately after starting this projeot. Prepare a list indicating the phone number, address and salesman of the dealer and/or manufacturer of the equipment so that the staff of the laboratory may perform complete maintenance work easily by acquiring the necessary parts and supplies without trouble and delays.

Upon careful study , the necessary materials shall as following list:

4-3-4 Basic Drawing Design & List of Equipment

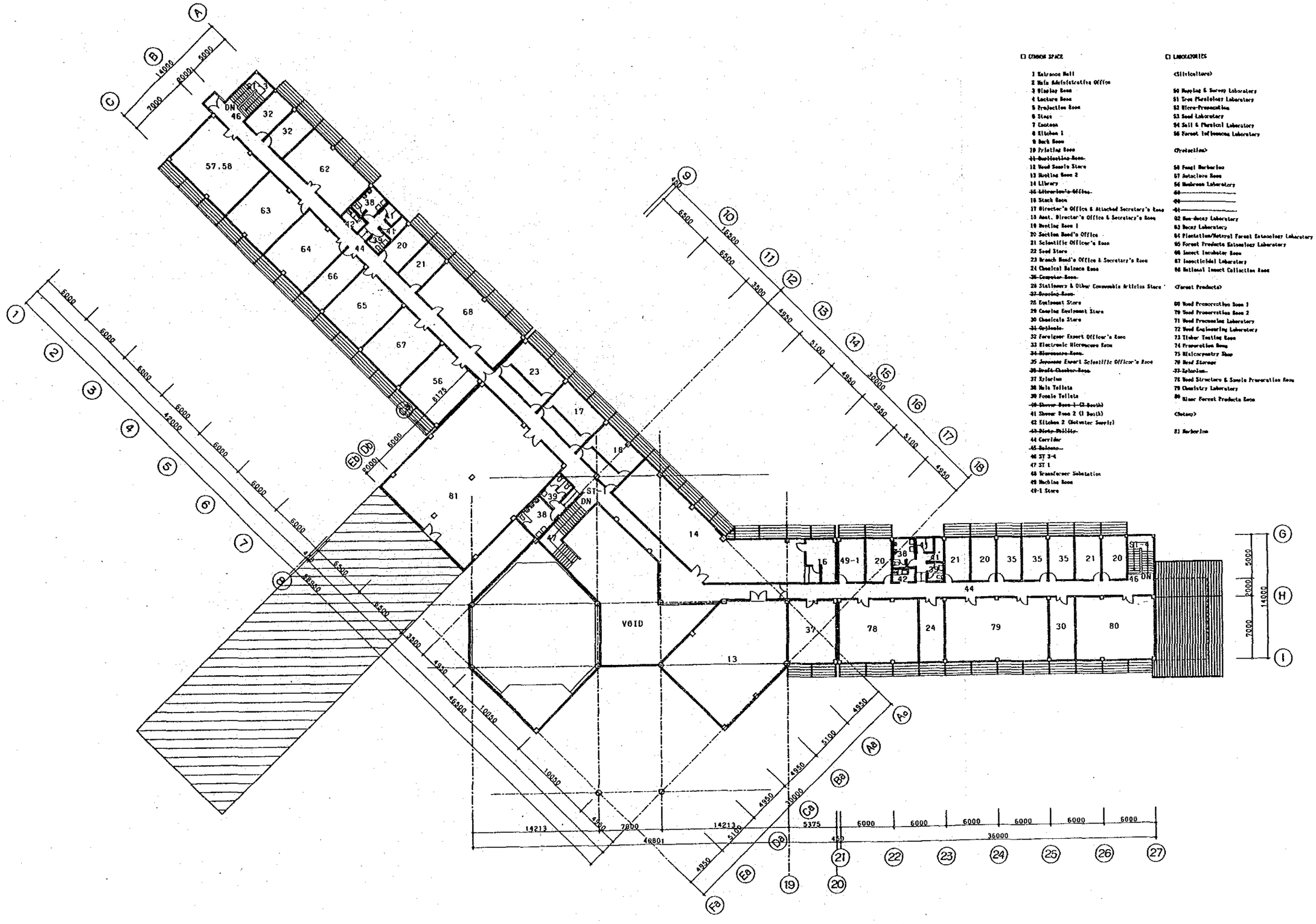

N
Inflammable & Toxic Chemicals
①
6
3
Experimental Treatment Plant
①
Forest Products
MAIN BUILDING
P
Huon Road
Protection, Silviculture
Affiliated Botanical
Laboratory
7
Affiliated Botanical Office
Nursery House & Store
②
4
4
5
8
Garage for vehicles
①
1
2
Insect House(Net House)
①
Memorial Avenue

PLOT PLAN



-99-

創造社 SOZOSHA CO.,LTD. TOKYO CONSULTANTS, ARCHITECTS & ENGINEERS 1級建築士登録 第31868号 八矢英世 HIDEYO-HACHIYA	NOTE	WORK NO. / APPROVAL / DRAWN	DATE / SCALE	TITLE: GROUND FLOOR PLAN	DRAWN NO



□ OFFICE SPACE

1 Entrance Hall
2 Main Administrative Office
3 Display Room
4 Lecture Room
5 Projection Room
6 Stage
7 Canteen
8 Kitchen 1
9 Back Room
10 Printing Room
~~11 Duplicating Room~~
12 Wood Sample Store
13 Meeting Room 2
14 Library
~~15 Librarian's Office~~
16 Stock Room
17 Director's Office & Attached Secretary's Room
18 Asst. Director's Office & Secretary's Room
19 Meeting Room 1
20 Section Head's Office
21 Scientific Officer's Room
22 Seed Store
23 Branch Head's Office & Secretary's Room
24 Chemical Balance Room
~~25 Computer Room~~
26 Stationery & Other Consumable Articles Store
~~27 Drawing Room~~
28 Equipment Store
29 Counter Equipment Store
30 Chemicals Store
~~31 Optimeter~~
32 Foreigner Expert Officer's Room
33 Electronic Microscope Room
~~34 Microscope Room~~
35 Japanese Expert Scientific Officer's Room
~~36 Draft Chamber Room~~
~~37 Typewriter~~
38 Male Toilets
39 Female Toilets
~~40 Shower Room 1 (2 Booth)~~
41 Shower Room 2 (1 Booth)
42 Kitchen 2 (Hot-water Supply)
~~43 Photo Printing~~
44 Corridor
~~45 Balcony~~
46 ST 3-4
47 ST 1
48 Transformer Substation
49 Machine Room
49-1 Store

□ LABORATORIES

<Silviculture>

50 Mapping & Survey Laboratory
51 Tree Physiology Laboratory
52 Micro-Propagation
53 Seed Laboratory
54 Soil & Physical Laboratory
55 Forest Influences Laboratory

<Protection>

56 Fungi Herbarium
57 Antechoes Room
58 Mushroom Laboratory
59 ——————
60 ——————
61 ——————
62 Rot-decay Laboratory
63 Decay Laboratory
64 Plantation/Natural Forest Entomology Laboratory
65 Forest Products Entomology Laboratory
66 Insect Incubator Room
67 Insecticidal Laboratory
68 National Insect Collection Room

<Forest Products>

69 Wood Preservation Room 1
70 Wood Preservation Room 2
71 Wood Processing Laboratory
72 Wood Engineering Laboratory
73 Timber Testing Room
74 Preparation Room
75 Microscopy Room
76 Wood Storage
77 Wood Structure & Sample Preparation Room
78 Chemistry Laboratory
79 Minor Forest Products Room

<Botany>

81 Herbarium

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創造社 SOZOSHA CO.,LTD. TOKYO
CONSULTANTS, ARCHITECTS & ENGINEERS
一級建築士登録 第5119号 八矢英世 HIDEYO-HACHIYA

NOTE

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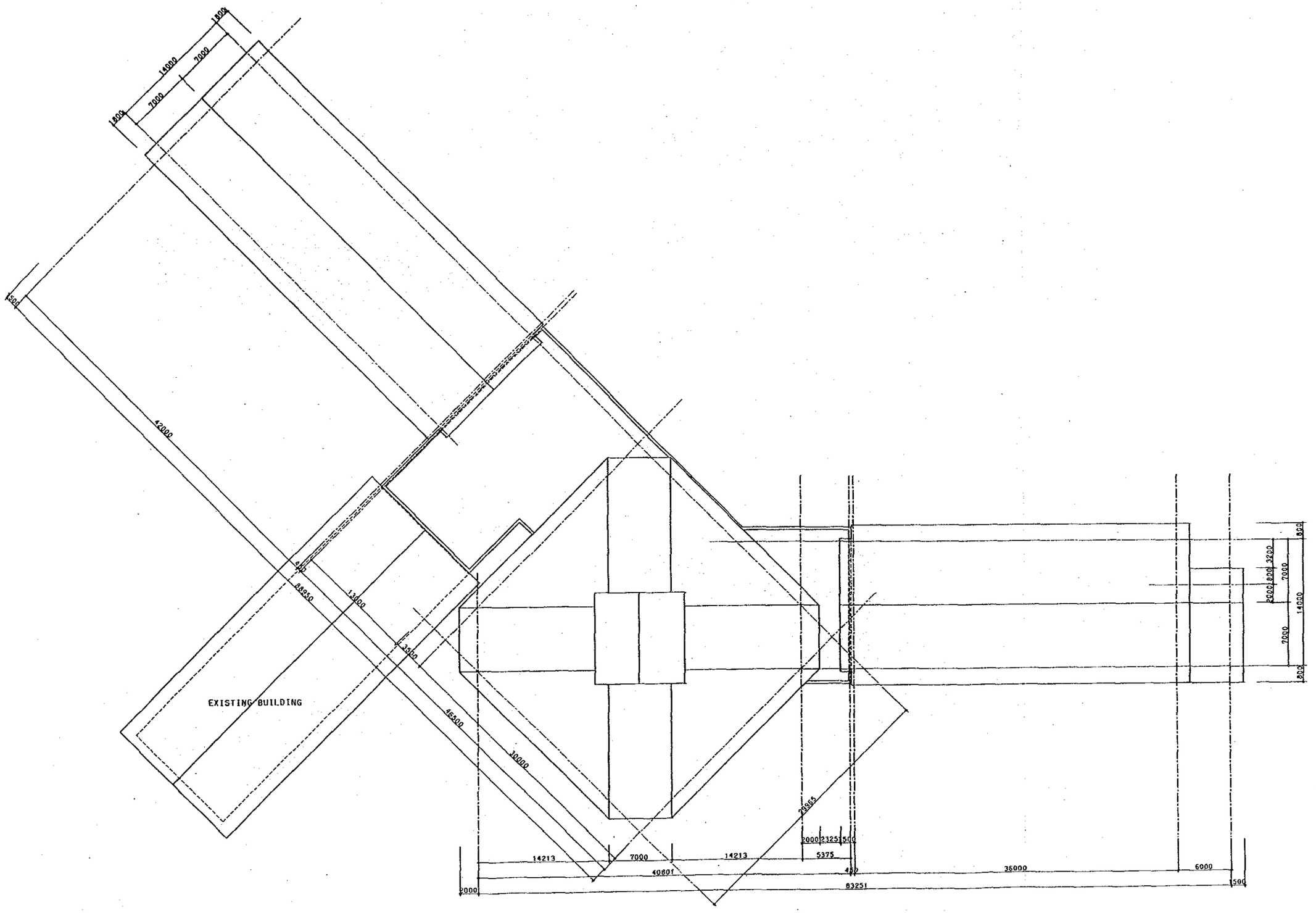
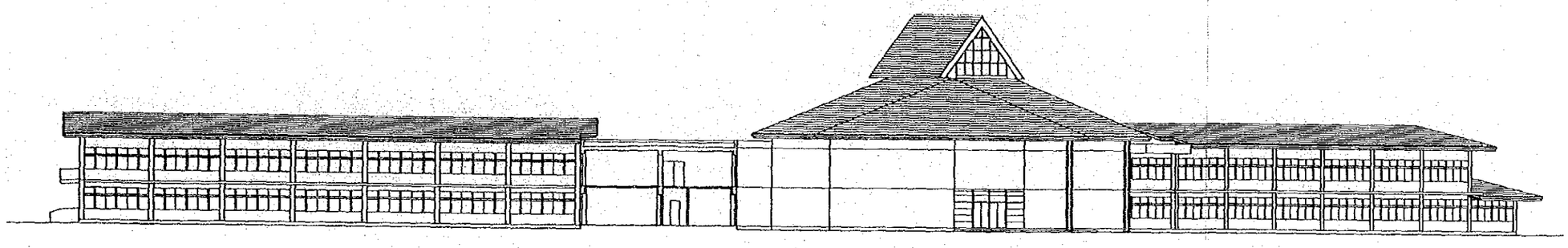
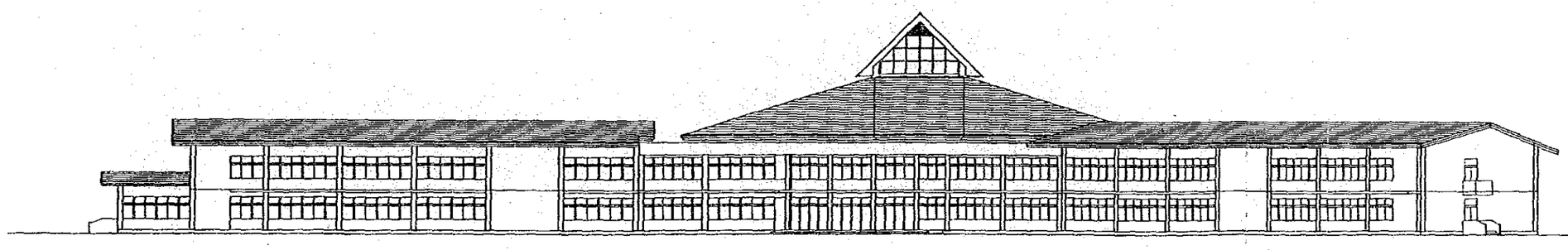
APPROVAL
DRAWN
DATE
SCALE
TITLE 1st. FLOOR PLAN
DRAWN NO

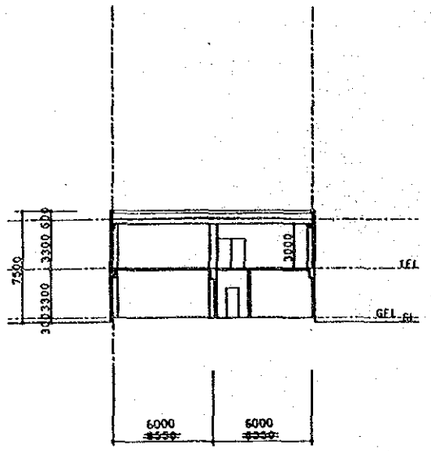


-101-

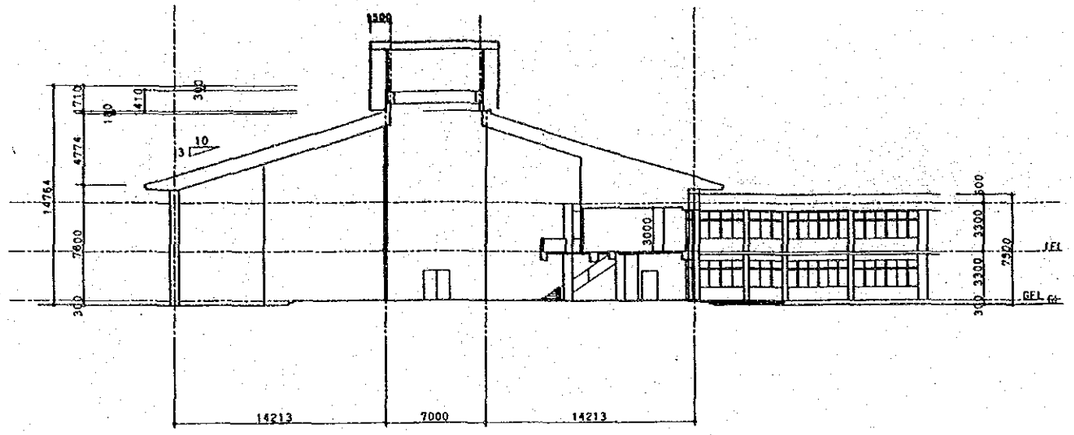
創造社 SOZOSHA CO.,LTD. TOKYO CONSULTANTS, ARCHITECTS & ENGINEERS 1級建築士登録 第31888号 八矢英世 HIDEYO-HACHIYA	NOTE	WORK NO.	DATE	TITLE ROOF PLAN	DRAWN NO.
		APPROVAL / DRAWN	SCALE		



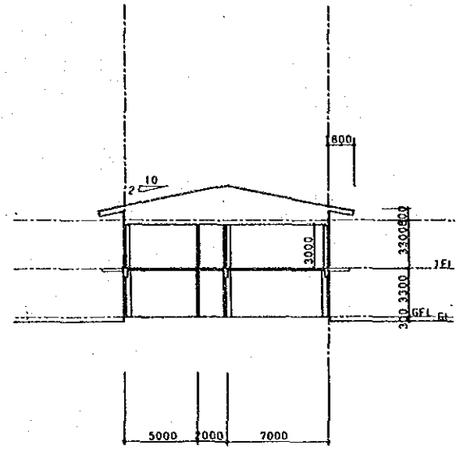




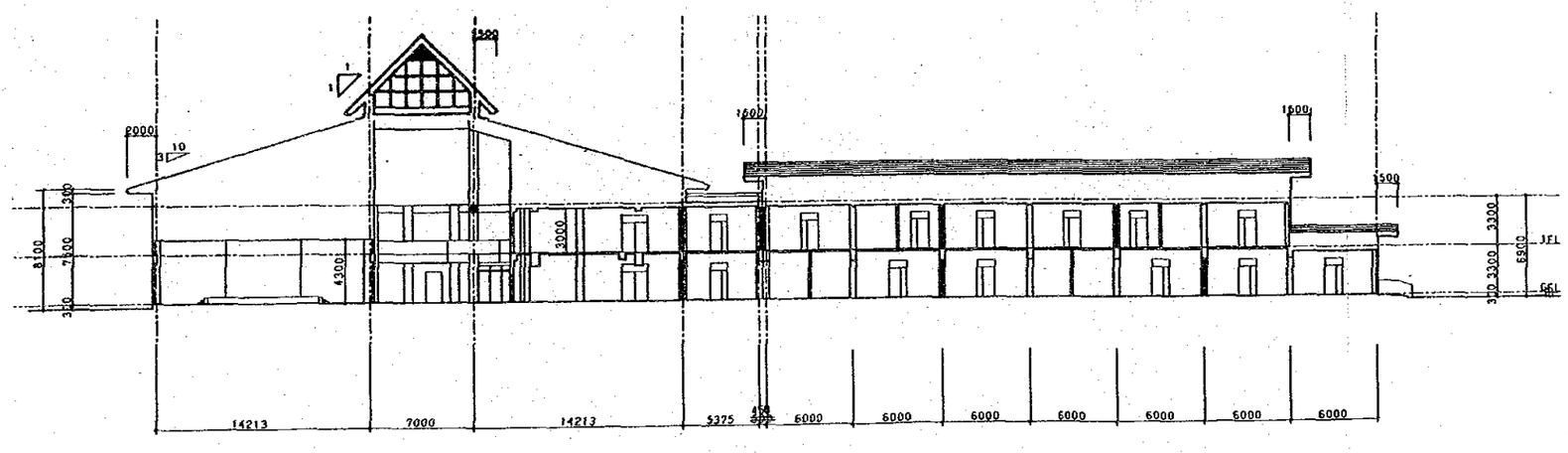
A-A SECTION



B-B SECTION



C-C SECTION



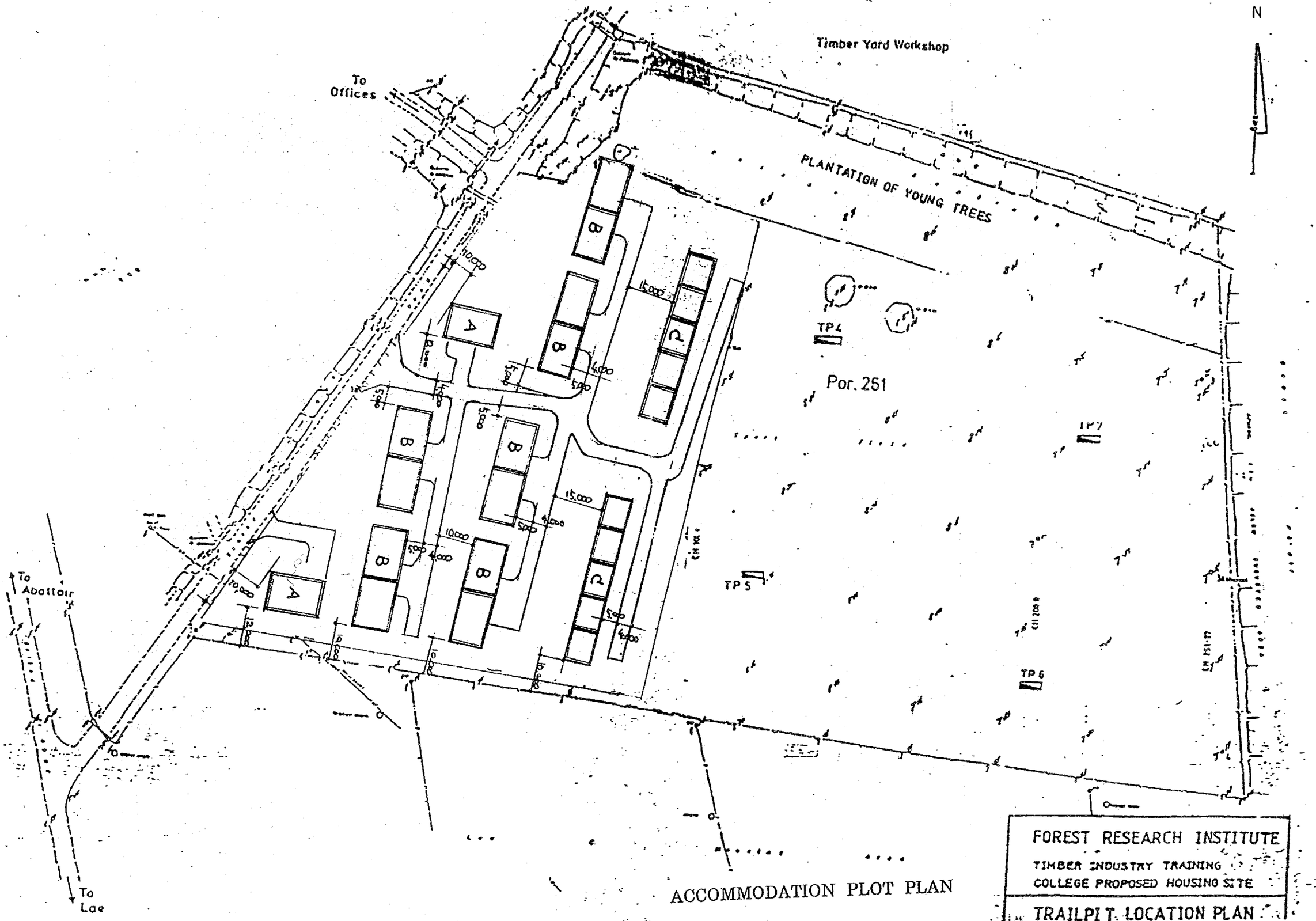
D-D SECTION

創造社 SOZOSHA CO.,LTD. TOKYO
CONSULTANTS ARCHITECTS & ENGINEERS
一級建築士登録 第31883号 八矢英雄 HIDEYO-HACHIYA

NOTE

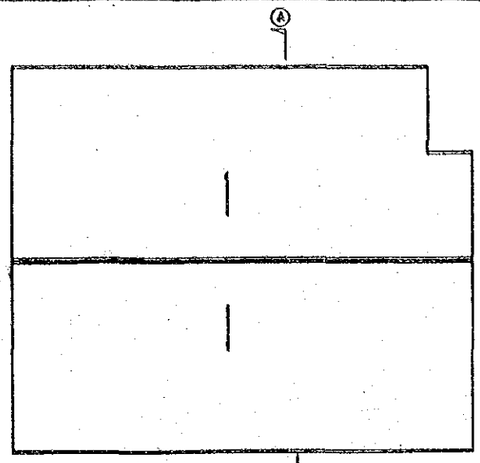
WORK NO. | DATE | TITLE: SECTION | DRAWN NO

APPROVAL | DRAWN | SCALE

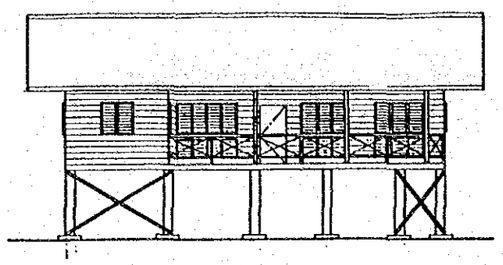


ACCOMMODATION PLOT PLAN

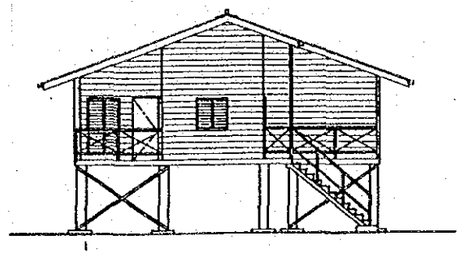
FOREST RESEARCH INSTITUTE
TIMBER INDUSTRY TRAINING COLLEGE PROPOSED HOUSING SITE
TRAILPIT LOCATION PLAN



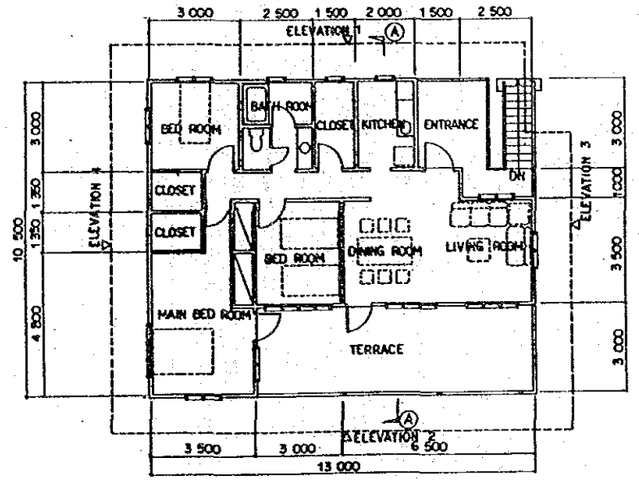
ROOF PLAN S-1:100



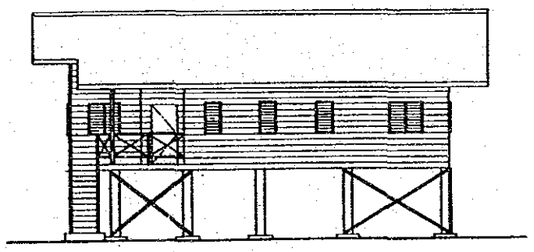
ELEVATION 2 S-1:100



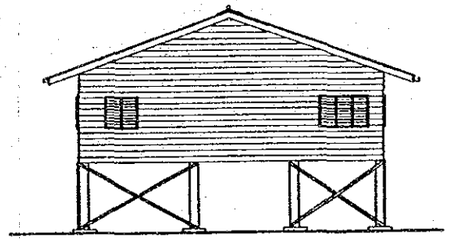
ELEVATION 3 S-1:100



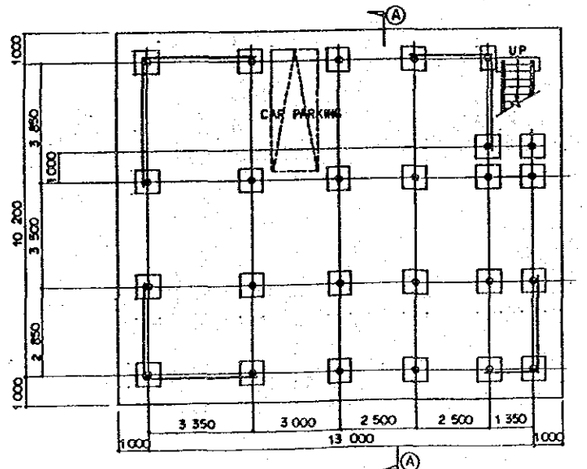
2ND FLOOR PLAN S-1:100



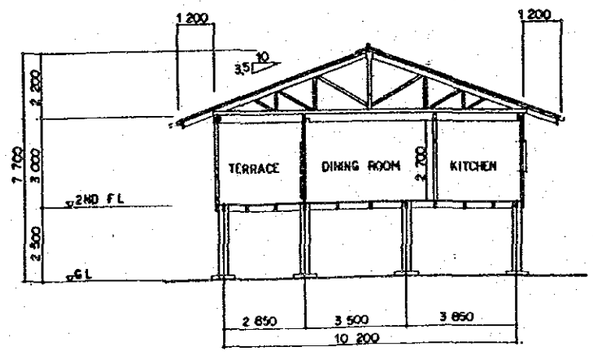
ELEVATION 1 S-1:100



ELELVATION 4 S-1:100



1ST FLOOR PLAN S-1:100



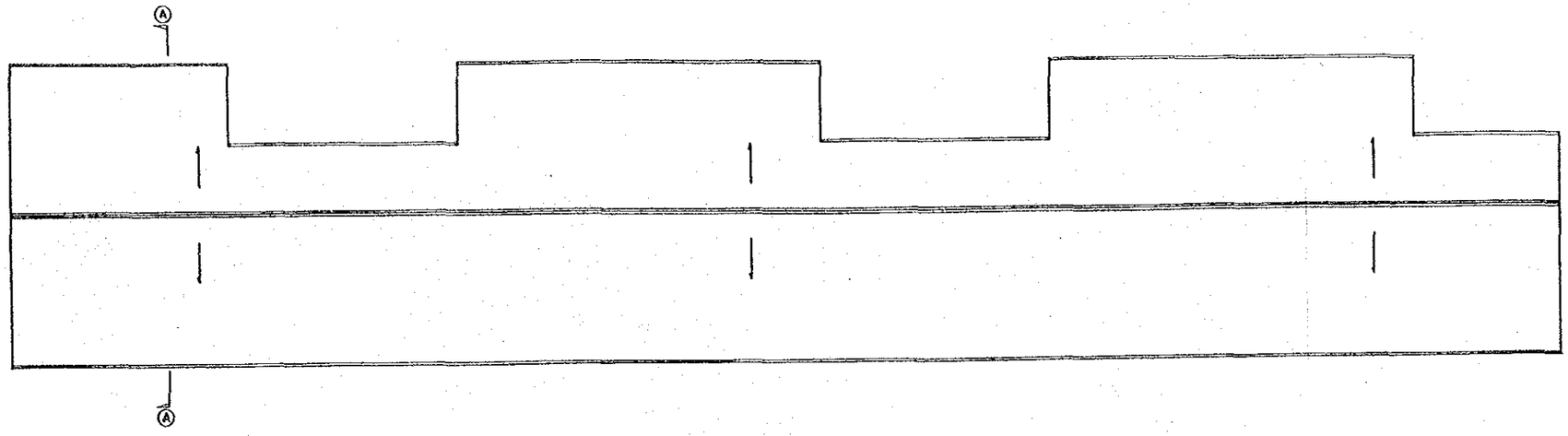
SECTION Ⓐ-Ⓐ S-1:100

ACCOMMODATION

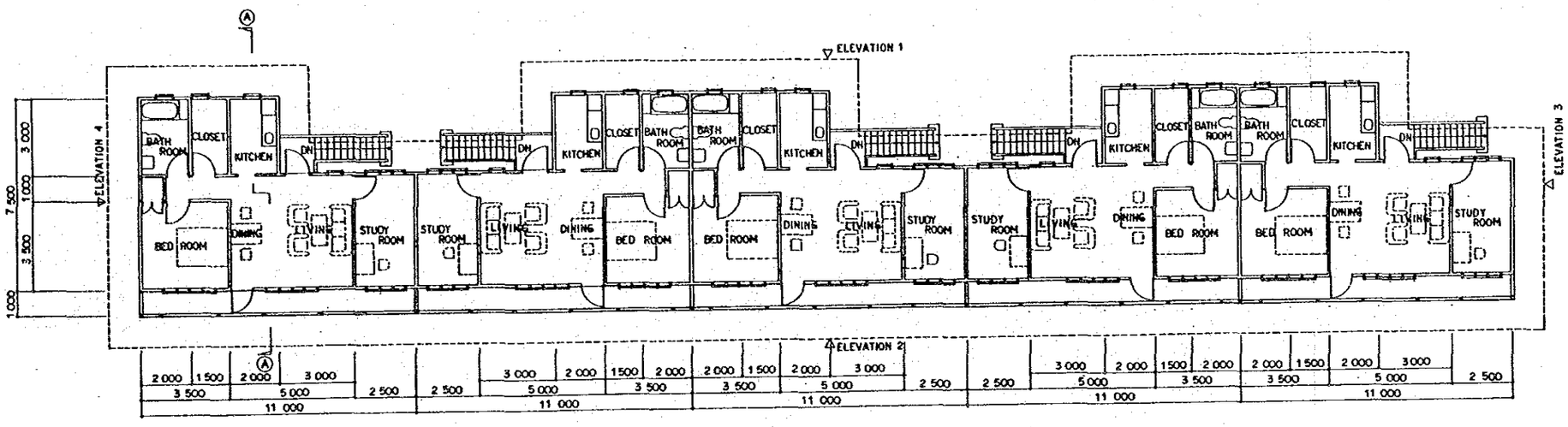
創造社 SOZOSHA CO.,LTD. TOKYO
CONSULTANTS, ARCHITECTS & ENGINEERS
一級建築士登録 第3116号 八矢英宏 HIDEYO-HACHIYA

NOTE

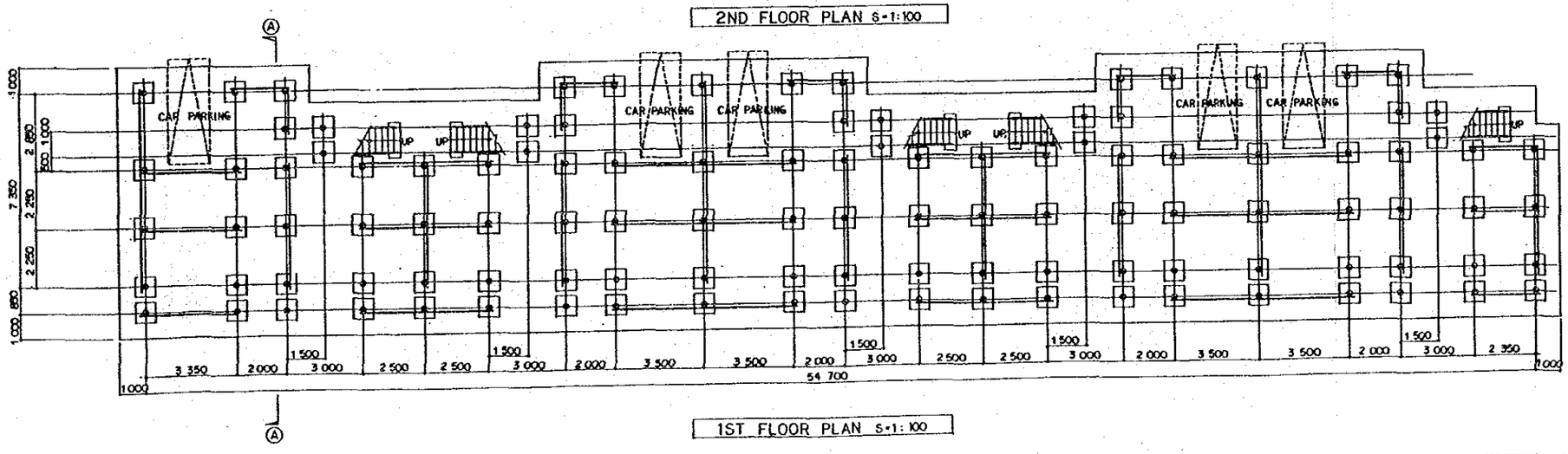
WORK NO	DATE	TITLE	DRAWN NO.
APPROVAL / DRAWN	SCALE	ACCOMMODATION FLOOR PLAN & ELEVATION, SECTION	



ROOF PLAN S=1:100



2ND FLOOR PLAN S=1:100



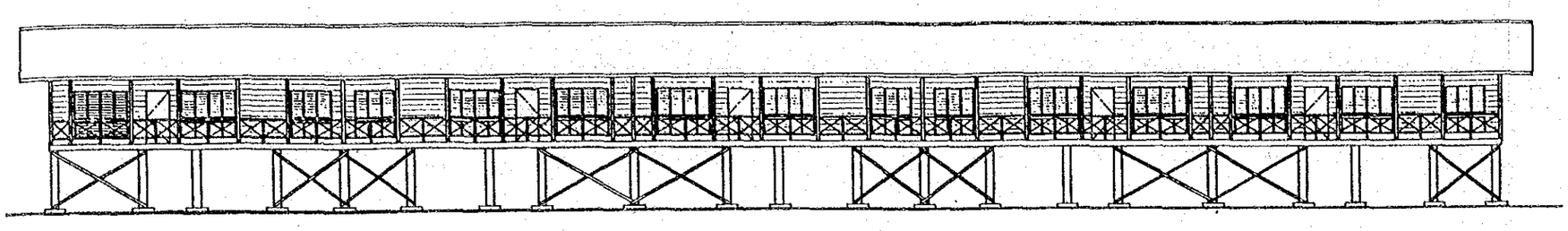
1ST FLOOR PLAN S=1:100

ACCOMMODATION

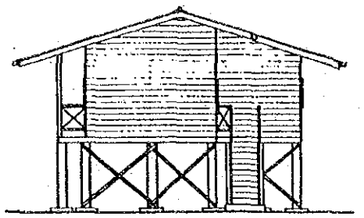
創造社 SOZOSHA CO.,LTD. TOKYO
CONSULTANTS, ARCHITECTS & ENGINEERS
HIDEYO-HACHIYA

NOTE

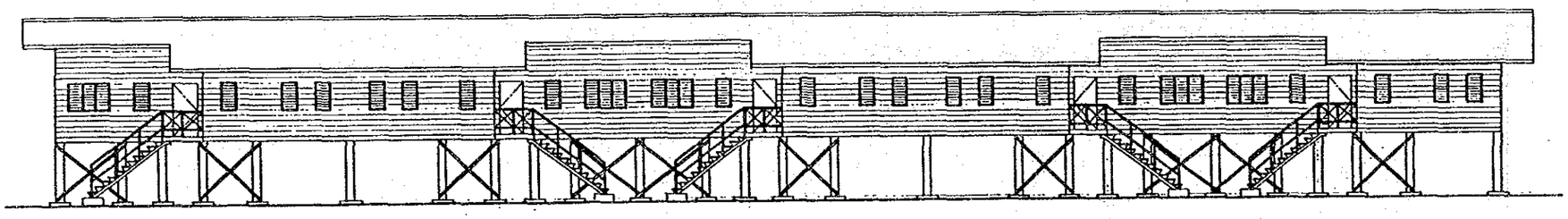
WORK NO | DATE | TITLE: ACCOMMODATION
APPROVAL | DRAWN | SCALE | FLOOR PLAN | DRAWN NO



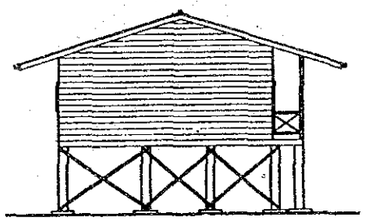
ELEVATION 2 S=1:100



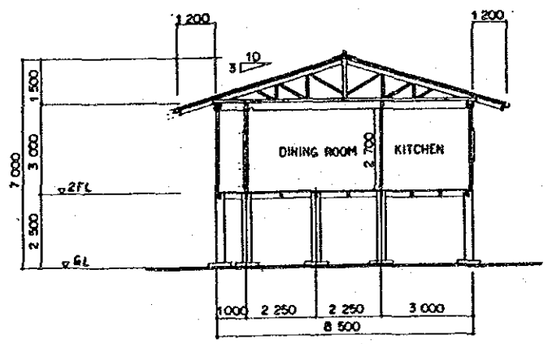
ELEVATION 3 S=1:100



ELEVATION 1 S=1:100



ELEVATION 4 S=1:100



SECTION Ⓐ - Ⓐ S=1:100

ACCOMMODATION

創造社 SOZOSHA CO.,LTD. TOKYO
CONSULTANTS ARCHITECTS & ENGINEERS
一級建築士登録 第3198号 八矢英俊 HIDEYO-HACHIYA

NOTE

WORK NO
APPROVAL
DRAWN
DATE
SCALE
TITLE ACCOMMODATION
ELEVATION & SECTION
DRAWN NO.

List of Equipment

A : Additional
R : Replace
N : New

Office Equipment

No	Item Descriptions	Quantity	Manual	Operation	A.R.N
1	Copier	1 unit	○		N
2	Book Cabinets	25 sets	○		N
3	Filing Cabinets	25 sets	○		N
4	Map Cabinets	5 sets	○		N
5	Wall Clocks	5 units	○		N
6	First Aid Kit	2 sets	○		N
7	Walkie-Talkie Set	2 sets	○		N
8	Word Processor (Micro computer)	4 units	○	○	N
9	Keyboard Lettering System	1 unit	○		N
10	Planimeter	1 unit	○		N

Meteorological Equipment

No	Item Description	Quantity	Manual	Operation	A.R.N
1-1	Meteorologic Observation Box	1 set	○	○	N
1-2	Spare Parts	1 set	○		N
2	Thermometer	1 piece	○		N
3	Thermohygrometer	4 piece	○		N
4	Pluviometer	1 piece	○		N
5	Rain Guage	3 pieces	○		N
6	Anemometer	1 piece	○		N
7	Sunshine Recorder (Jordan'type)	3 pieces	○		N
8	Soil Thermometer	3 sets	○		N
9	Evaporimeter	3 pieces	○		N
10	Barometer	3 pieces	○		N
11	Max-Min.Thermometer	1 piece	○		N
12	Instrument Shelter	1 piece	○		N
13	Anemometer	1 piece	○		N
14	Assman's Psychrometer	2 piece	○		N

Laboratory Equipment

No	Item Descriptions	Quantity	Manual	Operation	A.R.N
1	Drying Ovens	5 units	○		A
2	Hot Air Circulation Drying Oven	3 units	○		N
3-1	Incubators	3 units	○		A
3-2	Incubators	3 units	○		A
4-1	Centrifuge-Table Top	1 unit	○		N
4-2	Centrifuge-Table Top	2 units	○		N
5	Leaf Area Meter	1 unit	○		N
6	Pressure Chamber	1 unit	○		N
7-1	Thermostatic Germinator	2 units	○		N
7-2	Thermostatic Germinator	2 units	○		N
7-3	Thermostatic Germinator	2 units	○		N
8	Freezer	4 units	○		2N+2R
9-1	Refrigerator	4 units	○		2N+2R
9-2	Refrigerator	4 units	○		N
10-1	Microtome Large Sledge,Automatic Sharpener	1 unit	○		A
10-2	Microtome Large Sledge,Automatic Sharpener	1 unit	○		A
11	Soil Sterilizer	1 unit	○		A
12-1	Chemical Balance	4 units	○		A
12-2	Chemical Balance	4 units	○		N
13	Double Beam Spectrophotometer	1 unit	○		N
14-1	PH-Meter	2 unit	○		R
14-2	PH-Meter	3 unit	○		R
15	Air Screen Seed Selector	1 unit	○		N
16-1	Shaking Incubator	1 unit	○		N
16-2	Shaking Incubator	1 unit	○		N
17-1	Autoclave	1 unit	○		A
17-2	Autoclave	1 unit	○		N
18-1	Vacuum Pump	1 unit	○		A
18-2	Rotary Vacuum Pump	1 unit	○		A
19-1	Desiccator ø 240 mm	12 unit			N
19-2	Desiccator ø 180 mm	12 unit			N
20	Soil Tube Sampler	12 units	○		N
21	Soil Testing Kit	2 sets	○		N
22	Soil Color Chart	3 units	○		N

Laboratory Equipment

No	Item Descriptions	Quantity	Manual	Operation	A.R.N
23-1	Standard Testing Sieve	1 set			N
23-2	Standard Testing Sieve (mesh)	1 set			N
24-1	Kjeldhal Analyzer System	1 set	○	○	N
24-2	Kjeldhal Analyzer System	1 set	○	○	N
25	Indoor Seeding Cabinets	2 units	○		N
26	Muffle Furnace	1 set	○		N
27	Universal Wood Testing Machine	1 unit	○		N
28	Scanning Electron Microscope	1 unit	○	○	N
29	Ice Making Machine	1 unit	○		N
30	Deionizer	2 units	○	○	N
31-1	Hot Plates	3 units	○		A
31-2	Hot Plates	3 units	○		A
32-1	Rotary Evaporator	1 unit	○		N
32-2	Rotary Evaporator	1 unit	○		N
33	Electromagnetical Sieve Shaker	2 units	○		N
34	Drying Cabinet	1 unit	○		N
35	Compactus	2 units			N
36	Gas Chromatography	1 unit	○		N
37	Moisture Meter	2 units	○		N
38	Universal Thermo-Bath	3 units	○		N
39	Culture Bath Shaker	3 units	○		N
40	Multi Dispenser	1 unit	○		N
41	Muni-Sonic Homogenizer	1 unit	○		N
42	Ace Homogenizer	1 unit	○		N
43	Zoom Stereo Microscope	3 units	○		N
44	Zoom Stereo Microscope	4 units	○		N
45	High Power Microscope BHTU	3 units	○		N
46	High Power BH-PM-10AD Microscope	1 unit	○		N
47	Automatic Glass Apparatus Cleaner with 8 Test Tube Rack for Micro Prop	1 unit	○	○	N
48	Hot Air Sterilizer for Micro Prop	1 unit	○	○	N

Laboratory Equipment

No	Item Descriptions	Quantity	Manual	Operation	A.R.N
49	Balance for large cubic volume for Forest Influence (Plate:20cm x 20cm)	1 pcs	○		N
50	Stereo Scope for Areal Photograph for Map & Survey	1 unit	○		N
51	Drying Case for Microscopes	13 units	○		N

Nursery Equipment

No	Item Description	Quantity	Manual	Operation	A.R.N
1	Fencing Tool Kit	1 unit	○		N
2	Pocket Caliper	6 units	○		N
3	Sprayer	6 units	○		A
4	Sprinkler	2 sets	○		A
5	Peristaltic Pump	1 unit	○		A
6	Automatic Misting System	2 units	○		N

Training and Meeting Equipment

No	Item Description	Quantity	Manual	Operation	A.R.N
1	Color TV-Video Set	1 set	○	○	N
2	16mm Film Projector	1 unit	○	○	N
3	8mm Camera Projector for Editin	1 unit	○		N
4	Slide Projector	2 units	○		A
5	Slide Viewer	2 units	○		N
6	Overhead Projector	2 units	○		A
7	Tape Recorder	2 units	○		N
8	Screen	2 units			N

Vehicles and Transport

No	Item Description	Quantity	Manual	Operation	A.R.N
1	Wagon Type Land Cruiser (6 Passengers)	1 unit	○		A
2	Tractor	1 unit	○		A
3	Verge Mower Attachment	2 units	○		A
4	Slasher Attachment	1 unit	○		N
5	Grader Attachment	1 unit	○		N
6	Trailer	1 unit	○		A
7	Tipper Truck (2 Ton)	1 unit	○		N
8	Cherry Picker	1 unit	○		A
9	Self-propelled Lawnmowers	2 units	○		A

Maintenance Workshop and Machine Tools

No	Item Description	Quantity	Manual	Operation	A.R.N
1	Tool Box	1 unit			N
2	Electric Drills	2 unit	○		N
3	Cement Mixer	1 unit	○		N
4	Electric Saw	2 units			N
5	Band Saw	2 units			N

Laboratory Small Wares

No	Item Description	Quantity
1	Beakers,Criffin (Refer to 5001)	
	100ml	120pcs
	200ml	90pcs
	300ml	50pcs
	500ml	40pcs
	1,000ml	20pcs
	2,000ml	8pcs
2	Beakers, Berzelius (Refer to 5002)	
	100ml	20pcs
	200ml	20pcs
	300ml	30pcs
	500ml	10pcs
3	Beakers, Phillips (Refer to 5003)	
	100ml	20pcs
	300ml	50pcs
	500ml	10pcs
4	Flasks, Flat Bottom (Refer to 5004)	
	200ml	10pcs
	300ml	10pcs
	500ml	5pcs
	1,000ml	3pcs
	2,000ml	3pcs
5	Flasks, Round Bottom (Refer to 5004)	
	1,000ml	3pcs
	2,000ml	3pcs
6	Flasks, Erlenmeyer (Refer to 5005)	
	100ml	120pcs
	200ml	60pcs
	300ml	40pcs
	500ml	48pcs
	1,000ml	20pcs
7	Flasks, Erlenmeyer,with Stopper (Refer to 5006)	
	50ml	30pcs
	100ml	40pcs
	300ml	48pcs
	500ml	30pcs
	1,000ml	5pcs
8	Flasks, Kjeldahl,Short Neck (Refer to 5009)	
	100ml	10pcs
	200ml	10pcs
	300ml	10pcs
	500ml	5pcs

Laboratory Small Wares

No	Item Description	Quantity
9	Flasks, Kjeldahl, (Refer to 5008)	
	100ml	10pcs
	300ml	10pcs
	500ml	5pcs
10	Flask, Distilling (Refer to 5011)	
	500ml	5pcs
	1,000ml	3pcs
11	Dishes, Culture, Petri (Refer to 5042)	
	ø60m/m	50pcs
	75m/m	50pcs
	90m/m	100pcs
12	Dishes,Evaporating, Flat Bottom (Refer to 5036)	
	ø 45m/m	20pcs
	60m/m	20pcs
	75m/m	20pcs
13	Dishes, Crystallizing (Refer to 5039)	
	90m/m	10pcs
	100m/m	10pcs
	120m/m	5pcs
14	Test Tubes (Refer to 5051)	
	ø12 x 75m/m	100pcs
	12 x 120m/m	100pcs
	15 x 150m/m	200pcs
	16.5 x 165m/m	100pcs
	18 x 180m/m	100pcs
15	Test Tubes, with Glass Stopper (Refer to 5053)	
	10ml	50pcs
	20ml	50pcs
	25ml	50pcs
16	Color Comparison Tubes, Nessler (Refer to TR-105)	
	50ml	30pcs
	100ml	30pcs
17	Bottles, Reagent, Narrow Mouth, White (Refer to 5072)	
	60ml	50pcs
	120ml	50pcs
	250ml	50pcs
	500ml	30pcs
	1,000ml	12pcs
	2,000ml	5pcs
	3,000ml	3pcs
	5,000ml	2pcs
	10,000ml	1pcs

No	Item Description	Quantity
18	Bottles, Reagent, Narrow Mouth, White (Refer to 5073)	
	60ml	50pcs
	120ml	50pcs
	250ml	50pcs
	500ml	30pcs
	1,000ml	12pcs
	2,000ml	5pcs
	3,000ml	3pcs
	5,000ml	2pcs
19	Bottles, Reagent, Wide Mouth, White (Refer to 5074)	
	30ml	30pcs
	60ml	30pcs
	120ml	50pcs
	250ml	50pcs
	500ml	30pcs
	1,000ml	12pcs
20	Bottles, Reagent, Wide Mouth, Amber (Refer to 5075)	
	30ml	30pcs
	60ml	30pcs
	120ml	30pcs
	250ml	50pcs
	500ml	30pc
	1,000ml	12pcss
21	Bottles, Syrup (Refer to 5080)	
	250ml	5pcs
	500ml	3pcs
22	Bottles, Either (Refer to 5079)	
	250ml	5pcs
	500ml	3pcs
23	Bottles, Dropping, with Rubber Bulb, White (Refer to 5089)	
	30ml	10pcs
	60ml	20pcs
	120ml	20pcs
	250ml	10pcs
24	Bottles, Dropping, with Rubber Bulb, Amber (Refer to 5089)	
	30ml	10pcs
	60ml	20pcs
	120ml	20pcs
	250ml	10pcs
25	Bottles, Dropping White (Refer to 5087)	
	30ml	10pcs
	60ml	10pcs
	120ml	20pcs

Laboratory Small Wares

No	Item Description	Quantity
26	Bottles, Dropping Amber (Refer to 5087)	
	30ml	10pcs
	60ml	10pcs
	120ml	10pcs
27	Bottles, Aspirator, for Rubber Stopcock, White (Refer to 5077)	
	3,000ml	5pcs
	5,000ml	5pcs
	10,000ml	3pcs
28	Bottles, Aspirator, for Rubber Stopcock, Amber (Refer to 5077)	
	3,000ml	5pcs
	5,000ml	5pcs
	10,000ml	3pcs
29	Flask, Filtering (Refer to 5506)	
	300ml	10pcs
	500ml	10pcs
	1,000ml	10pcs
	2,000ml	3pcs
30	Desiccators (Refer to 5851)	
	ø15cm	3pcs
	18cm	3pcs
	21cm	2pcs
	24cm	2pcs
	30cm	1pcs
31	Desiccators, with Tubulation in Lib (Refer to 5853)	
	ø21cm	2pcs
	24cm	2pcs
	30cm	1pcs
32	Bell Jars, Filtering (Refer to 5502)	
	ø12 x 18cm	2pcs
	15 x 21cm	2pcs
	18 x 24cm	1pcs
33	Troughs, Pneumatic (Refer to 5103)	
	ø18cm	5pcs
	24cm	5pcs
	30cm	3pcs
34	Gas Generators, Kipp (Refer to 6402)	
	500ml	2pcs
35	Condensders, Liebig, Sealed (Refer to 5190)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	2pcs

No	Item Description	Quantity
36	Condensers, Allihn (Refer to 5192)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	2pcs
37	Condensers, Dimroth (Refer to 5194)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	2pcs
38	Funnels, Ribbed on Inside and Outside (Refer to 5111)	
	ø60cm	10pcs
	75cm	10pcs
	90cm	10pcs
	110cm	10pcs
39	Shakers (Refer to 5707)	
	ø60cm	20pcs
	75cm	30pcs
	90cm	20pcs
	105cm	10pcs
	120cm	10pcs
40	Glass Filters Crucible Type, 1G (Refer to 5511)	
	Filter No. 1	10pcs
	2	10pcs
	3	10pcs
	4	10pcs
41	Glass Filters Funnel Type, 3G (Refer to 5512)	
	Filter No 1	10pcs
	2	10pcs
	3	10pcs
	4	10pcs
42	Glass Filters Funnel Type, 11G (Refer to 5512)	
	Filter No 1	10pcs
	2	10pcs
	3	10pcs
	4	10pcs
43	Funnels, Separatory (Refer to 5124)	
	100ml	10pcs
	200ml	10pcs
	300ml	10pcs
	500ml	5pcs
	1,000ml	2pcs

No	Item Description	Quantity
44	Funnels, Separatory,Squibb, Pear-Shaped (Refer to 5125)	
	100ml	10pcs
	200ml	10pcs
	300ml	10pcs
	500ml	5pcs
	1,000ml	2pcs
45	Funnels, Separatory,Squibb, Pear-Shaped (Refer to 5126)	
	50ml	5pcs
	100ml	5pcs
	200ml	5pcs
	300ml	5pcs
46	Stopcocks, Straight (Refer to 5152)	
	ø 6m/m	10pcs
	7.5m/m	10pcs
	9m/m	10pcs
	10m/m	5pcs
47	Stopcocks, Three Way (Refer to 5153)	
	ø 6m/m	5pcs
	7.5m/m	5pcs
	9m/m	5pcs
48	Bottles, Specific Gravity,Gay-Lussac,for Liquid (Refer to 5139)	
	10ml	5pcs
	25ml	10pcs
	50ml	5pcs
	100ml	3pcs
49	Bottles, Specific Gravity,with Thermometer (Refer to 5140)	
	25ml	5pcs
	50ml	5pcs
50	Drying Tubes, Straight, One Bulb (Refer to 5183)	
	ø12ml	10pcs
	15ml	5pcs
	18ml	5pcs
51	Drying Jars, Glass Stoppered (Refer to 5137)	
	L.24cm	5pcs
	30cm	5pcs
	36cm	3pcs
52	Bottles, Gas Washing Drechsel (Refer to 5129)	
	250ml	5pcs
	500ml	2pcs
53	Bottles, Gas Washing Walter (Refer to 5128)	
	250ml	5pcs
	500ml	2pcs

Laboratory Small Wares

No	Item Description	Quantity
54	Bottles, Gas Washing Ichihose (Refer to 5130)	
	250ml	5pcs
	500ml	2pcs
55	Bottles, Gas Washing Muencke (Refer to 5131)	5pcs
	250ml	
	500ml	2pcs
56	Volumetric Flasks, White (Refer to 1101)	
	100ml	30pcs
	200ml	20pcs
	250ml	20pcs
	500ml	10pcs
	1,000ml	5pcs
57	Volumetric Flasks, Amber (Refer to 1102)	
	50ml	5pcs
	100ml	10pcs
	200ml	10pcs
	250ml	10pcs
	500ml	5pcs
	1,000ml	2pcs
58	Measuring Cylinders (Refer to 1171)	
	25ml	10pcs
	50ml	10pcs
	100ml	15pcs
	250ml	5pcs
	500ml	5pcs
	1,000ml	3pcs
	2,000ml	2pcs
59	Graduates, Cylindrical (Refer to 1177)	
	50ml	5pcs
	100ml	5pcs
	500ml	3pcs
	1,000ml	2pcs
60	Graduate, Cohical (Refer to 1179)	
	10ml	5pcs
	20ml	5pcs
	50ml	5pcs
	100ml	5pcs
	200ml	5pcs
61	Burets, with Stopcock, White (Refer to 1118)	
	10ml	5pcs
	25ml	5pcs
	50ml	5pcs

No	Item Description	Quantity
62	Burets, with Stopcock, Amber (Refer to 1119)	
	10ml	5pcs
	25ml	5pcs
	50ml	5pcs
63	Burets, with Stopcock, Schellback (Refer to 1120)	
	10ml	5pcs
	25ml	5pcs
	50ml	5pcs
64	Micro Burets, White (Refer to 1144)	
	2ml	2pcs
	5ml	3pcs
	10ml	1pcs
65	Micro Burets, Amber (Refer to 1145)	
	2ml	2pcs
	5ml	3pcs
	10ml	1pcs
66	Automatic Burets, White (Refer to 1135)	
	25ml	2pcs
	50ml	3pcs
67	Automatic Burets, Amber (Refer to 1136)	
	25ml	2pcs
	50ml	2pcs
68	Measuring Pipets (Refer to 1147)	
	0.5ml	10pcs
	1ml	30pcs
	2ml	30pcs
	3ml	10pcs
	5ml	20pcs
	10ml	20pcs
	20ml	10pcs
	25ml	5pcs

Laboratory Small Wares

No	Item Desoription	Quantity
69	Volmetric Pipets (Refer to 1155)	
	0.5ml	10pcs
	1ml	20pcs
	2ml	20pcs
	3ml	20pcs
	5ml	20pcs
	10ml	20pcs
	15ml	10pcs
	20ml	10pcs
	25ml	10pcs
	40ml	5pcs
	50ml	5pcs
	100ml	3pcs
70	Pipets with rubber (Refer to 1161)	
	1ml	10pcs
	2ml	20pcs
	3ml	10pcs
	5ml	10pcs
	10ml	10pcs
71	Glass Tubing (Refer to 5189)	
	ø 6m/m	50pcs
	8m/m	50pcs
	10m/m	30pcs
72	Rubber Tubing Black (Refer to 5402)	
	No. 4	50m
	5	50m
	6	50m
	7	30m
	8	20m
	9	20m
	10	10m
73	Rubber Tubing, Red (Refer to 5403)	
	Gas ø 9 x 13m/m	30m
	Burner 8 x 12m/m	30m
	Aspirator 6 x 12m/m	10m
	Channe 115 x 21m/m	30m
74	Rubber Tubing, Vaccum (Refer to 5405)	
	ø 6 x 15m/m	10m
	7.5 x 8m/m	10m
	9 x 21m/m	5m
75	Vinyl Tubing (Refer to 5411)	
	ø 6 x 8m/m	30m
	8 x 10m/m	30m
	10 x 12m/m	30m

Laboratory Small Wares

No	Item Description	Quantity
76	Silicone Tubing (Refer to 20-08)	
	ø 4 x 6m/m	30m
	6 x 8m/m	30m
	8 x 10m/m	30m
77	Polyethylene Tubing (Refer to 20-11)	
	ø 4 x 6m/m	20pcs
	6 x 8m/m	20pcs
	8 x 10m/m	20pcs
	12 x 15m/m	10pcs
	15 x 18m/m	10pcs
78	Rubber Stoppers (Refer to 5401)	
	No. 1	50pcs
	2	50pcs
	3	50pcs
	4	50pcs
	5	50pcs
	6	50pcs
	7	50pcs
	8	30pcs
	9	30pcs
	10	30pcs
	11	30pcs
	12	30pcs
	13	20pcs
	14	20pcs
	15	20pcs
	16	10pcs
	17	10pcs
	18	10pcs
	19	10pcs
	20	10pcs
79	Rubber Stoppers (Refer to 6948)	
	No. 1	50pcs
	2	50pcs
	3	50pcs
	4	30pcs
	5	30pcs
	6	30pcs
	7	20pcs
	8	20pcs
	9	20pcs
	10	20pcs

No	Item Description	Quantity
80	Polyethylene Bottles, Narrow Mouth (Refer to 5413)	
	100ml	120pcs
	250ml	60pcs
	500ml	48pcs
	1,000ml	20pcs
81	Polyethylene Bottles, Narrow Mouth (Refer to 5414)	
	100ml	150pcs
	250ml	120pcs
	500ml	60pcs
	1,000ml	30pcs
82	Polyethylene Beakers (Refer to 5418)	
	100ml	30pcs
	300ml	20pcs
	500ml	20pcs
	1,000ml	10pcs
83	Polyethylene Bottles,Aspirator (Refer to 5416)	
	5,000ml	5pcs
	10,000ml	3pcs
	20,000ml	2pcs
84	Polyethylene Bottles,Washing (Refer to 5417)	
	250ml	12pcs
	500ml	12pcs
	1,000ml	12pcs
85	Watch Glasses (Refer to 5045)	
	ø60m/m	50pcs
	75m/m	50pcs
	90m/m	50pcs
	110m/m	30pcs
	120m/m	30pcs
86	Aspirators (Shibaki's) (Refer to 6645)	5pcs
87	Crucibles, Porcelain,with Cover, B-type (Refer to 5354)	
	10ml	20pcs
	30ml	10pcs
	50ml	10pcs
	100ml	10pcs
88	Mortars, with Peste, Porcelain (Refer to 5391)	
	90ml	5pcs
	120ml	5pcs
	150ml	3pcs

Laboratory Small Wares

No	Item Description	Quantity
89	Funnels, Bucher Type, Porcelain (Refer to 5383)	
	ø 90m/m	10pcs
	110m/m	10pcs
90	Dishes, Evaporating, Round Bottom Procelain (Refer to 5351)	
	ø 60m/m	10pcs
	90m/m	10pcs
	110m/m	10pcs
	150m/m	5pcs
91	Safty Pipeter (Refer to 12-01)	5pcs
92	Hydrometer Set, Normal, 19 pieces set (Refer to 1305)	
	0.700-1.850	1pcs
93	Hydrometer, for Liquid Heavier than Water (Refer to 1331)	
	1.000-2.000	3pcs
94	Hydrometer, for Liquid Lighter than Water (Refer to 1332)	
	1.000-0.700	3pcs
95	Thermometers Set, Normal (Refer to 1404)-50-360 C	
96	Thermometers, Engrave Stem, Alcohol (Refer to 1407)	
	0-100 C	30pcs
	-30-50 C	10pcs
	-20-100 C	10pcs
97	Thermometers, Engrave Stem, Hydragyrum(Refer to 1408)	
	0-150 C	10pcs
	0-200 C	10pcs
	0-300 C	10pcs
	0-360 C	10pcs
98	Thermometers, Maximum and Minimum, Six, U-Type (Refer to 1433)	
	-20-+50 C	2pcs
99	"Toyama-Type"Toyama-Type 2 (Refer to No.1020)	
	-10-+50 C	2pcs
100	Burners, Alcohol Lamps (Refer to 6001) 90ml	5pcs
101	Brushes (Refer to 6947)	
	a. Test Tube	5pcs
	b. Buret	5pcs
	c. Flask L.	5pcs
	M.	5pcs
	S.	5pcs
	d. Pipet	5pcs
	e. Beaker	5pcs

No	Item Description	Quantity
102	Qualitative Filter Papers No.1 (Refer to 5541)	
	ø 9cm	5pcs
	ø 11cm	10pcs
	Qualitative Filter Papers No.2 (Refer to 5541)	
	ø 9cm	5pcs
	ø 11cm	10pcs
103	Qualitative Filter Papers No.5A (Refer to 5542)	
	ø 9cm	5pcs
	ø 11cm	10pcs
	Qualitative Filter Papers No.5B (Refer to 5542)	
	ø 9cm	5pcs
	ø 11cm	10pcs
	Qualitative Filter Papers No.5C (Refer to 5542)	
	ø 9cm	5pcs
	ø 11cm	10pcs
104	Spatulas Stainless (Refer to 6983)	
	L. 150m/m	10pcs
	180m/m	10pcs
	210m/m	10pcs
105	Spoons Stainless (Refer to 6980)	
	L. 150m/m	10pcs
	165m/m	10pcs
	180m/m	10pcs
106	Forceps Stainless (Refer to 6976)	
	L. 120m/m	10pcs
	150m/m	10pcs
	180m/m	10pcs
107	Glass Tubing Cutter (Refer to FLG-20)	20pcs
108	Pinch Cocks (Refer to 6956)	
	S.	20pcs
	M.	20pcs
	L.	20pcs
109	Pinch Cocks (Refer to 6957)	
	S.	30pcs
	M.	30pcs
	L.	30pcs
110	Burners, Gas (Refer to 6019) L.P Gas	5pcs
111	Tripods (Refer to 6941) ø 120m/m	5pcs
112	Asbestos Wire Gauze (Refer to 6963) 150x150m/m	30pcs
113	Tongs, Crucible (Refer to 6904) L-210m/m	6pcs
114	Clamp, Test Tube, Wooden (Refer to 6909)	10pcs

No	Item Description	Quantity
115	Hose Band, Hand fastened (Refer to 6-475-01)	
	ø 20-32m/m	5pcs
	14-25m/m	10pcs
	10-19m/m	10pcs
116	Clamps, Flask (Refer to 6935)	
	S ø 15-35m/m	10pcs
	M 25-45m/m	10pcs
	N 40-70m/m	10pcs
117	Clamp (Refer to FLC-380) Condenser	5pcs
118	Bossheads (Refer to FLC-390) L. ø 15m/m	10pcs
119	Bossheads (Refer to FLC-391) L. ø 13m/m	15pcs
120	Bossheads (Refer to FLC-392) L. ø 9m/m	10pcs
121	Rings (Refer to FLR-6922)	
	L. ø 90m/m	10pcs
	M. 75m/m	10pcs
	S. 60m/m	10pcs
122	Support, Square Base with rod (Refer to 246)	
	Base 130x210m/m	
	Support rod 13x750m/m	10pcs
123	Support, Buret 2-place (Refer to 6928)	3pcs
124	Supports, Funnel 2-place (Refer to 6920) Wooden	3pcs
125	Support, Separating Funnel 10-place (Refer to BR-12) Plastic	2pcs
126	Color Comparision Tubes, Nessler 10-place (Refer to TR-105)	
	50ml	1pcs
	100ml	1pcs
127	Burner, Blast L.P Gas (Refer to 6034) Glass Work	2pcs
128	Burner,Gas. L.P Gas (Refer to 6029) Handy Type	1pcs
129	Bellows, Foot Power (Refer to 6659) ø 180m/m	2pcs
130	Glass-Blowers' Tools (Refer to 5800-01)	1pcs

CHAPTER 5 PROJECT IMPLEMENTATION PLAN

CHAPTER 5 PROJECT IMPLEMENTATION PLAN

5-1 Project Implementation System & its Polocy

5-1-1 Project Implementation System

The implementation system for this grant aid cooperation project is as follows:

a. Department of Finance, Planning Division

This is the decisive agency on the PNG side and, at the same time, the contracting party for contracts with the Japanese consultant and construction companies.

b. Department of Forests

This is the responsible agency on the PNG side of this construction project.

c. Research Division (Department of Forests)

This is the project implementation agency of this construction project and the agency which is to represent the PNG side.

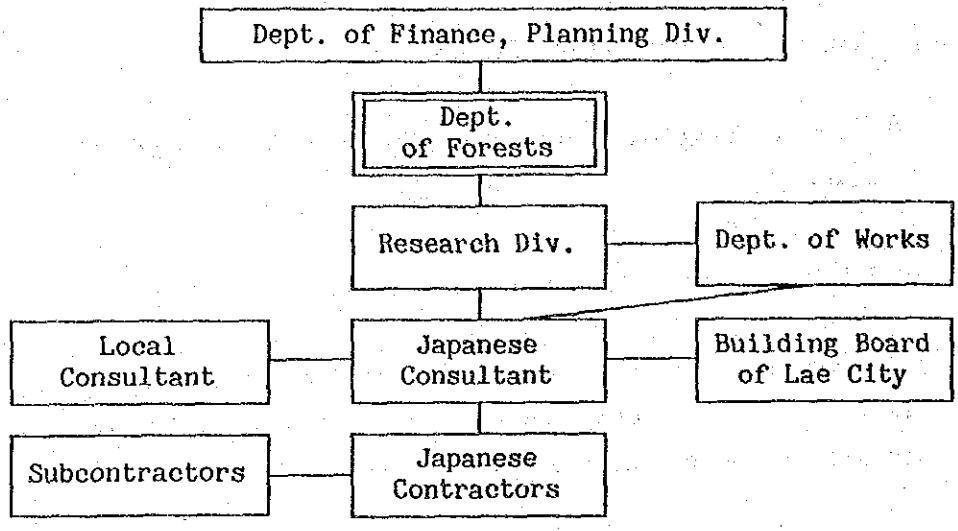
d. Department of Works

This is the checking agency on the PNG side for technical matters during the construction period of this project and is a responsible agency for contracting business and application for approval and authorization.

e. Building Board in Lae City

This is the agency for approval and authorization for this construction project.

The relationships among the above agencies, the consultant and construction companies on the Japanese side, and equipment supply companies can be charted as follows:



5-1-2 Implementation Procedure

In proceeding with construction of this institution, the Exchange of Notes (E/N) shall be concluded between the Japanese Government and the PNG Government in accordance with the flow of the Grant Aid Program. With the conclusion of the Exchange of Notes, Japan shall commit itself officially to the cooperation and initiate specific actions. After the above-mentioned conclusion a consulting agreement shall be concluded between a consultant which has Japanese nationality and the PNG Government, and detailed designing shall be initiated immediately.

The contracting party on the PNG side is the Department of Finance, Planning. The Department of Works will also engage in the implementation of the Project from its standpoint.

After all of the detailed design drawings, construction specifications, research and experiment equipment specifications necessary for the construction and the documents necessary for the construction bid contract are completed, with the approval of the PNG

Government regarding the contents of the design drawings, construction contractors are to be selected by a preliminary qualification examination, after which the construction contractors will be invited for bidding.

After concluding a construction contract between the successful bidder and the PNG Government, with verification by the Japanese Government, the construction will be started.

The PNG Government shall complete the preliminary work such as necessary preparation, leveling of the ground, road access, lead-in of electricity and telephones so as not to hinder the start of the construction.

In this project the original contractor shall be selected through bidding by Japanese building corporations. The successful bidder shall be examined on the contents of the contract price, and after its appropriateness is confirmed, the successful bidder shall conclude a construction contract with the PNG Government. The construction work shall start after the Japanese Government approves the construction contract. However, the key to success of the construction lies in cooperation with the appropriate local professional manufacturers, and it is necessary to create an organized structure so that smooth management will take place considering the division of work between the original contractor and the local subcontractors and the personnel allocation.

The time when the construction on this project begins is assumed to be 2.5 months after the conclusion of the Exchange of Notes between the two governments under the Grant Aid Program of the Japanese Government.

For construction work supervision, the Japanese consultant shall coordinate closely with the Department of Forests and related agencies of PNG.

At the construction supervision stage an experienced person shall be dispatched full-time for meetings, adjustments and other formalities with the Department of Forests and related agencies of PNG. further, quality control and process control shall be performed during the construction. Engineers shall be periodically dispatched from Japan to render sufficient support. Temporary constructions will require sufficient attention to safety.

5-2 Construction Policies and Precautions

5-2-1 Construction Policies

The fundamental construction policies for implementing the Project under the Grant Aid Program are conceived as follows:

1) Construction Period

According to the inquiry to the local subcontractors and consultant during the survey, the standard construction period to build a two-story building of approximately 8,000 m^2 is 14 to 16 months. (This construction period is based on a complete five-day work week.) However, it will be necessary to complete the building in 12 months from the point of view of the requirement to finish it in March, 1988 to be in accordance with the system of the Japanese Grant Aid Program. For this reason it will be necessary to schedule the overall building process on the assumption of working overtime and on Saturdays.

2) Assurance of Quality and Quantity

The quality and the quantity specified in the design documents shall be maintained throughout the entire process.

3) Strict Enforcement of Safety during Construction

Since this is a grant aid project, strict enforcement of safety shall be the most important item. Especially, since the construction will be conducted in such a way as to include extension of buildings while the existing facilities are still operating, sufficient attention to safety shall be needed for temporary construction plans.

5-2-2 Precautions in Construction

Considering the general conditions, local characteristics (existence of rainy season), legal restrictions to be taken into account, etc. the precautions in construction are conceived as follows:

1) In making temporary construction plans, since the existing facilities will be operating during the construction period, a way must be devised so that they can be accessed independently and separate from the construction area.

2) Since many items of construction will be contracted to medium and small-sized builders with versatile workers due to the shortage of skilled construction workers, the process control will require careful attention.

3) Since the management and the foremen of the contractors of various job categories and of the major subcontractors are Australians, New Zealanders, and Philippines and their ordinary workers are local people, attention is required to communication.

4) Since the roof work of this research institute uses steel frames, it is necessary to give consideration to proper securing of heavy materials.

There are not many companies who own cranes of 50 tons or larger.

5) Materials for temporary construction such as footstools, supports, and structure stands are not leased. Care must be taken since construction companies own them.

6) Since the legal restrictions are based on Australian standards, there are specific restrictions such as building completion inspections, mid-term inspections, fireproof restrictions, and restrictions on the use of buildings. Since it tends to take some time to obtain approvals, it is necessary to submit various notifications early.

7) Local materials are extremely limited except for concrete, brick, etc. The quantity of import materials is not sufficient. Investigations on materials to be procured are needed beforehand.

8) Since there are many alignment points such as between building work and facility construction, and between facility construction and equipment, the construction requires careful attention.

All of the above precautions are based on the assumption that every effort will be made "to create the quality and quantity specified in the design documents within the construction period."

5-3 Division of Construction

The total project is divided into that portion borne by the grant aid from the Japanese Government and that portion borne by the PNG Government as shown below.

o Construction borne by the Japanese side

1) Building Construction

Structure,
Building finishing, and
Standard laboratory furniture

2) Electrical Facilities Construction

Electricity receiving and transforming facilities, power and main line facilities, lights, outlet facilities, interphone facilities, telephone facilities, broadcast facility, lightning rod facility, fire alarm facilities, and indoor fire hydrant facilities.

3) Water Supply and Drainage, Hygiene, and Air-conditioning and Ventilation Facilities

Water supply facilities, hot water supply facilities, drainage and ventilation facilities, hygiene equipment facilities, air-conditioning and ventilation facilities, and fire extinguishing facilities.

4) Special Facility Construction

Water drainage treatment facility, emergency power supply facility, and incinerator.

5) Outdoor Construction

Fire hydrants, roads on the premises, and outdoor lamps.

6) Experiment and Testing Equipment Construction

Experiment equipment, testing equipment, training equipment, and installation work.

7) Accommodation

o Construction borne by the PNG side

1) Building Construction

Guardhouse

2) Leveling of Ground

Felling of existing trees, removal of stumps, and leveling of ground.

3) Outdoor Construction

Landscaping, cultivation, gates, doors, fences, and paving of access roads outside the premises.

4) Infrastructure Lead-in Connection Work

Lead-in of electricity and telephones, installation of portable fire extinguishers, and sewerage facility.

5) Fixtures and furniture

Curtains, shades, and general furniture.

6) Others

Confirmation application, boring survey, surveying, customs formalities and tax exemption measures at landing.

7) Expenses required for maintenance, administration, and management.

5-4 Construction Supervision Plan

1) Form of Building Construction Process

The form of this building construction process consists of a Japanese enterprise contracting for the building construction (the general contractor) and Japanese enterprises contracting for equipment procurement (the suppliers) under the Japanese consultant as representative of the owner.

2) Start of Construction and Construction Period

The construction needs to be started at the beginning of April, 1988 at the latest. Due to the system of the Japanese Grant Aid Program, the assumption is made that the entire construction process should be completed by March, 1989. Therefore, since it will be a tight schedule as a whole, the starting time of the construction work should be strictly observed.

The construction period requires 12 months under the previously mentioned conditions.

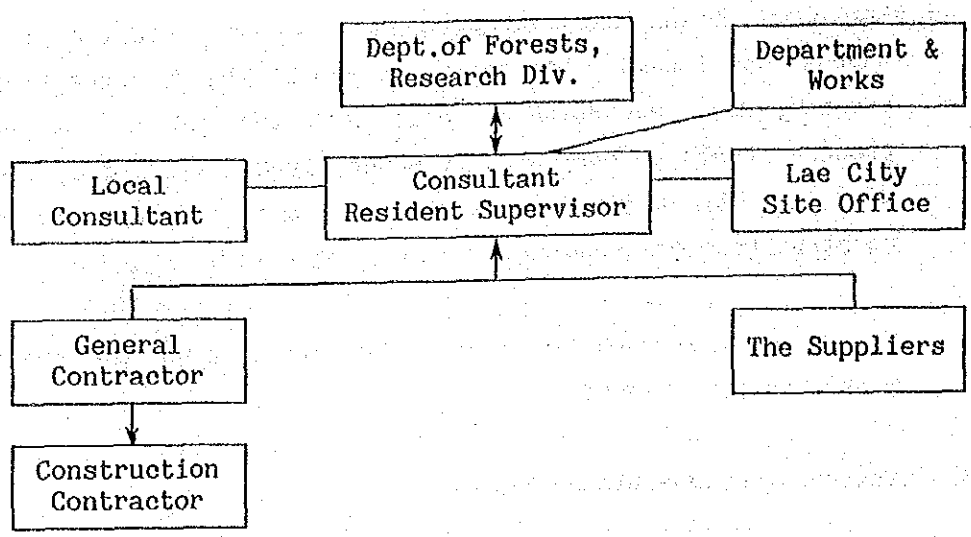
3) Construction Supervision System

The consultant as the deputy of the Owner (the PNG Government) shall dispatch one expert architect selected from those who have similar project experiences as a full-time supervisor. This full-time supervisor supervises each contractor, reflecting the intention of the Owner. Each contractor shall be incorporated under the supervision of this full-time supervisor. Each contractor will not communicate directly with the Owner but rather all through the full-time supervisor.

The construction contractor shall dispatch Japanese engineers as an principle specified below.

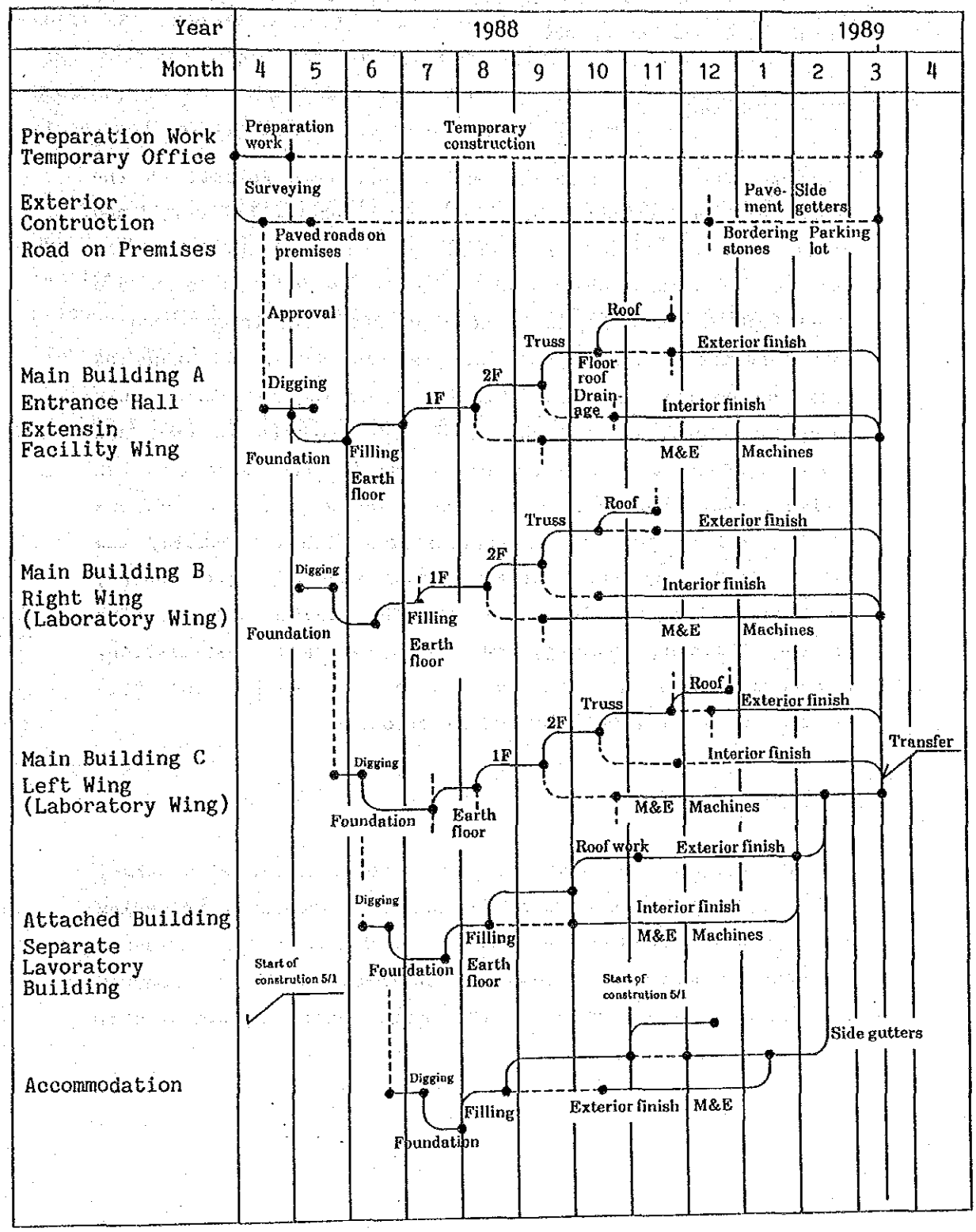
a)	Site deputy (Construction director)	1 person
b)	Construction chief and assistant chief	1 person
c)	Building engineers	2 persons
d)	Facility engineers	2 persons
e)	Business manager	1 person

The above mentioned supervision structure can be charted as follows:



The construction schedule is shown below for reference.

Estimation of Construction Schedule



5-5 Materials Procurement Plan

It is discussed assuming that the materials are procured in Lae City, Papua New Guinea.

Building-Materials

Both the supply and the quality of items related to the body of the construction such as rubble, cement, and ready-mixed concrete are stable. A stable supply is also expected for structural steel such as reinforcing bars and steel frames. However, it is worried that steel frames require long manufacturing periods. Care is required in the ordering time for construction. As for the finishing materials, only concrete blocks, plywood and timber are produced in PNG, and the rest of the materials depend on imports from Australia, New Zealand, etc. However, agents from each company have offices in PNG, and no problems are anticipated with the quality and supply. However, since aluminum sash windows, steel doors, shutters, and take a long time from the manufacturing drawing to the building drawing, manufacturing, and installation, procurement will be from Japan upon considering the time constraints of this building construction.

Electrical facility

The lighting equipment, electric wire, electric wire tubes, wiring equipment, etc. shall be procured locally considering the aspect of maintenance and the local standards. However, the other manufactured items and equipment shall be procured from Japan in consideration of the required delivery times, etc.

Mechanical facility

Basically even the items which can be procured locally shall be procured from Japan because of the size and delivery time problems since the construction schedule is very tight. However, it is judged that fume pipes, lead tubes, cast-iron pipes, and polyvinyl chloride tubes can be procured locally.

Basically equipment shall be procured from Japan. However, hot-water heaters, fire extinguishers, sanitation fixtures, small-sized air conditioners, and ventilation fans shall be procured locally considering the procurement condition, maintenance, etc.

The supply condition of each material is as follows:

Material List

Item	Availability		Country of origin			Expected quality		Notes
	Good	Not good	PNG	Japan	Other		Descriptions	
Garden soil	○		○					
Gravel	○		○				Quality in size and material is stable. Gravel washing facilities are installed.	
Sand	○		○				Own plants have been installed locally and material in a relatively stable quality is avialable.	
Macadam		○	○					
Portland cement	○			○	○		Imported from New Zealand and Korea. No local products are available.	The same description is applied even to white cement.
Ready - mix concrete	○		○				Local plants are in operation, each one of which have a relatively improved production control system.	
Veneer plywood board	○		○				water - proof type veneer plywood board is fabricated locally.	
Regular steel rod	○			○	○			
Irregular steel rod	○			○	○			
PC steel		○			○			
H - form steel	○			○	○			

Item	Availability		Country of origin			Expected quality		Notes
	Good	Not good	PNG	Japan	Other		Descriptions	
Concrete block	○		○				Materials for both construction frame and finishing use are available locally. 100% local production.	
Regular brick		○			○		The use of this item is popular locally. But all is supplied from Australia and New Zealand.	
Asphalt waterproof finish equipment	○			○	○			
Alminum fixtures	○				○		Frequently adopted item. Parts and materials are imported from Australia and fabricated locally.	
Wood fixtures	○				○		Quality products are fabricated locally.	
Steel fixtures	○				○			
Shutter	○				○			
Zinc coated iron sheet	○				○		Used very frequently for general residences. No problems with the supply.	
Aluminum alloy coated iron sheet		○			○			
Normal glass (float glass)	○				○		Imported from Australia.	

Item	Availability		Country of origin			Expected quality		Notes
	Good	Not good	PNG	Japan	Other		Descriptions	
Net - reinforced glass		○			○		Imported from Australia.	
Coloring materials	○				○			Parcially imported and maintenance is not available.
Sprayer	○				○			
Glazed mosaic (in pair)	○				○			
Polyvinylchlori tile	○			○	○		All demand is met by import. Japanese products are among them.	
Dressed plywood					○		All materials are imported from Australia and New zealand.	
Ceiling board	○				○			
Asbesto material for spray		○			○			
Furniture	○				○		Australian standard products prevail. The quality is relatively good.	

Item	Availability		Country of origin			Expected quality		Notes
	Good	Not good	PNG	Japan	Other		Descriptions	
Bath tub	○				○		Australian standard products prevail. The quality is relatively good.	
Blind (shade)	○				○		Australian standard products prevail. The quality is relatively good.	
Power distribution board (high and low voltage)		○		◎	○		Imported products.	Products of Japan, Australia and Singapore.
Power distribution board	○			◎	○		Ditto	Ditto
Illumination equipment	○		◎	○	○		Ditto	Products of Japan, Australia and New Zealand.
Lightning conductor	○		◎	◎	○		Ditto	Products of Japan, Australia and New Zealand.
Electric cable	○		◎	○	○		Ditto	Products of Japan, Australia and New Zealand.
Electric cable cover pipe	○		◎	○	○		Only the PVC type is available locally. Other types are imported.	Products of Japan, Australia, New Zealand, Singapore and Hong Kong.
Wiring equipment	○		◎	○	○		Imported products.	Products of Japan, Australia, New Zealand, Singapore and Hong Kong.

Item	Availability		Country of origin			Expected quality		Notes
	Good	Not good	PNG	Japan	Other		Descriptions	
Power generator		○		◎			Imported products.	Products of Japan, and Australia.
Electronics equipment		○		◎			Imported products.	Products of Japan, and Australia.
Pumps	○			◎	○		Ditto	Products of Japan,USA,UK, and Australia.
Tanks	○			◎	○		Ditto	Products of Japan, Australia, New Zealand, and Singapore.
Distinguisher	○		◎	◎	○		Imported products are used. No problems if Australian products are supplied	Products of Japan, and Australia.
Sanitation fixtures	○		◎	○	○		Ditto	Products of CAROMA / JAMES MAROIS / ARHITAGE SHANES (AUS) ,and Japan.
Hume concrete pipe	○		◎	○	○		Ditto	Products of HUMES (AUS), and Japan.
White gas pipe	○			◎	○		Imported products.	Products of Japan, and Australia.
Black gas pipe	○			◎	○		Ditto	Ditto
Lead pipe	○		◎	○	○		Imported products.	Products of Australia, and New Zealand.

Item	Availability		Country of origin			Expected quality		Notes
	Good	Not good	PNG	Japan	Other		Descriptions	
Cast iron pipe	○		◎	○	○		Imported products.	Products of Japan, Australia, and New Zealand.
Aircooled airconditioning unit (Split type)	○			◎	○		Only imported products are available. But there is no problems with maintenance.	CENTURY (AUS) DAIKIN (J) CARRIER (USA) HITACHI (J) MITSUBISHI (J)
Window frame airconditioning unit	○		◎	◎	○		Ditto	ACMA (SIN) PAN-ELECTRICAL (AUS) DAIKIN' (J) CARRIER (USA) MITSUBISHI (J)
Electric fan	○			◎	○		Imported products.	Products of Japan, UK, USA, , and Australia.
Ceiling fan	○		◎	○	○		Imported products.	Products of Japan, UK, USA, , and Australia.
Electric fan ventilator	○		◎	○	○		Imported products.	Products of Japan, UK, USA, , and Australia.
Duct materials (zinc plated iron sheet)	○			◎	○		Imported product. The finishing precision of those products is in medium level.	Products of Japan, and Australia

5-6 Implementation Schedule

Although there are not many buildings in the construction of this research institute, the floor area is more than 6,470 m^2. Since the construction will be executed while the existing facilities are used as they are, there will be restrictions on the temporary construction. Further, considering the ability of the local workers, the construction period shall require a minimum of 12 months. Although there are no problems with the access roads, the infrastructure, etc., sufficient drying and curing periods will be required since there will be interruption of the construction due to heavy rainfall during the rainy season and it will involve some wet construction such as concrete block work and tile work.

5-7 Estimated Project Cost

The assumptions used in calculating the estimated cost of this project are as follows:

① Time of calculation: As of October, 1987

② Exchange rate: US$1=145.00 yen (1 kina = 161.39 yen)

③ Construction period: 12 months

④ Material procurement: In accordance with the procurement plans of 5-5

⑤ Construction company: Construction company possessing Japanese nationality

⑥ Others: The tax exemption items such as customs duties on construction materials, enterprise tax on the Japanese construction company, and value added tax in PNG within the scope of the Japanese Government's Grant Aid Program are included.

The Project cost to be borne by PNG is estimated at 93,000 Kina.

Estimated rough cost for new wiring of electricity to the site for accommodation is 45,000 Kina.

Estimated rough cost of removing existing water supplying line of laboratory is 11,000 Kina.

Estimated rough cost of setting new water supply line from existing line to the site for accommodation is 37,000 Kina.