2) Hot Water Supply System

a) Hot water for washing both animal cages in the Animal Experiment Building and research apparatus for common use will be supplied from a boiler.
Pumps for the hot water supply and the hot water storage tank will be installed in the Laboratory Building.

b) Potable hot water will be prepared in kettles on the electric hot plate which will be in the kitchenette.

c) Hot water for showers in the infected animal laboratories will be supplied locally by an electric water heater.

d) The projected hot water supply capacities are as follows:

Cleaning	$5m^3$/day
Potable	$1m^3$/day
Total	$6m^3$/day

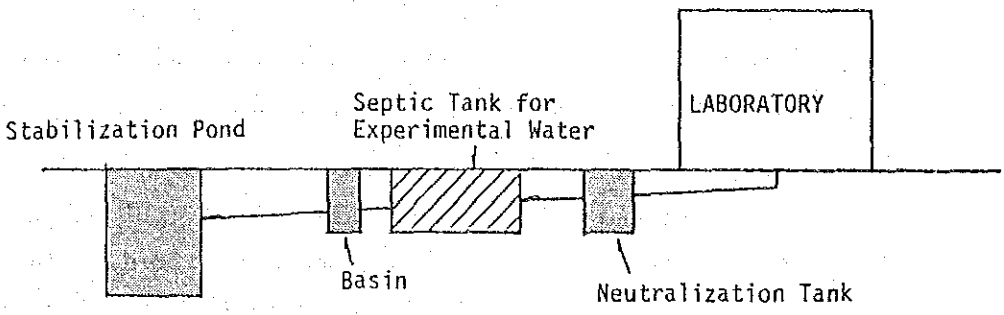
3) Drainage

The drainage system within the building will be designed to dispose of general waste water, laboratory waste water, and animal waste water separately. After treatment in the waste water treatment tank, waste water will be discharged into the existing creek on the west side of the Project Site.

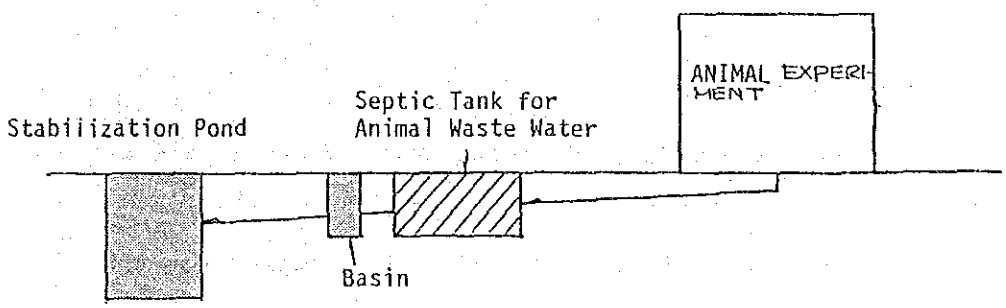
a) Drainage for domestic-use water
The drainage system within the building will handle soil sewage and water discharged from the building sewage together. The waste water will be treated in an outdoor waste-water treatment tank.

DRAINAGE SYSTEM

1 EXPERIMENTAL WATER



2 ANIMAL WASTE WATER



3 DOMESTIC WATER

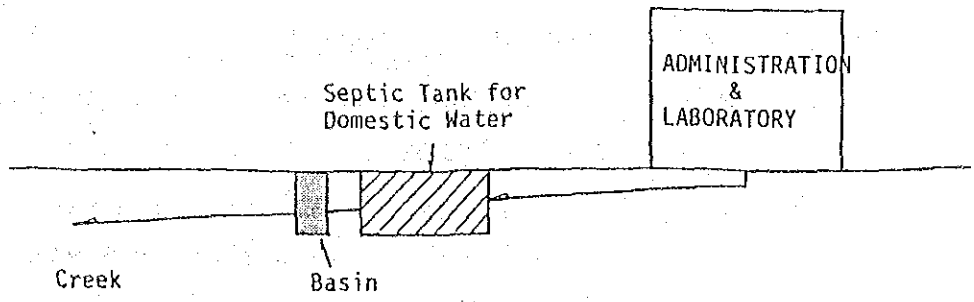


FIG. 4-3-37 DRAINAGE SYSTEM DIAGRAM

b) Waste water from experiments
Substances such as acids or solvents which cause corrosion or deformation of drainage pipes, and acid cyanide or heavy metals which cannot be released into the general environment for reasons of pollution, will be treated in bottles provided in each laboratory by the researchers. Then the bottles will be incinerated. As a result, there will be no drainage system for waste water from experiments.

c) Animal waste water
Contaminated and uncontaminated water will be treated separately. Both types will be sterilized, then treated in a waste water treatment tank for animal waste, and finally discharged into the creek.

d) The flow diagram of supply and waste water is shown in the Fig. 4-3-37.

4) Sanitary fixtures

a) Wash basins, mirrors, service sinks, closets and urinals will be installed in toilets.

b) Shower facilities will be installed for the research staff.

c) The closets are of the Thai type, and will have a low tank for flushing.

5) LPG (liquid petroleum gas) supply

a) LPG will be supplied to laboratories for general experimental purposes.

b) Gas cylinders will be installed at a central location. The piping will be fitted with main cocks where necessary for delivery of LPG.

c) The flow diagram for LPG is shown in Fig. 4-3-38.

GAS SUPPLY SYSTEM

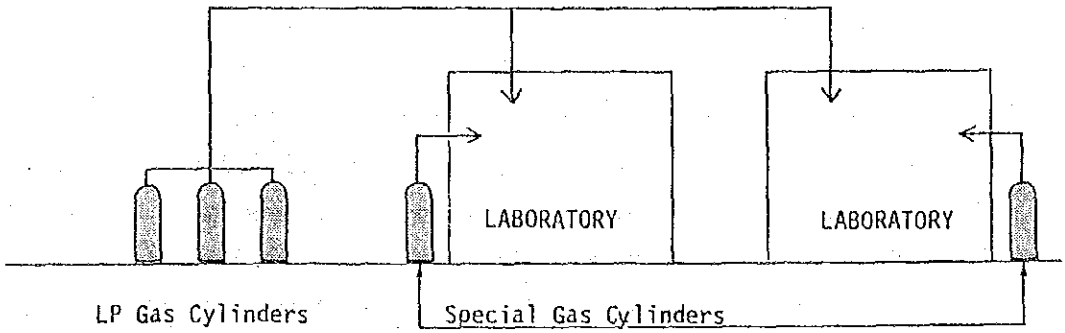


FIG. 4-3-LPG FLOW DIAGRAM OF LPG

6) Fire-fighting equipment

a) Indoor fire hydrants will be installed on every floor of the Laboratory Building in accordance with the regulations in Thailand.

b) Small fire extinguishers will be supplied for every building.

7) Waste treatment tanks

a) The following waste treatment tanks will be installed for the various drainage systems:

Tank for domestic use water	$30m^3$/day
Tank for contaminated animal waste water	$5m^3$/day
Tank for uncontaminated animal waste water	$20m^3$/day

b) A neutralization tank will be installed for the waste water from experiments. Its capacity is estimated to be about $15m^3$/day.

(4) Air-Conditioning and Ventilation Systems

1) The air conditioning and ventilation system facilities to be installed will be divided into four categories according to the use, purpose, function and temperature conditions of the rooms. The categories of the projected facilities are shown in Fig. 4-3-38 - 43 as Grades I through IV.

a. Ventilation only (Grades I, I')

Ventilation of rooms such as researcher rooms, conference rooms, toilets, general storage, etc., will be carried out mechanically by ventilator fans. Most rooms in the Training and Administration Building will have a natural air supply through the windows and will be fitted with ceiling fans.
See Fig. 4-3-38, 39.

b. Air conditioning and ventilation (Grades II, II')

Air conditioners and ventilation fans will be installed in general research rooms, laboratories, Directors' Rooms, etc. The air conditioners used will be of the remote type. The indoor conditions planned are as follows:

Temperature: 27±1°C (D.B. °C) and
R.H.: 50±5%

See Fig. 4-3-40, 41

c. Air conditioning and air cleaning and removal (Grade III)

For some research rooms whose waste gas may be contaminated with toxic gases or harmful microbes, a duct-type air-cleaning ventilation system with a moderate performance filter, as well as room air-conditioning equipment, will be provided. The indoor conditions planned are as for Grades II and II'.

The air-cleaning ventilation system will be installed only in the Cattle and Pig Unit, the Poultry Unit and the Small-Animal Unit. See Fig. 4-3-42

d. Air conditioning and air-cleaning ventilation (Grade IV)

(All-fresh-air type packaged air conditioning)
These systems will be installed in rooms requiring all fresh air, for example, laboratories where viruses and bacteria that may infect humans are handled, the Isolation Units for cattle and pigs for poultry and for small experimental animals. These air conditioners have high-efficiency filters enabling them to perform air conditioning, air cleaning and ventilation at the same time.
The indoor conditions (temperature and humidity) shall be determined according to the function of each room. See Fig. 4-3-43.

e. In rooms where air conditioning is required all day long, such as equipment and refrigerator rooms, a number of remote-type air conditioners will be installed.

f. Air conditioning equipment with air-cooled direct-expansion coils will be installed in the cold rooms used to store sera, etc. In addition, prefabricated unit rooms will be installed as cold storage rooms maintained at around +4°C.

2) Grading of air conditioning and ventilation facilities

I. Ventilation only (Grade I)

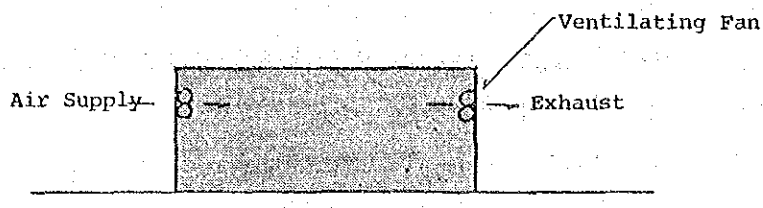


FIG. 4-3-38 GRADE I

I'. Natural ventilation with ceiling fan (Grade I')

(For use mainly in the Training and Administration Building)

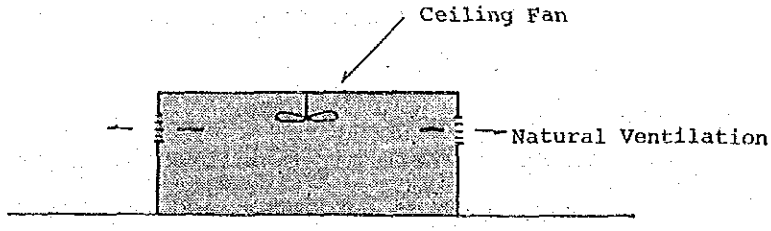


FIG. 4-3-39 GRADE I'

II. Air conditioning and ventilation (Grade II)

(For use in general research rooms)

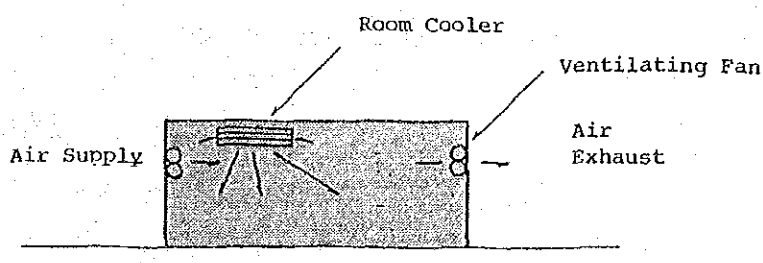


FIG. 4-3-40 GRADE II

II'. Air conditioning and ceiling fan (Grade II')

(For use in conference rooms and Directors' Rooms)

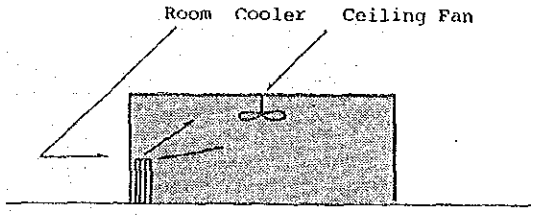


FIG. 4-3-41 GRADE II'

III. Air conditioning and air cleaning and removal (Grade III)

(For use in rooms fitted with clean benches, etc.)

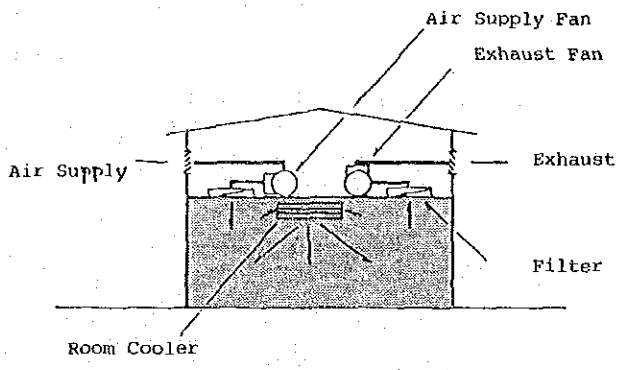


FIG. 4-3-42 GRADE III

IV. All-fresh-air type packages air conditioning (Grade IV)

(For use in special research rooms and laboratories where air contamination by hazardous substances may occur, Isolation Units)

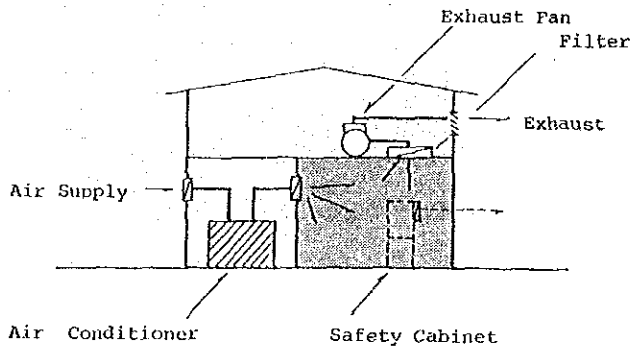


FIG. 4-3-43 GRADE IV

3) Air conditioning and ventilation facilities

1. Laboratory Building

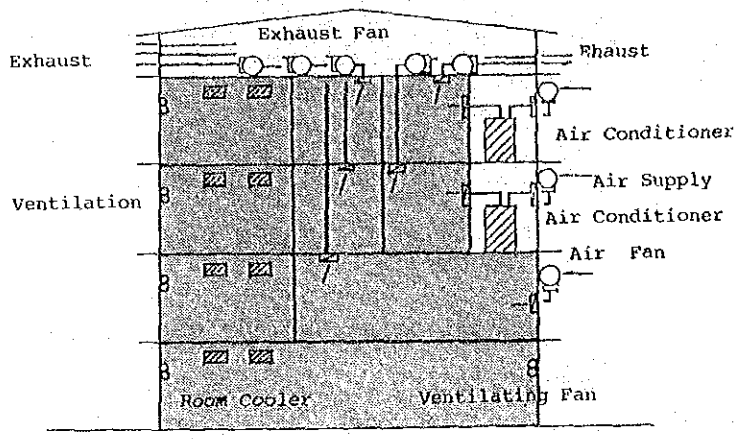


FIG. 4-3-44

Animal Experiment Building

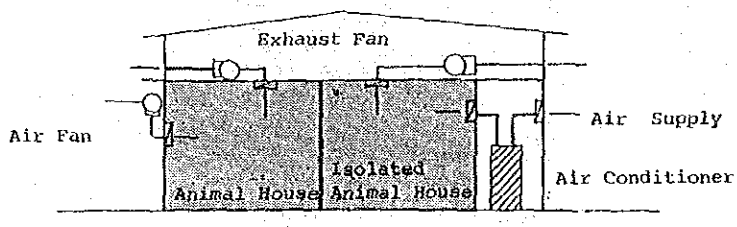


FIG. 4-3-45

3. Training and Administration Building

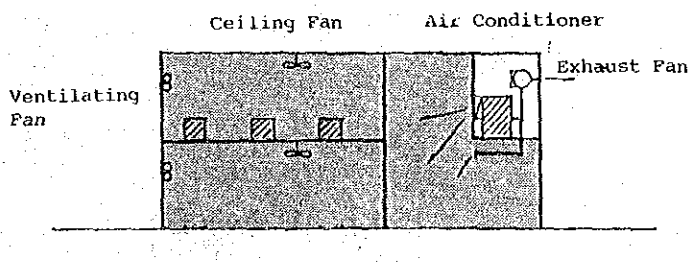


FIG. 4-3-46

(5) Special Equipment

1) Gas Supply

Cylinders of gas other than LPG for special equipment will be installed in each laboratory where it is needed.
The categories of gas for special equipment are as follows:

- Liquid CO_2 gas
- Liquid N_2 gas
- N_2 gas
- He gas (imported)
- Ar gas
- H_2 gas

2) Steam Supply

Steam generated by boilers will be supplied to autoclaves for the purpose of sterilization, and to humidifying devices.

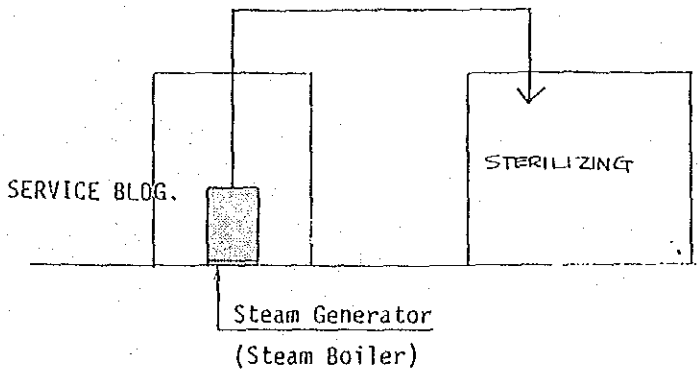


FIG. 4-3-47 STEAM SUPPLY

4-3-5 External Work

The following planning of the external work to follow the execution of the site preparation works by the Thai side, as described in 4-3-1 (2), has been carried out in accordance with the Block Layout.

1) Service Roads and Sidewalks

The entrance roads into the Project site should be limited to two: those leading from the main and service gates opening onto the road on the west site. The service gate will be the existing gate of the Pig Breeding Station. The service road will be used particularly as an approach to the Institute's service yard adjacent to the Laboratory Building, and will have a rotary in front of the Training and Administration Building for convenient traffic flow. A sidewalk from the entrance road around the rotary will provide an entry route for pedestrians. The service road will also run past the service yard of the Laboratory Building and go around the Animal Experiment Building. It will be 6 meters wide, and paved.

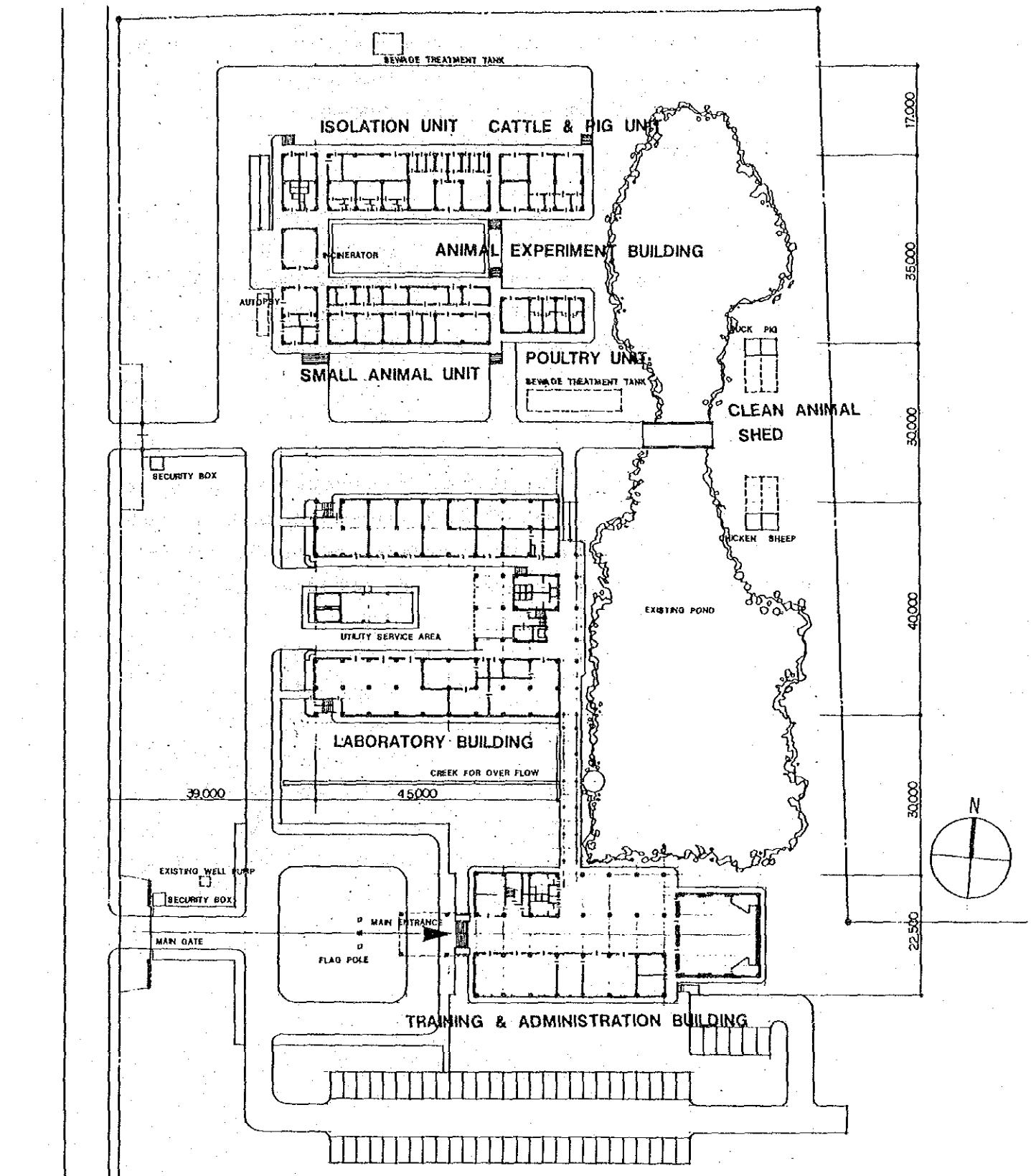
2) Parking Space

Parking space will be provided for approximately 25% of the total staff working at NAHPI. There will be a total parking space for 60 cars in parking lots in front of the Training and Administration Building.

3) Existing Pond

The areas of the existing pond not to be filled by the Thai Government will be bordered by a firm embankment along the near side. This pond will be used for regulatory purposes, to control storm drainage and dispose of treated wastewater.

4-3-5 EXTERNAL WORK PLANNING



4) Storm Drainage Work

Rain water will be drained through open ditches and through piping into the creek and the existing pond.

5) Landscaping

The research facilities should be free of sand, dirt and dust, so a lawn to act as a ground cover is necessary, at least for the unpaved ground around the facilities. Tall trees should be planted near the buildings and the parking space, so that these will be partly shaded from strong sunlight.

6) Exterior Facilities

Guard Houses will be located to one side of the entrance road to the Project Site and of the service road, both of which will be provided with gates; and a fence will be erected around the entire expanded area of the site.

4-3-6 Equipment Planning

(1) Basic Policies

1) The equipment planning for the Project will cover all equipment for the proposed new NAHPI.

2) Equipment will be selected depending on the nature of the activities, methods and conditions of research at the NAHPI. Equipment necessary for future operations is excluded.

3) Special equipment, which requires advanced operating techniques and high maintenance expenditure shall be used in common under a system of careful supervision and control.

4) Ordinary equipment will be selected from the viewpoints of ease of operation, durability and ease of maintenance.

5) Standardized equipment will be selected as far as possible so that parts can be replaced instantly when the equipment is repaired.

6) Equipment will be provided assuming the establishment of a system of routine maintenance care, inspection and a certain extent of repair and improvement.

(2) Equipment Plans

1) Equipment for Research Laboratories

a. Bacteriology

The main aim of research is to establish the diagnosis of, and prevention measures against, animal diseases caused by aerobic bacteria, anaerobic bacteria and fungi. Research should be carried out using animal experiments in addition to general bacteriological methods.

The equipment planned for the Bacteriology Section is as follows:

1. Lamina flow, balances and autoclaves indispensable for the preparation of culture media of bacteria, where precision is required.
2. UV Spectro-photometer, water baths, centrifuge and liquid chromatography apparatus necessary for physical and chemical studies of bacterial toxins.
3. Microscopes and centrifuges for identification of various pathogens.
4. Freeze dryer for the preservation of bacterial strains.
5. Fundamental equipment such as incubator, low temperature incubator, anaerobic incubator, and carbon dioxide incubator.
6. Freezers for preservation of diagnostic antisera.

The main equipment is as follows:

1. Refrigerator
2. Balances
3. Microscopes
4. Centrifuges
5. Blenders

6. Sonic vibrator
7. Colony counters
8. Filter holders
9. Air pump
10. Lamina flow
11. Glove boxes
12. Pipetting machine
13. Large incubator
14. Incubator
15. Low temperature incubator
16. CO_2 incubator
17. Anerobic incubator
18. Freezer
19. Water baths
20. Water bath with shaker
21. Wood's light
22. -80°C freezer
23. pH meters
24. Autoclave

b. Virology

Of the current infections in Thailand, virus diseases account for a large portion. Accordingly, this research field especially requires strengthening of fundamental research technology. Research methods in up-to-date virology are essentially dependent on cell culture methods, serological methods and immunological techniques. At the same time, the promotion of research in this field requires basic physical methods to be carried out with a high degree of skill.

The equipment planned for the Virology Section is as follows:

1. Electron and optical microscopes for morphological investigation
2. Centrifuges and density gradient fractionation apparatus for virus purification.
3. Ultracentrifuge, chromatography apparatus, electrophoresis apparatus and UV spectrophotometer for concentration and fractionation of virus proteins.
4. Incubator, carbon dioxide incubator, low temperature incubator for cell culture.
5. Deep freeze for preserving viruses and sera.

The main equipment are as follows:

1. Ultra centrifuge *
2. Density gradient fractionator
3. Lamina flow
4. Centrifuges
5. Sonic vibrator
6. Incubator
7. Low temperature incubator
8. CO_2 incubator
9. Refrigerator
10. Microscopes

11. Filter holders
12. Ultrafiltration apparatus
13. Balances
14. Homogenizer
15. Water baths
16. Air pump
17. Autoclave
18. Water stills
19. -20°C freezer
20. -80°C freezer
21. Microplate washer
22. Multiscan MC
23. Autodroppers
24. pH meters
25. Freeze-drying machine *

c. Parasitology

The wide variety of parasites in Thailand are the cause of many diseases.

In this section, researches are to be carried out into the living environment of parasites so as to elucidate various problems about the diseases caused by them.

The equipment planned for the Parasitology Section is as follows:

1. Basic research equipment such as microscopes and centrifuges.
2. Freezer and low temperature incubator for accurate isolation and identification.

The main equipment for the Parasitology Section are shown as follows:

1. Refrigerator
2. Low temperature incubator
3. Centrifuges
4. Microscopes
5. Automatic blood cell counter
6. Automatic diluter
7. Printer
8. Autoclave
9. Lamina flow

d. Pathology

Pathological research of animal and poultry diseases is useful not only for the investigation of disease pathogenesis and diagnosis but also for obtaining suggestions for various other researches on these diseases. Part of the task of the Pathology Section is to perform pathological diagnosis of field samples sent from the central area of the country, technology development for diagnosis, and some of the research related to technological development of quality and safety control of feeds and animal products.

The equipment planned for the Pathology Section is as follows:

1. Basic research equipment consisting of microscopes, tissue processors, a tissue embedding center and microtome.
2. Electron microscope, ultramicrotome, glass knife processor, and tissue photographic apparatus necessary for the investigation of the relation between host and pathogen.

The main equipment in the Pathology Section is as follows:

1. Electron microscope *
2. Vacuum coating apparatus *
3. Ultra microtome *
4. Glass knife processor *
5. Photographic apparatus *
6. Tissue processor
7. Draft chamber
8. Tissue embedding center
9. Microtome
10. Water baths
11. Microscopes
12. Refrigerator
13. Centrifuges
14. Incubators
15. Dry heat oven
16. Cryostat microtome*
17. Microtome knife sharpener*

e. Biochemistry

For the complete understanding of animal diseases themselves, their causes, and responses, biochemical knowledge is indispensable. Clinical biochemical diagnosis, diagnostic procedure development, researches on immunochemistry, studies of residual toxic substances, and quality tests of feeds and animal products, etc., are the main activities of this Section.

The equipment planned is as follows:

1. Basic research equipment consisting of balances, pH meters, hoods, muffle furnace and dessicator.
2. Grinder, chromatograph preparation apparatus, homogenizer and blender necessary for specimen preparation.
3. Electrophoresis apparatus, liquid chromatography apparatus and rotary evaporator for fractionation of components.
4. Amino acid analyser, atomic absorption spectrophotometer and auto analyser for analysis of biological materials and feeds.
5. Bioassay analyser and densitometer for reading test results.

The main equipment is as follows:

1. Amino acid analyzer *
2. Atomic absorption spectrophotometer *
3. Auto analyzer *
4. Balance *
5. pH meter *
6. Gas chromatography apparatus *
7. Mill *
8. Muffle furnace *
9. Electrophoresis apparatus *
10. Liquid chromatography apparatus *

11. Thin-layer chromatography apparatus *
12. Spectrophotometer *
13. Spectrofluorophotometer *
14. Calorimeters
15. Extraction apparatus
16. Densitometer *
17. Laboratory hood cabinet
18. Refrigerator
19. Rotary evaporator
20. Rotary shaker
21. Digesting apparatus
22. Water baths
23. Dessicator
24. Homogenizer
25. Blenders
26. Centrifuges
27. Bioassay analyser
28. Chromatochamber *
29. Column chromatography set *
30. Fraction collector *
31. Autoclave *
32. Distillation unit
33. Automatic voltage stabilizer
34. Microcomputer *
35. Typewriter *

2) Common-use equipment

Those items of the specific research equipment, that receive less frequent usage are planned to be utilized in common under a system of careful control and supervision, so that unnecessary duplication of such devices in the NAHPI is rendered. Their effective utilization will contribute to the rapid progress of research and handling methods. Interdivisional cooperation is expected to be helpful for the training of researchers with a wide range of knowledge.
The main equipment is as follows:

a) Equipment for assigned management

Among the specific equipment which will be managed by the Virology and Pathology Laboratories, etc., those devices scheduled to be utilized occasionally by other sections shall be kept under the management of the above units. Devices in this category are marked in the equipment list for each section with an asterisk,*.

b) Equipment for the Central Service Section

1. Liquid nitrogen stocker
2. Liquid nitrogen transportation tank

c) Equipment for the Freezer Room

1. -20°C freezer
2. -80°C ultra-low freezer
3. Ice maker

d) Equipment for the Workshop

1. Circuit testers
2. Voltmeters
3. Soldering irons
4. Tool sets

e) Equipment for Wash-up and Sterilizing Room

1. Autoclave
2. Dry heat sterilizer
3. Ultrasonic cleaner
4. E.O. gas sterilizer
5. Washing machine
6. Dehydrator
7. Laundry dryer
8. Press
9. Temperature recorder
10. Automatic washer
11. Carts
12. Immersion tank
13. Drying shelf
14. Dryer

3) Equipment related to animal experiments

Animal experiments are absolutely indispensable for research in the field of animal health, and it is hardly conceivable that steady development of research can be achieved without accurate animal experimentation.

The following equipment is planned for infection experiments, immunity experiments, specimen collection work, etc.

The main equipment is as follows:

1. Steam cleaner
2. Rabbit cage racks
3. Guinea pig cage racks
4. Mouse cage racks
5. Chicken cage racks
6. Autopsy table
7. Dehumidifier
8. Refrigerator
9. Balances
10. Mill
11. V-shaped-mixer

4) Equipment for training, etc.

One of the major objectives of this Project is to upgrade the quality of researchers and technical staff engaged in animal health through education and training. For this purpose, it is necessary to prepare equipment for collecting, arranging and distributing information on disease control and animal health. The researchers and technical staff in local stations can utilize such information for their own education. The equipment to be provided for these activities is as follows:

1. Wagon car
2. Copy machine
3. Mimeographic rotary press
4. Typewriter

5. Slide projector
6. Autoslide projector
7. Overhead projector
8. Refraction projector
9. 16 mm movie projector
10. 16 mm movie camera
11. Video camera
12. Video editor
13. Video television
14. Still camera
15. Micro-computer

(3) Utility Design Related to the Equipment

The following utility design is required, in view of the fact that so-called hazardous mediums such as microbes and their vectors will be used for experiments at NAHPI and that safe conditions are needed for the researchers. Also, the equipment requires accurate operation and at the same time calls for circumstances where accurate operation is possible. The main points of utility design are described below:

1) Appropriate partitioning and air-conditioning and ventilation systems will be required when it is necessary to prevent contamination and infection by microbes.

2) Suitable facilities will be required for the areas nominated as hazardous areas, so as to ensure the safety of researchers.

3) Treated water will be prepared where necessary since the quality of water is very important in accurate experiments and for the accurate operation of research equipment.

4) Much consideration will be given to waste disposal so that chemical substances and microbes discharged from the facilities will not pollute the surroundings.

5) Appropriate utility services will be provided according to the environmental conditions required for the animals, and to the type of experiments to be performed, so that there will be no deterioration in the validity or accuracy of the results of experiments.

6) Electrical power will be supplied through earthed plug receptacles, and will have a voltage of 220V, single-phase, for general research equipment; and a 3ø 380V supply for large equipment will be provided through separate circuits.

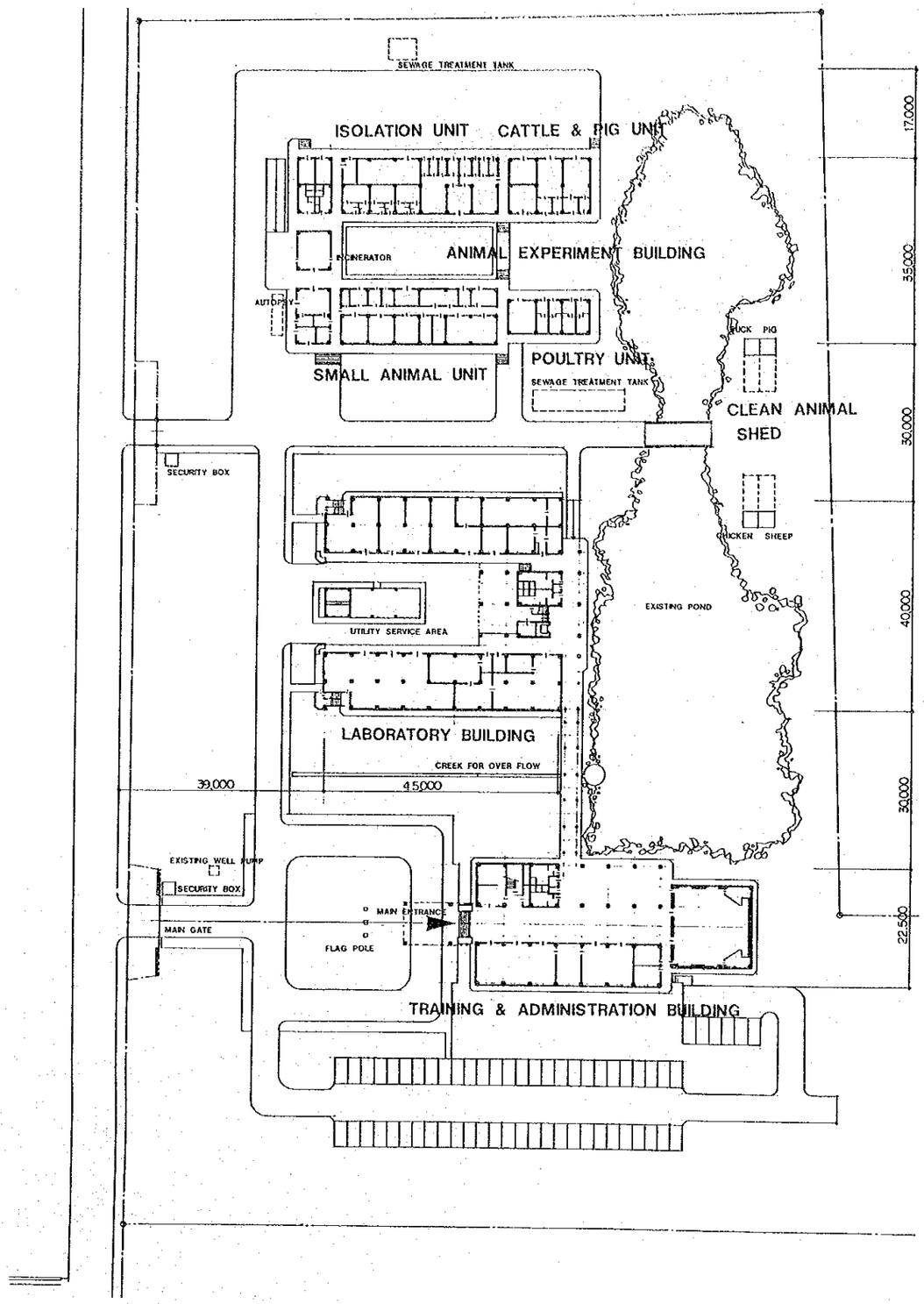
7) Power of constant voltage and constant frequency will be installed for equipment that require a stabilized power source.

8) Power will be supplied by stand-by generator for facilities and equipment related to experiments that could be affected by being interrupted by a power failure.

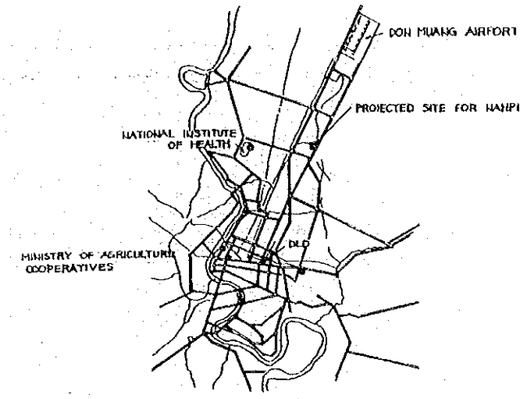
9) Cylinders for special gas to be used for experiments will be installed near the laboratories where they will be used, and will have appropriate detectors or alarm systems.

4-4 Basic Design Drawings

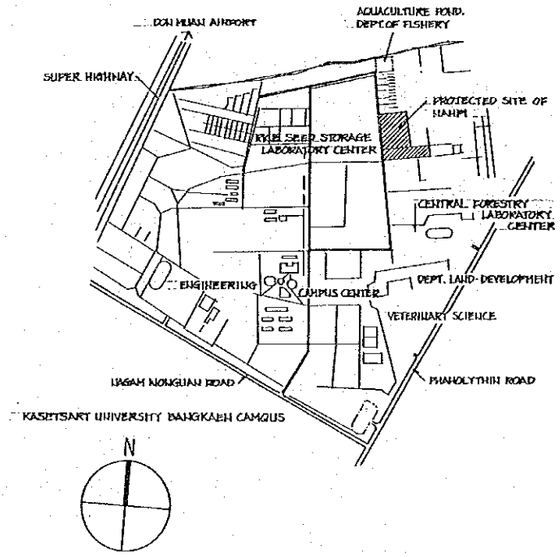
1	SITE PLAN	1:1000
2 - 6	LABORATORY BUILDING PLAN	1: 200
7 - 8	ANIMAL EXPERIMENT BUILDING PLAN	1: 200
9 - 11	TRAINING & ADMINISTRATION BUILDING PLAN	1: 200
12 - 14	SECTION	1: 200
15 - 16	ELEVATION	1: 400
17	OVERLAP SITE PLAN OF EXISTING AND PROJECTED FACILITIES	1:1000



SITE PLAN 1 : 1000

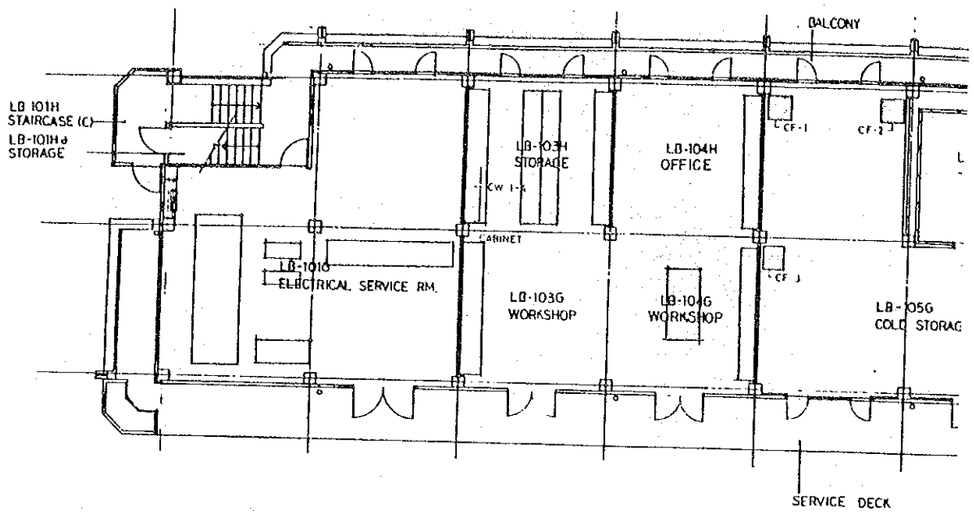


MAP OF BANGKOK



FLOOR AREA OF FACILITIES

1 Laboratory Building, four stories	5,085 m^2
2 Animal Experiment Building, one story	1,038 m^2
3 Training and Administration Building two stories	1,921 m^2
4 Connecting Corridor and others	200 m^2
Total area	8,244 m^2



1) CENTRAL SUPPLY SERVICE CENTER

No.	Item	Q'ty
CS-1	Liquid nitrogen stocker	1
CS-2	Liquid nitrogen transportation tank	1

2) EQUIPMENT FOR FREEZER ROOM

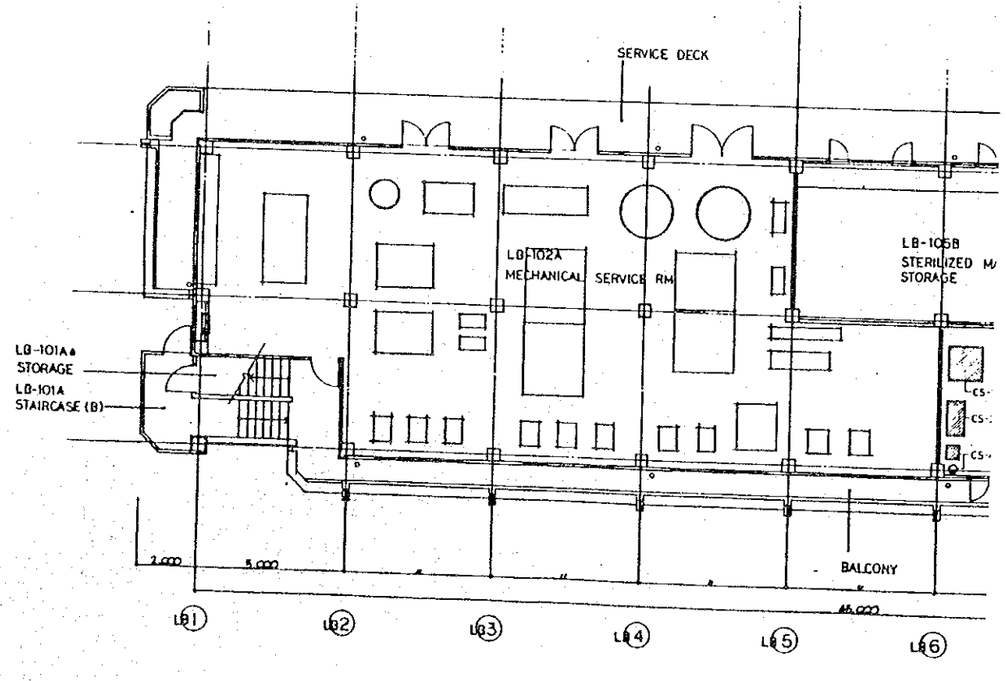
No.	Item	Q'ty
CF-1	-20°C freezer	1
CF-2	-80°C ultra low freezer	1
CF-3	Ice maker	1

3) EQUIPMENT FOR WORKSHOP

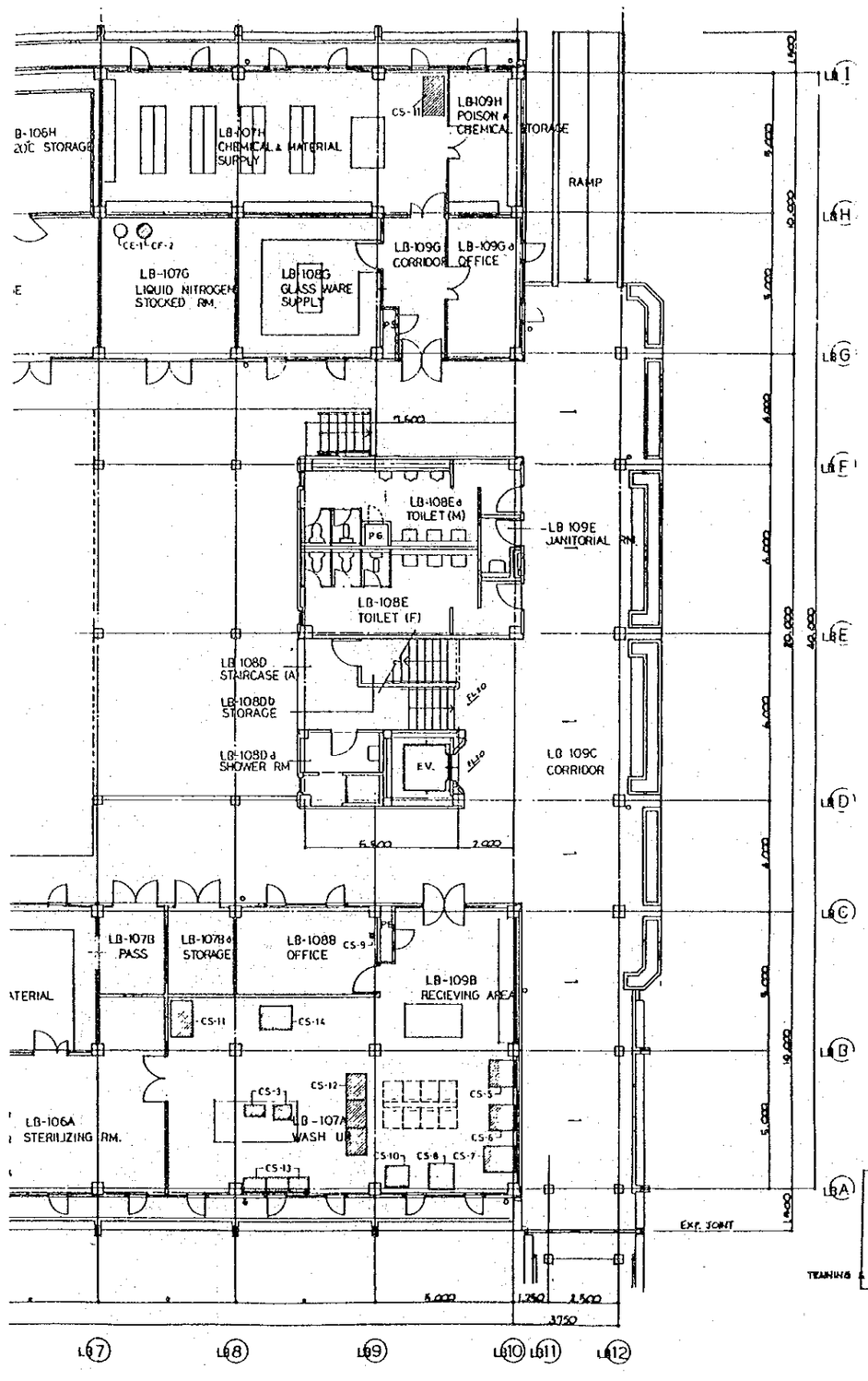
No.	Item	Q'ty
CW-1	Circuit tester	1
CW-2	Voltmeter	1
CW-3	Soldering iron	1
CW-4	Tool set	1

4) EQUIPMENT FOR WASH-UP AND STERILIZING ROOM

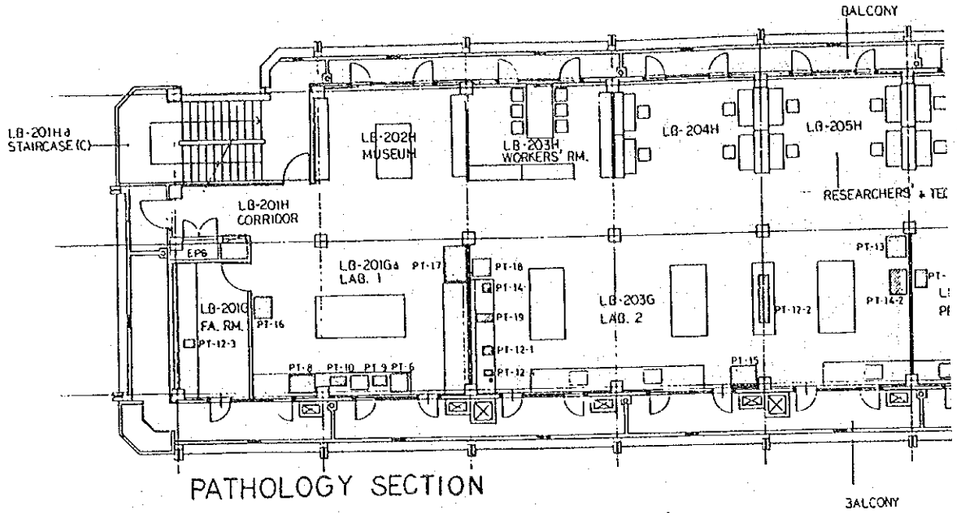
No.	Item	Q'ty
CS-1	Autoclave	1
CS-2	Dry heat sterilizer	1
CS-3	Ultra sonic cleaner	1
CS-4	E. O. gas sterilizer	1
CS-5	Washing machine	1
CS-6	Dehydrator	1
CS-7	Laundry-dryer	1
CS-8	Press	1
CS-9	Temperature recorder	1
CS-10	Automatic washer	1
CS-12	Cart	1
CS-13	Immersion tank	6
CS-14	Drying shelf	3
CS-15	Dryer	3



LABORATORY BUILDING 1ST



FLOOR PLAN 1 : 200



PATHOLOGY SECTION

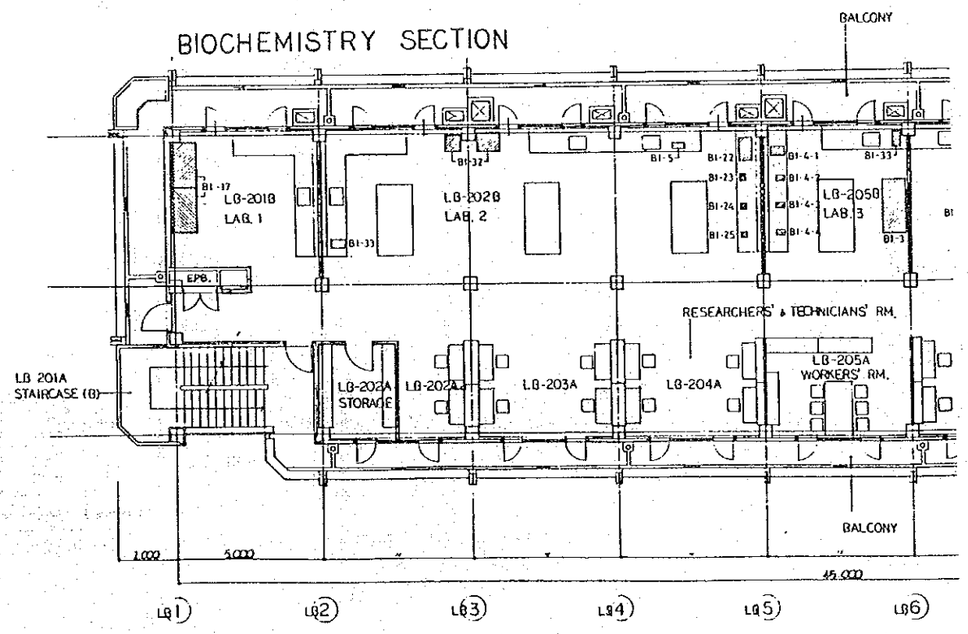
(4) PATHOLOGY SECTION

No.	Item	Q'ty
PT-1-1	Electron microscope	1
PT-1-2	Electron microscope	1
PT-2	Vacuum coating apparatus	1
PT-3	Ultra microtome	1
PT-4	Glass knife processor	1
PT-5-1	Photographic apparatus (Shadow free)	1
PT-5-2	Photo enlarger	1
PT-5-3	Slide film processor	1
PT-5-4	Microscopic photo apparatus	1
PT-6	Tissue Processor	1
PT-8	Tissue embedding center	1
PT-9	Microtome	1
PT-10	Water bath	1
PT-12-1	Microscope	1
PT-12-2	Microscope	1
PT-12-3	Microscope	1
PT-12-4	Microscope	1
PT-13	Refrigerator	1
PT-14-1	Centrifuge	1
PT-14-2	Centrifuge	1
PT-15	Incubator	1
PT-16	Dry heat oven	1
PT-17	Draft chamber	1
PT-18	Cryostat microtome	1
PT-19	Microtome knife sharpener	1

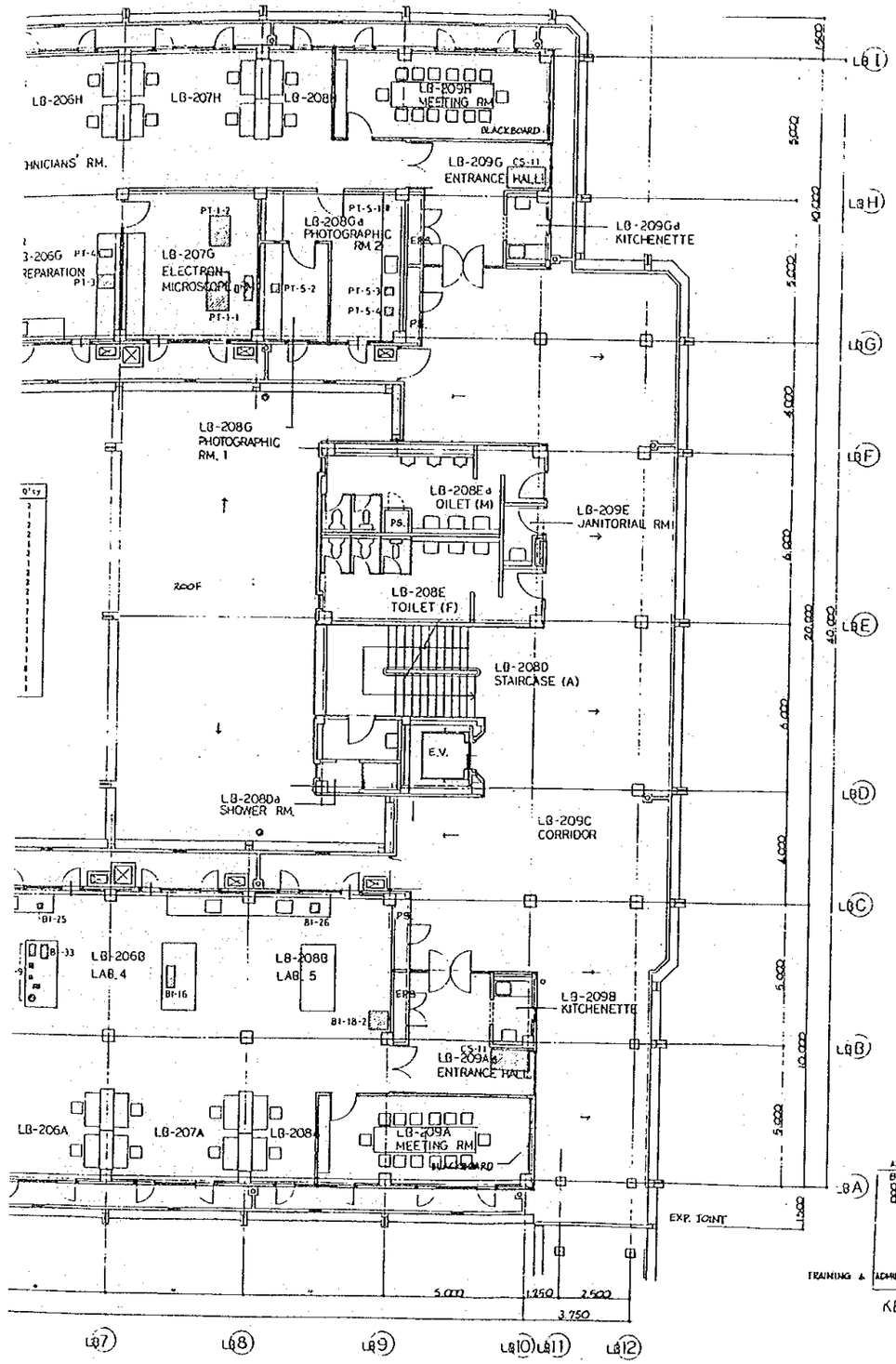
(5) BIOCHEMICAL SECTION

No.	Item	Q'ty
BI-1	Amino acid analyser	1
BI-2	Atomic absorption spectrophotometer	1
BI-3	Auto analyser	1
BI-4-1	Balance	1
BI-4-2	Balance	1
BI-4-3	Balance	1
BI-4-4	Balance	1
BI-5	pH meter	2
BI-6	Gas chromato-graphy apparatus	1
BI-7	Mill	1
BI-8	Muffle furnace	2
BI-9	Electrophoresis apparatus	1
BI-10	Liquid chromato-graphy apparatus	1
BI-11	Thin layer chromato-graphy apparatus	1
BI-12	Spectro-photometer	1
BI-13	Spectro-fluorophotometer	1
BI-14	Calorimeter	1
BI-15	Fat extractor	2
BI-16	Densitometer	1
BI-17	Laboratorybood cabinet	2

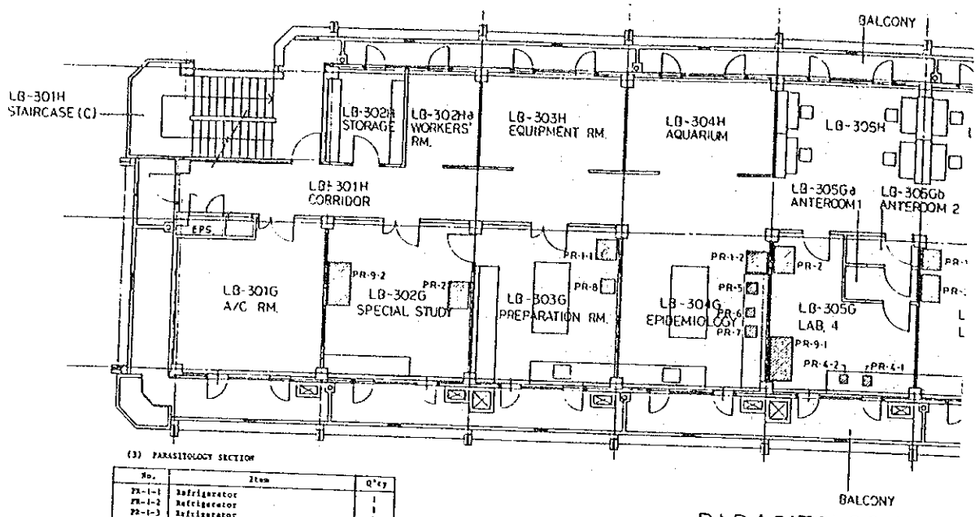
No.	Item	Q'ty
BI-18-1	Refrigerator	1
BI-18-2	Refrigerator	1
BI-19-1	Rotary evaporator	1
BI-19-2	Aspirator	1
BI-20	Rotary shaker	1
BI-21	Digesting apparatus	1
BI-22	Water bath	1
BI-23	Desiccator	1
BI-24	Homogenizer	1
BI-25	Blender	1
BI-26	Centrifuge	1
BI-27	Bioassay analyser	1
BI-28	Chromato-chamber	1
BI-29	Column chromatography set	1
BI-30	Fraction collector	1
BI-31	Autoclave	1
BI-32	Water Still	1
BI-33	Automatic voltage stabilizer	1
BI-34	Microcomputer	1
BI-35	Typewriter	1



LABORATORY BUILDING 2ND



FLOOR PLAN 1 : 200



PARASITOLOGY SE

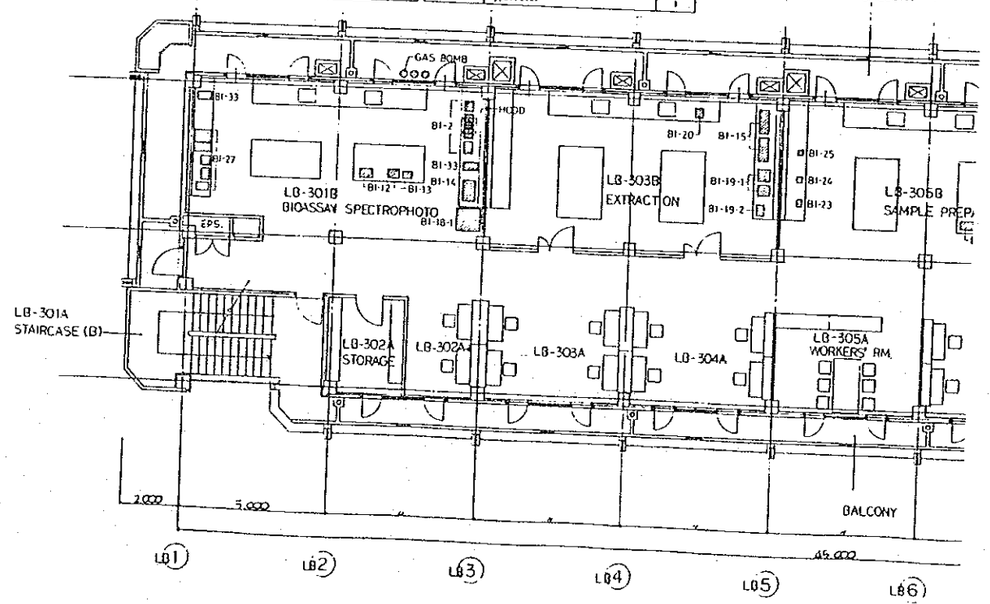
(3) PARASITOLOGY SECTION

No.	Item	Q'ty
PR-1-1	Refrigerator	1
PR-1-2	Refrigerator	1
PR-1-3	Refrigerator	1
PR-2	Low temperature incubator	3
PR-3	Centrifuge	3
PR-4-1	Microscope	4
PR-4-2	Microscope	4
PR-5	Automatic blood cell counter	1
PR-6	Automatic diluter	1
PR-7	Printer	1
PR-8	Autoclave	1
PR-9-1	Lamina flow	1
PR-9-2	Lamina flow	1

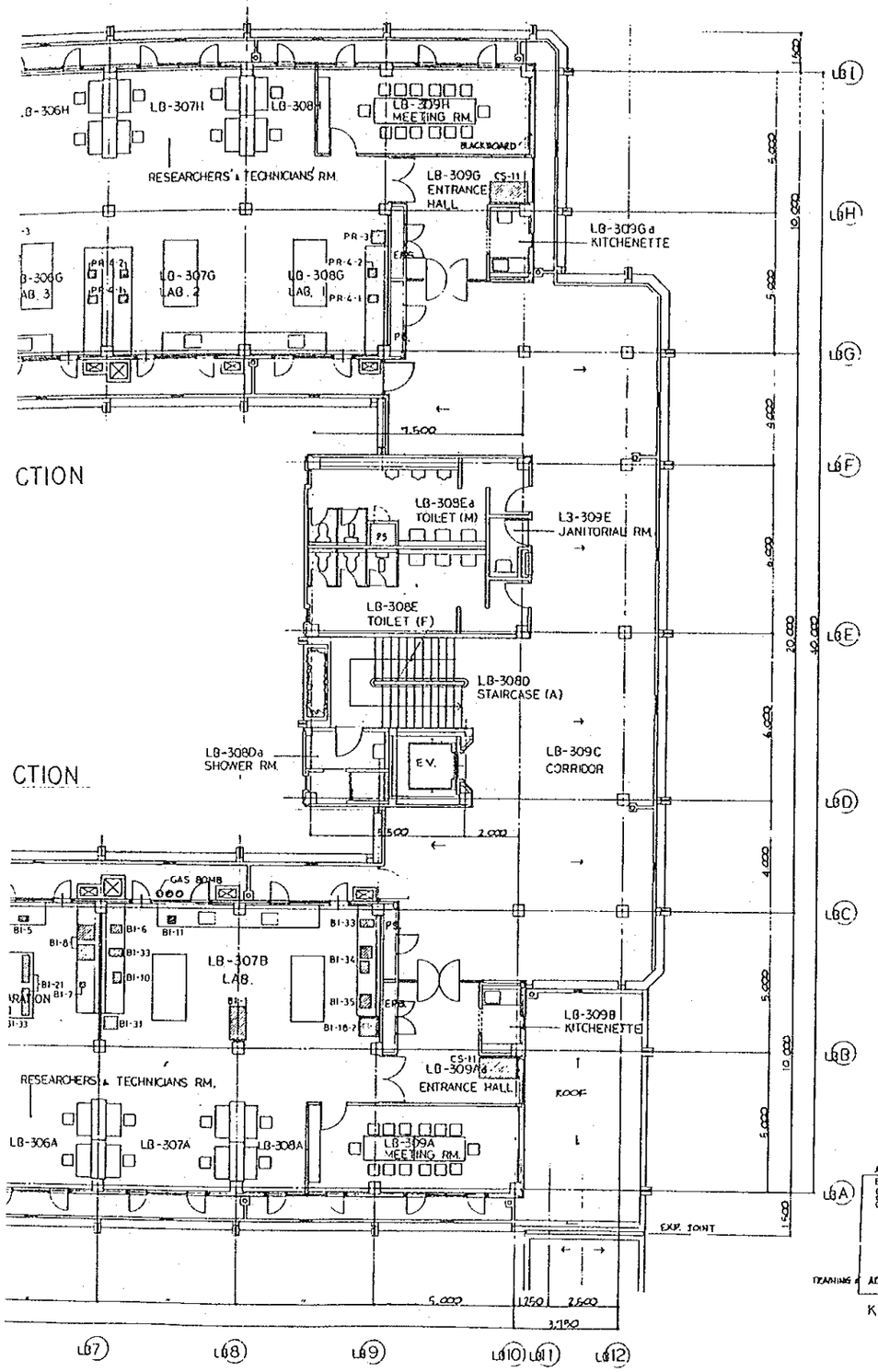
(5) BIOCHEMICAL SECTION

No.	Item	Q'ty
BI-1	Amino acid analyzer	1
BI-2	Atomic absorption spectrophotometer	1
BI-3	Auto analyzer	1
BI-4-1	Balance	1
BI-4-2	Balance	1
BI-4-3	Balance	1
BI-4-4	Balance	1
BI-5	pH meter	1
BI-6	Gas chromato-graphy apparatus	2
BI-7	Mill	1
BI-8	Muffle furance	1
BI-9	Electrophoresis apparatus	2
BI-10	Liquid chromato-graphy apparatus	1
BI-11	Thin layar chromato-graphy apparatus	1
BI-12	Spectro-photometer	1
BI-13	Spectro-fluorophotometer	1
BI-14	Colorimeter	1
BI-15	Fat extractor	1
BI-16	Densitometer	1
BI-17	Laboratoryhood cabinet	2
BI-18-1	Refrigerator	1
BI-18-2	Refrigerator	1
BI-19-1	Rotary evaporator	1
BI-19-2	Aspirator	1
BI-20	Rotary shaker	1
BI-21	Digesting apparatus	1
BI-22	Water bath	1
BI-23	Desiccator	1
BI-24	Homogenizer	1
BI-25	Blender	1
BI-26	Centrifuge	1
BI-27	Bioassay analyzer	1
BI-28	Chromato-chamber	1
BI-29	Column chromatography set	1
BI-30	Fraction collector	1
BI-31	Autoclave	1
BI-32	Water Still	1
BI-33	Automatic voltage stabilizer	8
BI-34	Microcomputor	1
BI-35	Typewriter	1

BIOCHEMISTRY SE



LABORATORY BUILDING 3RD



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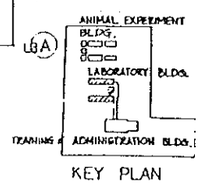
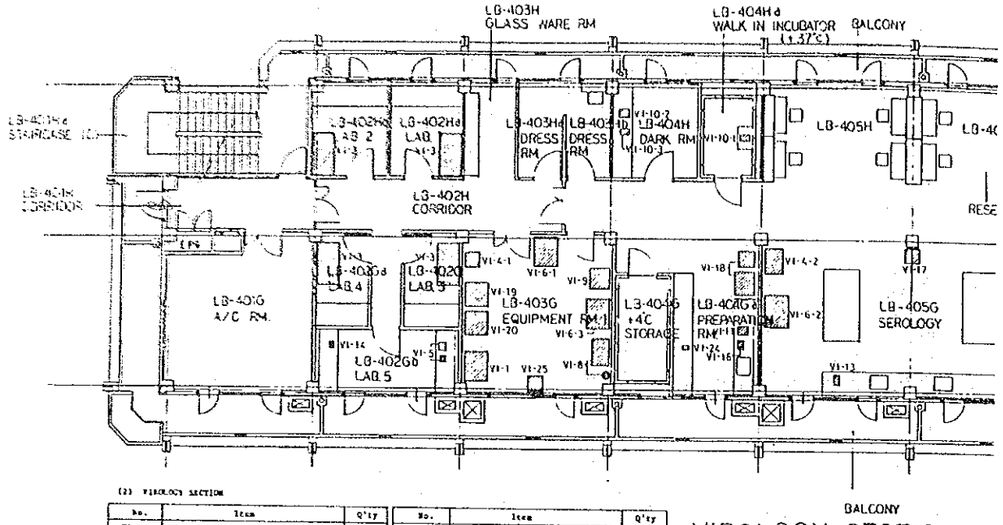


KEY PLAN

FLOOR PLAN 1 : 200



VIROLOGY SECTION

(2) VIROLOGY SECTION

No.	Item	Q'ty
VI-1	Ultra centrifuge	1
VI-2	Density gradient fractionator	1
VI-3	Lamina flow	4
VI-4-1	Centrifuge	1
VI-4-2	Centrifuge	1
VI-5	Sonic vibrator	1
VI-6-1	Incubator	1
VI-6-2	Incubator	1
VI-6-3	Incubator	1
VI-7	Low temperature incubator	1
VI-8	CO2 incubator	1
VI-9	Refrigerator	1
VI-10-1	Microscope	1
VI-10-2	Microscope	1
VI-10-3	Microscope photographic apparatus	1

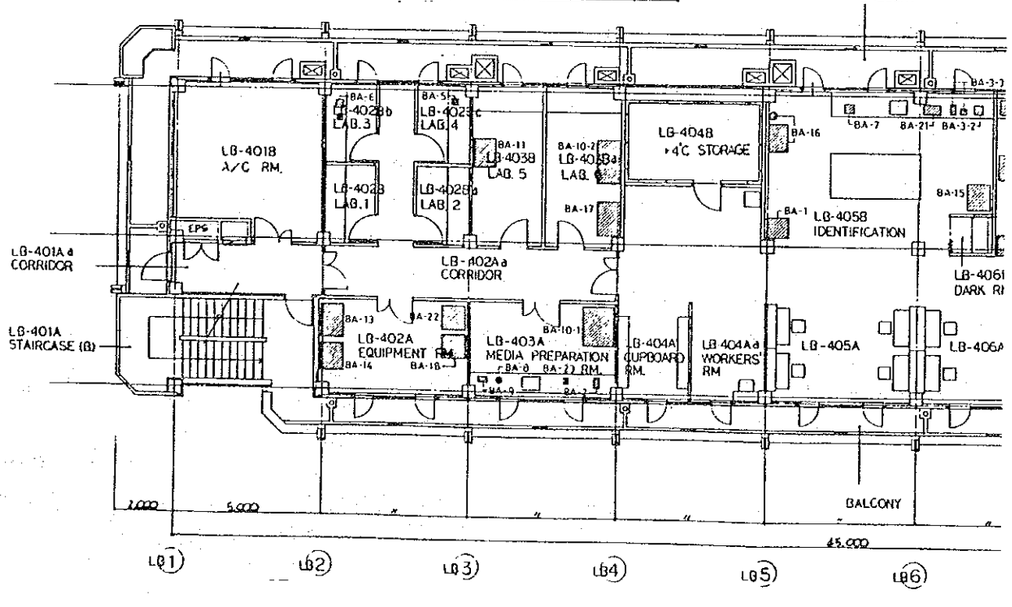
No.	Item	Q'ty
VI-11	Filter holder	1
VI-12	Ultrafiltration apparatus	1
VI-13	Balance	1
VI-14	Homogenizer	1
VI-15-1	Water bath	1
VI-15-2	Water bath	1
VI-16	Air pump	1
VI-17	Autoclave	1
VI-18	Magic still	1
VI-19	-20°C freezer	1
VI-20	-60°C freezer	1
VI-21	Microplate washer	1
VI-22	Multitron MC	1
VI-23	Autodropper	1
VI-24	pH meter	1
VI-25	Freeze drying machine	1

(1) BACTERIOLOGY SECTION

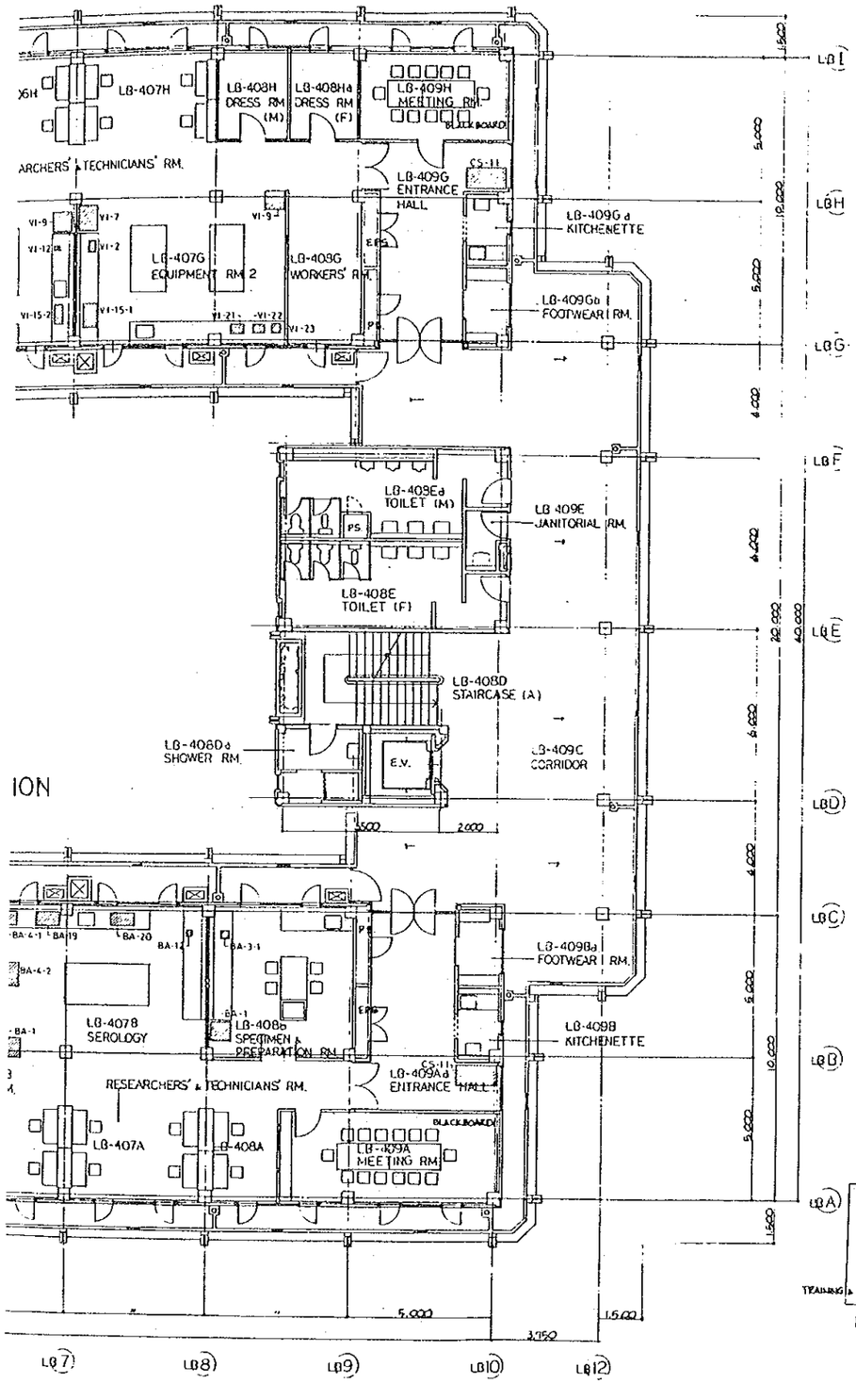
No.	Item	Q'ty
BA-1	Refrigerator	3
BA-2	Balance	1
BA-3-1	Microscope 1	1
BA-3-2	Microscope 2	1
BA-3-3	Microscope 3	1
BA-4-1	Centrifuge 1	1
BA-4-2	Centrifuge 2	1
BA-5	Blender	1
BA-6	Sonic vibrator	1
BA-7	Colony counter	1
BA-8	Filter holder	1
BA-9	Air pump	1
BA-10-1	Lamina flow	1
BA-10-2	Lamina flow	1

No.	Item	Q'ty
BA-11	Glove box	1
BA-12	Pipetting machine	1
BA-13	Incubator	1
BA-14	Incubator	1
BA-15	Low temperature incubator	1
BA-16	CO2 incubator	1
BA-17	Anaerobic incubator	1
BA-18	Freezer -20°C	1
BA-19	Water bath	1
BA-20	Water bath w/shaker	1
BA-21	Woog's light	1
BA-22	-80°C freezer	1
BA-23	pH meter	1
BA-24	Autoclave	1

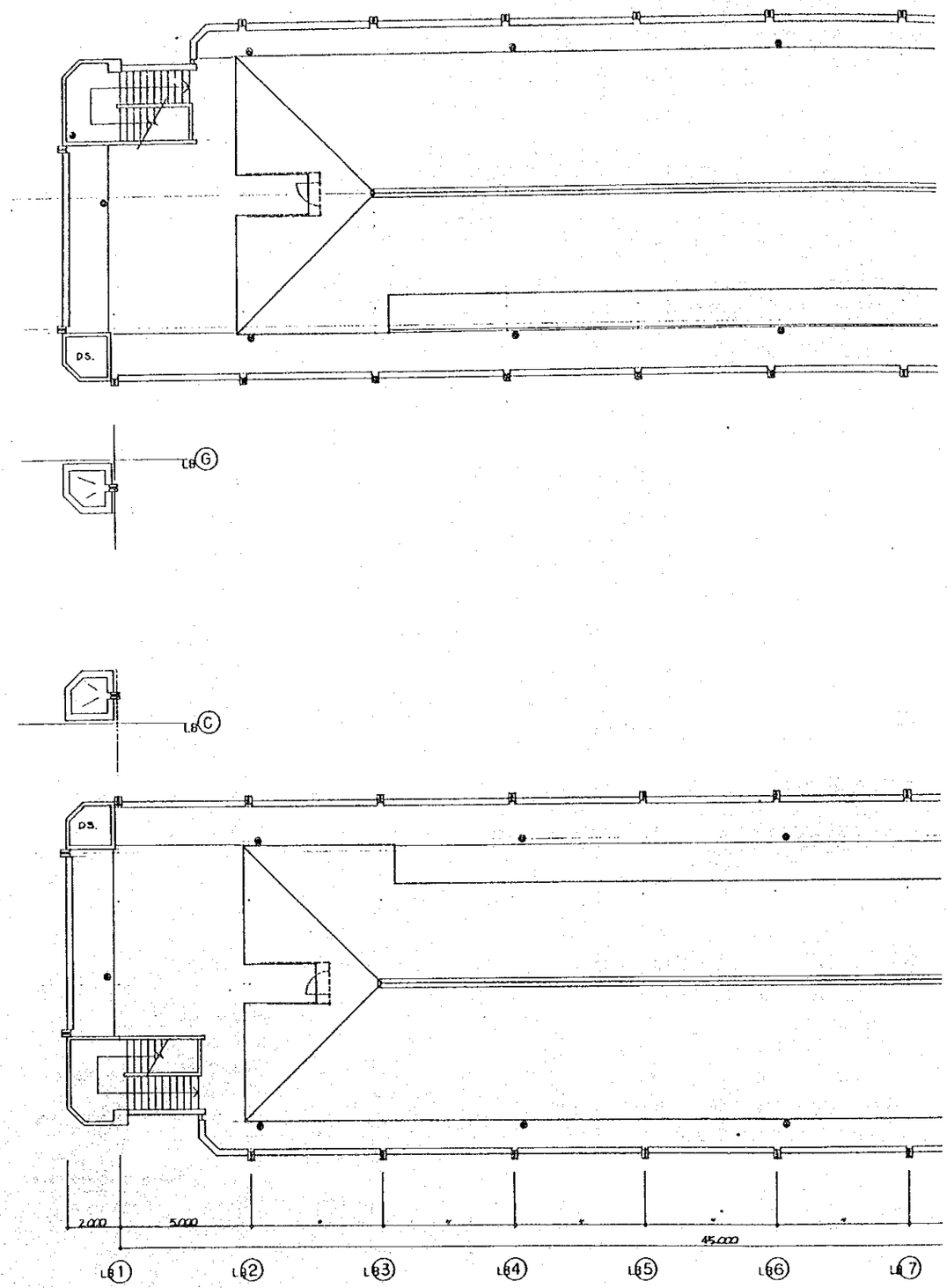
BACTERIOLOGY SECTION



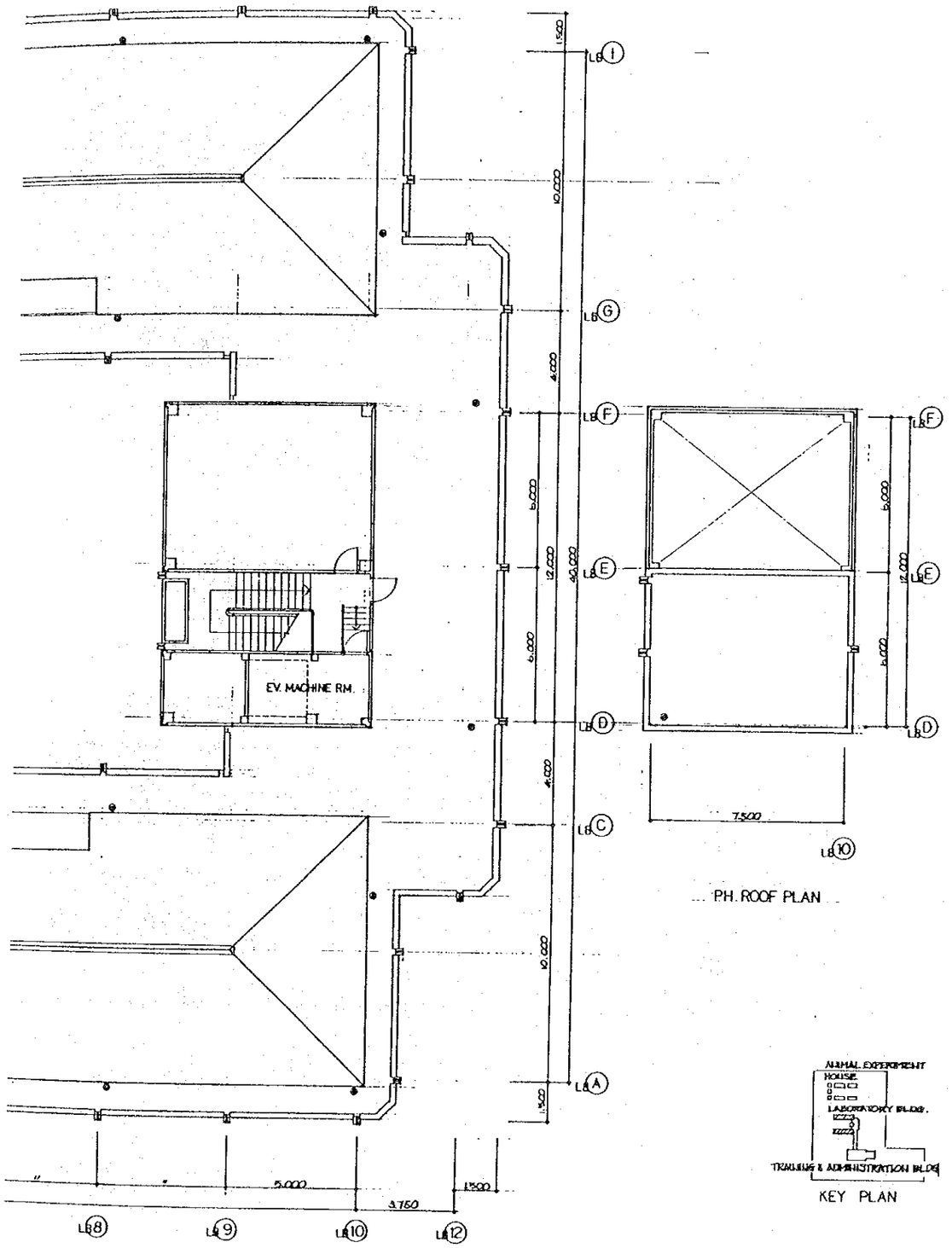
LABORATORY BUILDING 4TH



FLOOR PLAN 1 : 200

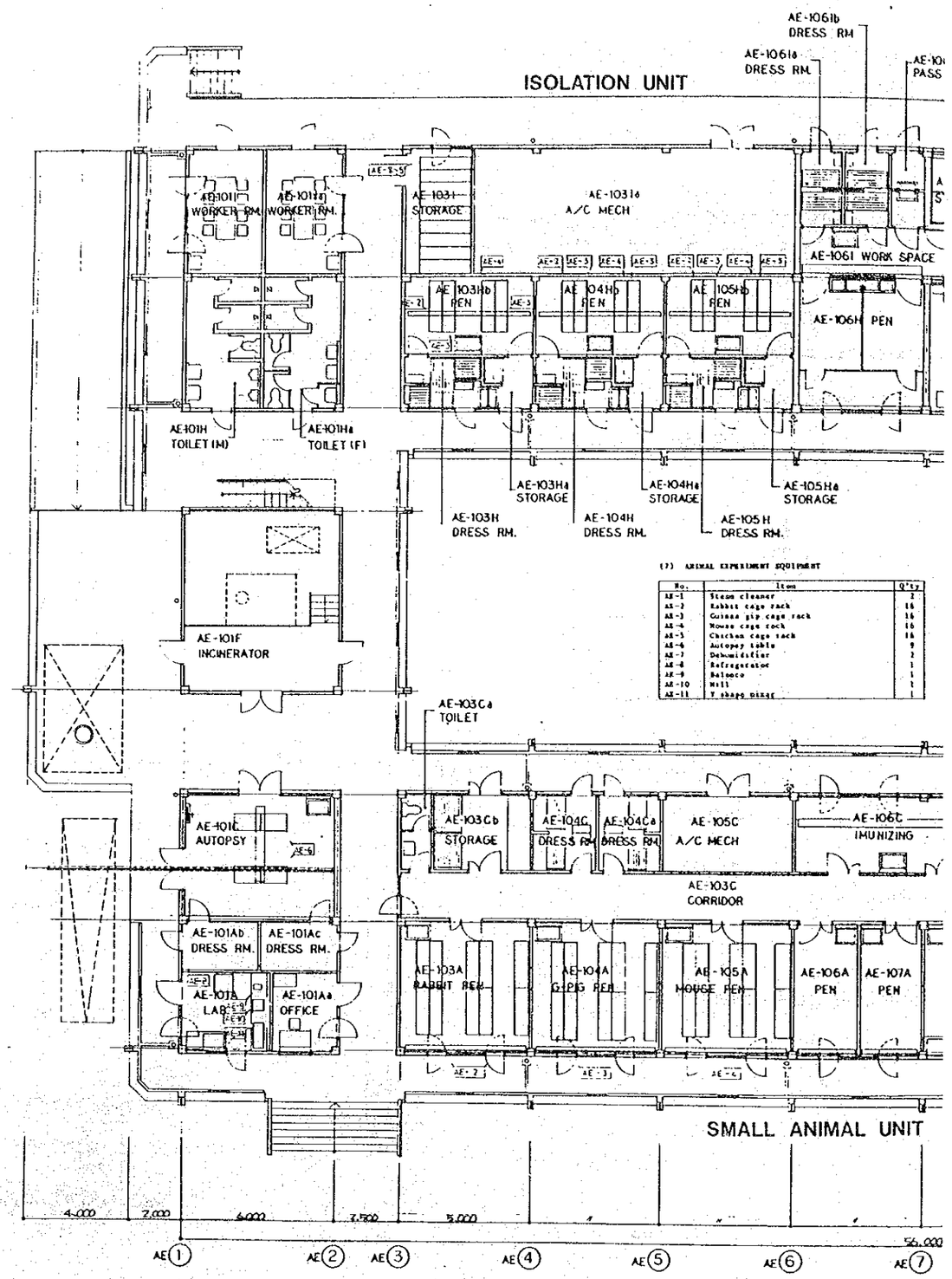


LABORATORY BUILDING ROOF

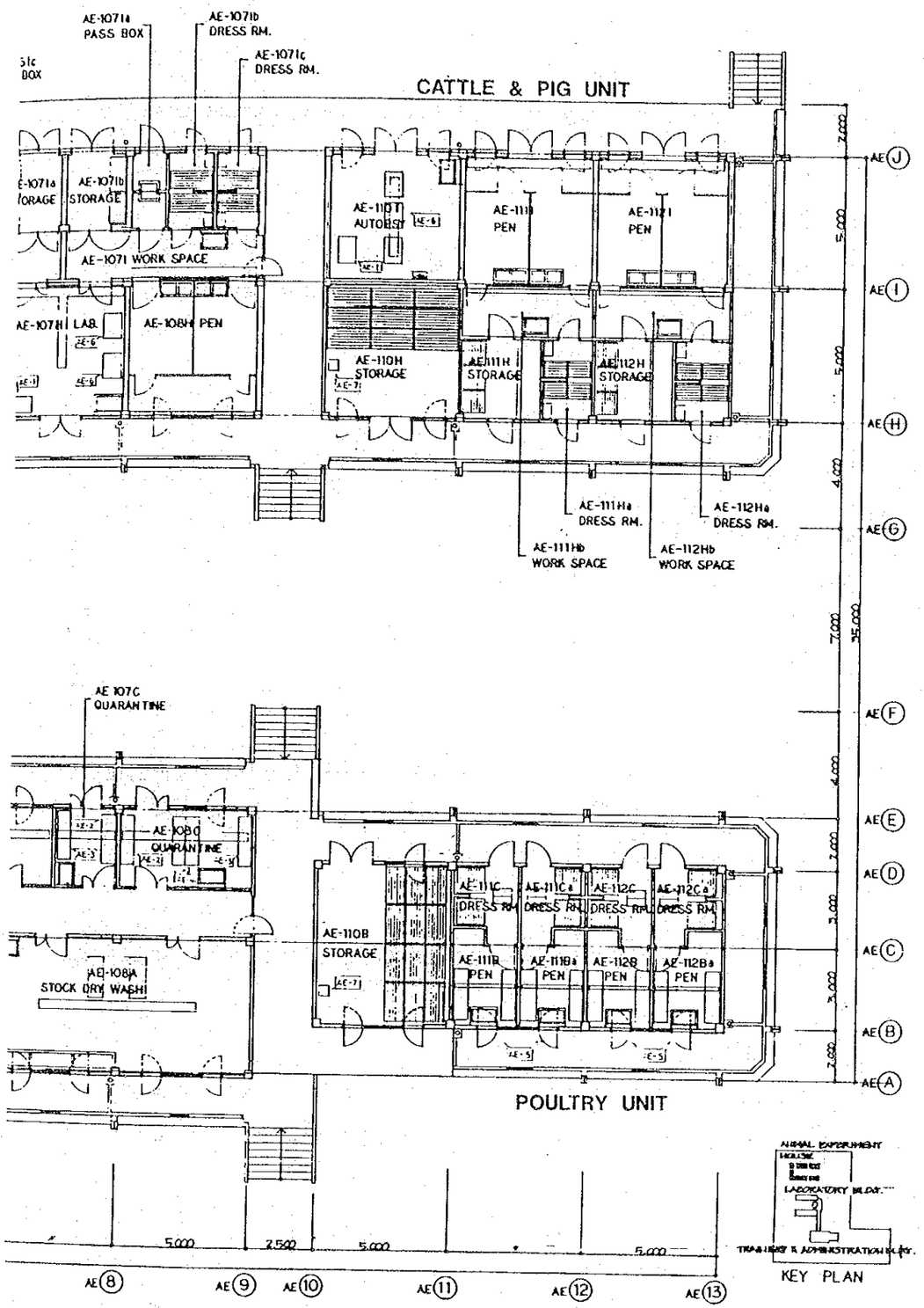


PH. ROOF PLAN

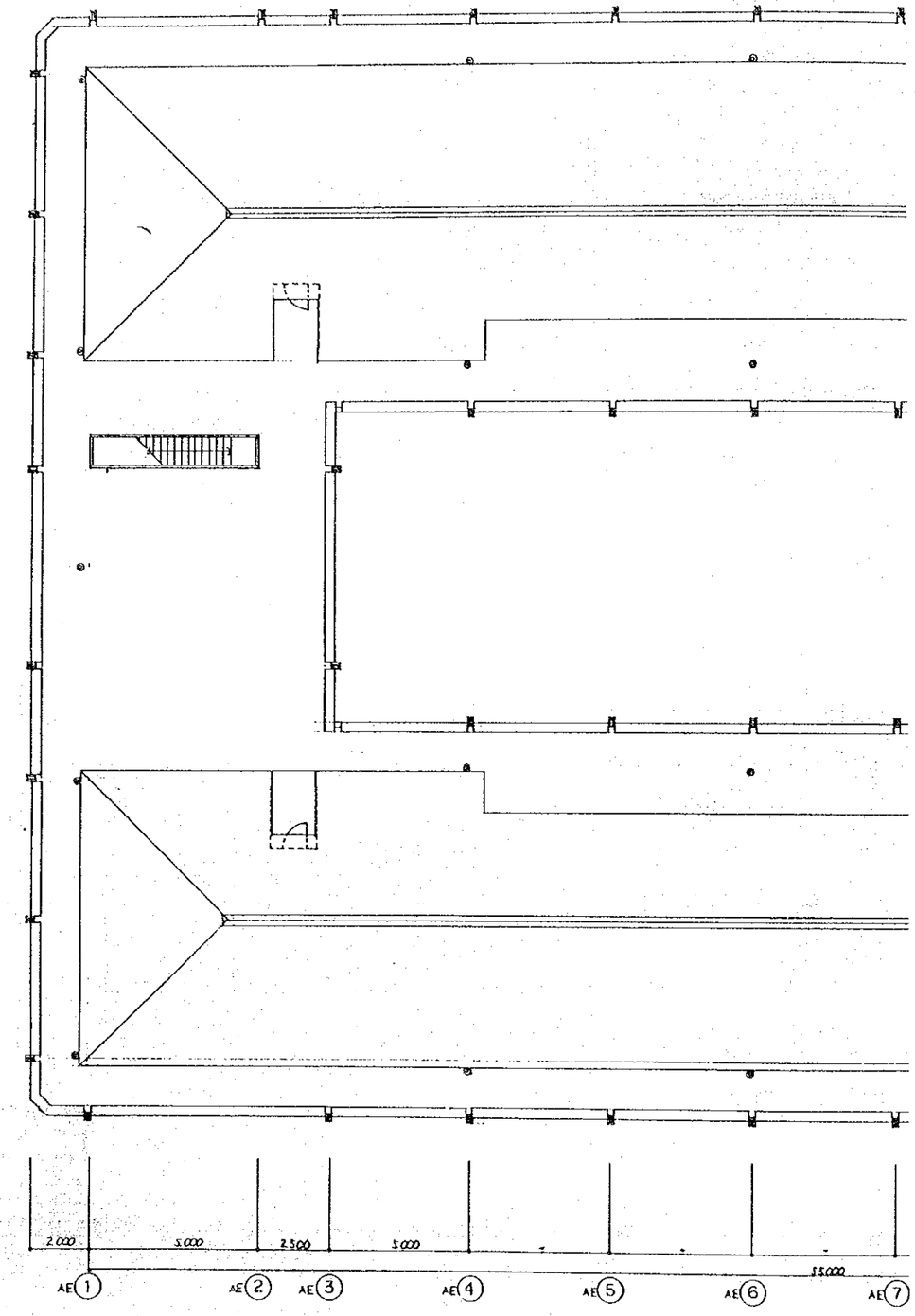
PLAN 1 : 200



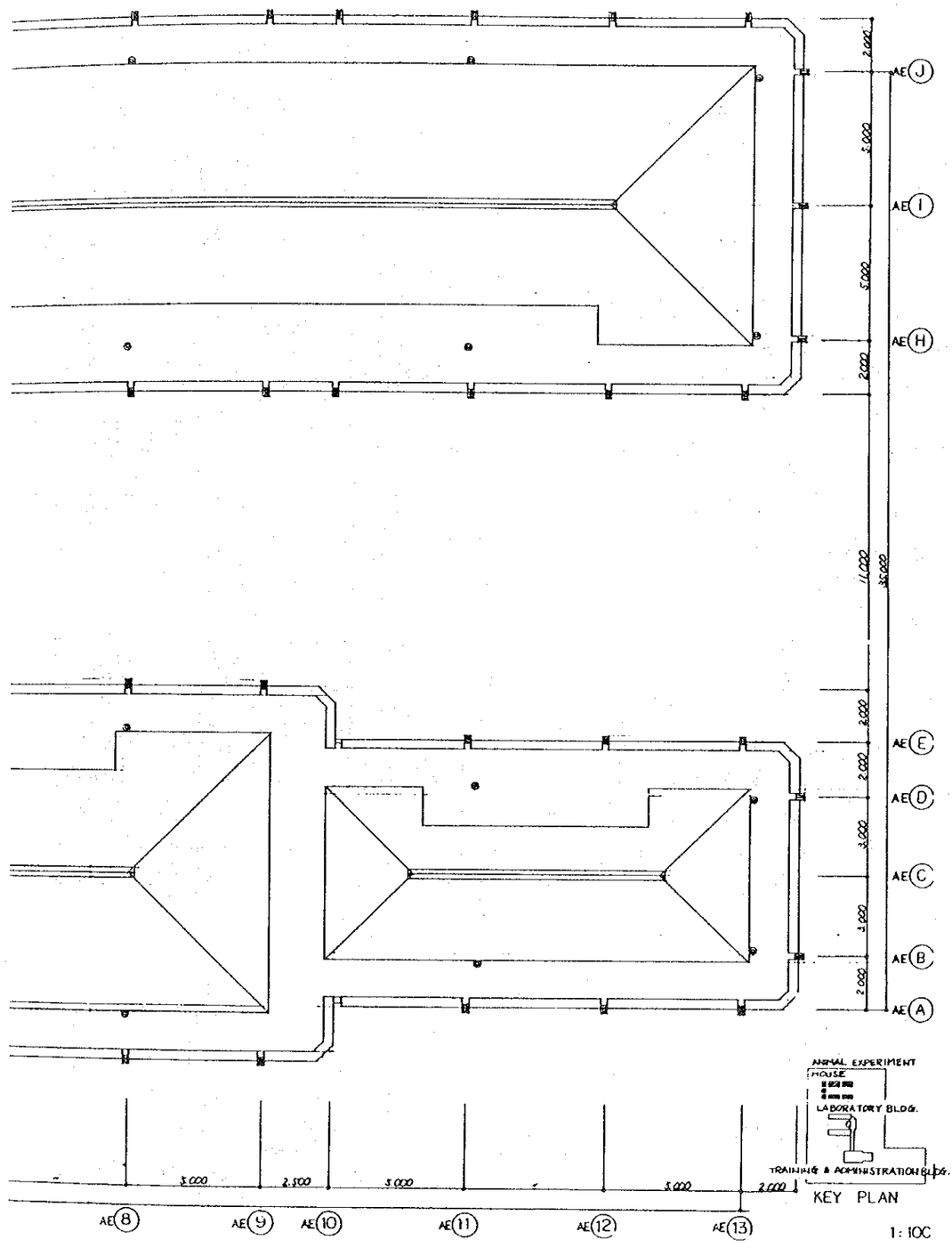
ANIMAL EXPERIMENT BUILDING 1ST



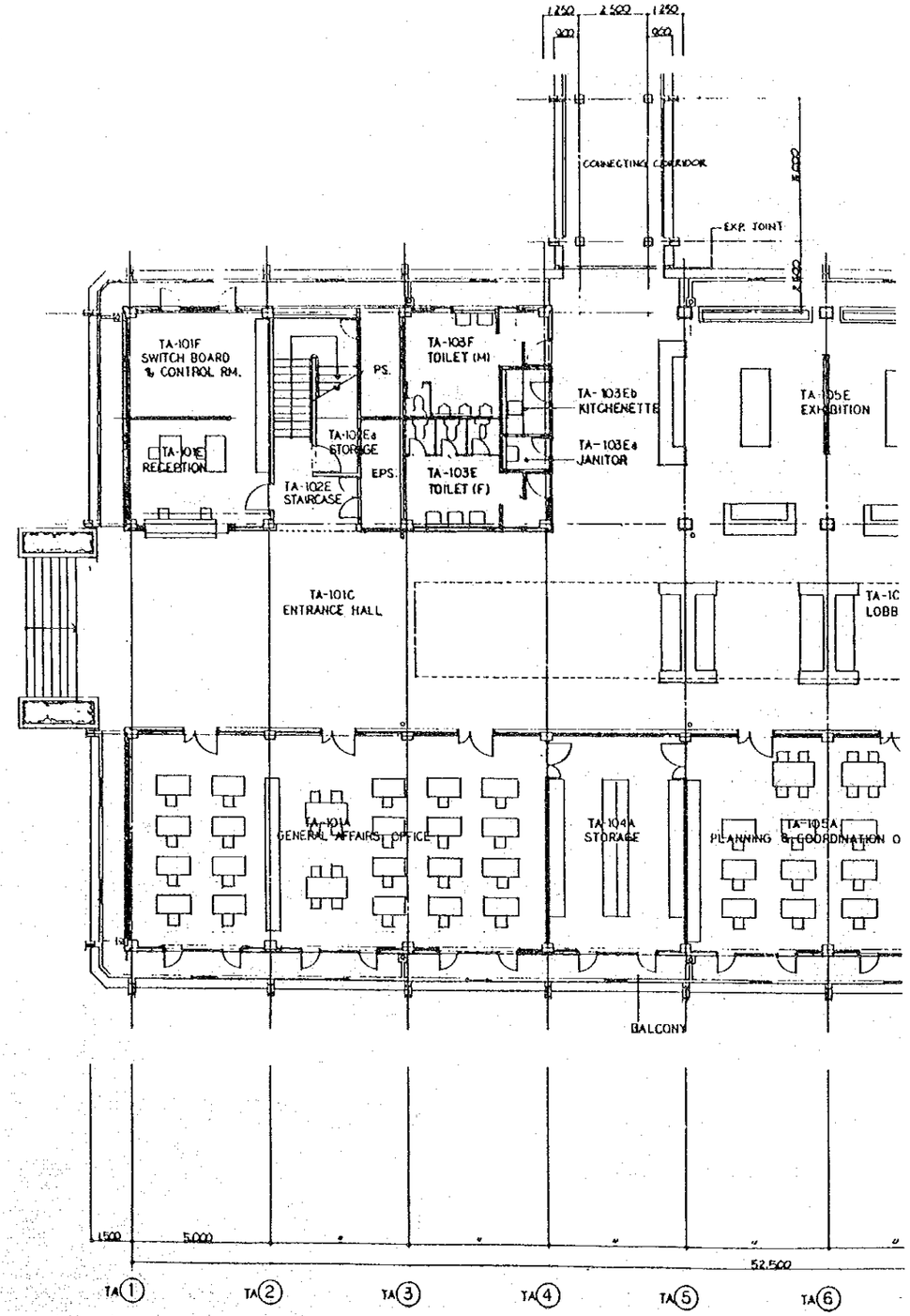
FLOOR PLAN 1 : 200



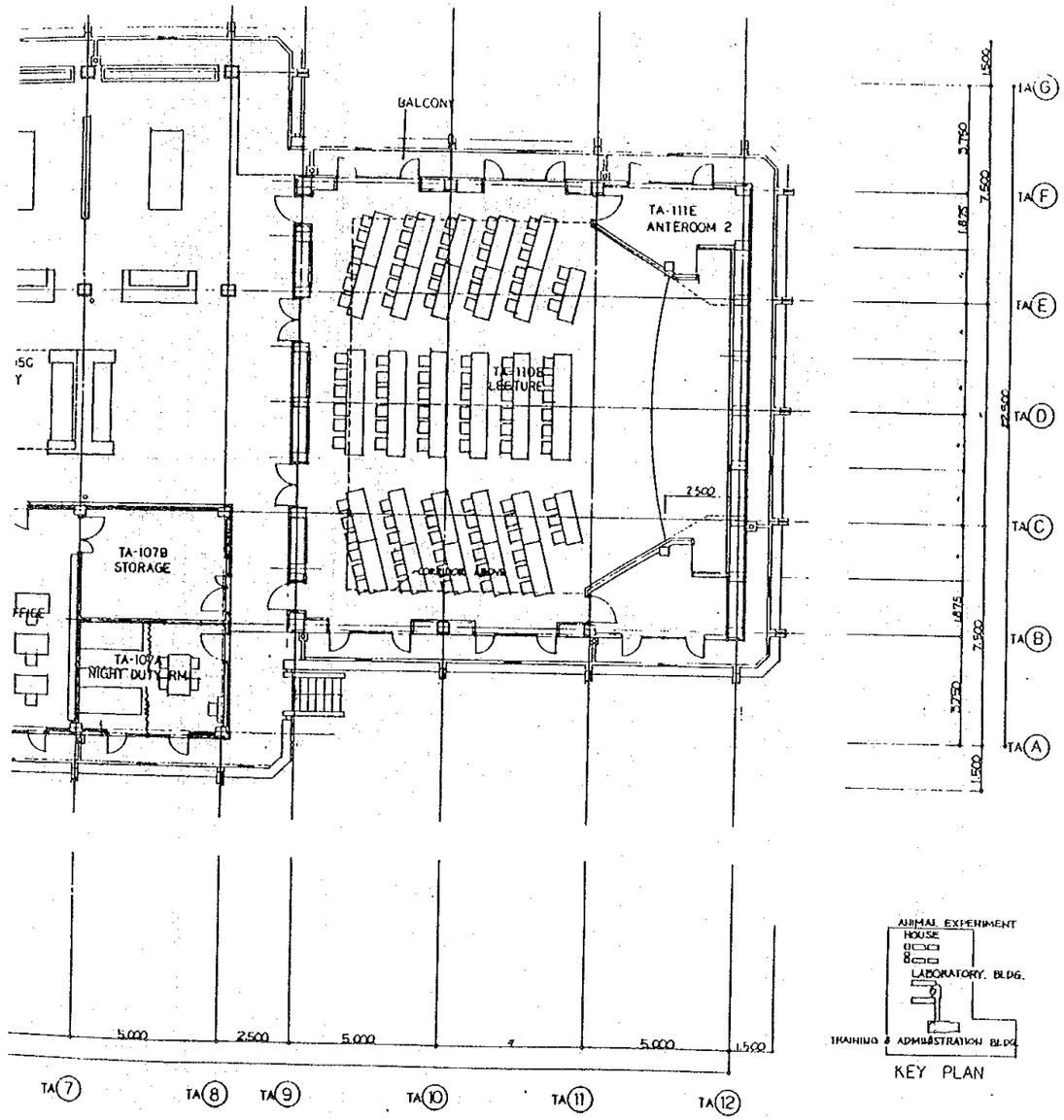
ANIMAL EXPERIMENT BUILDING



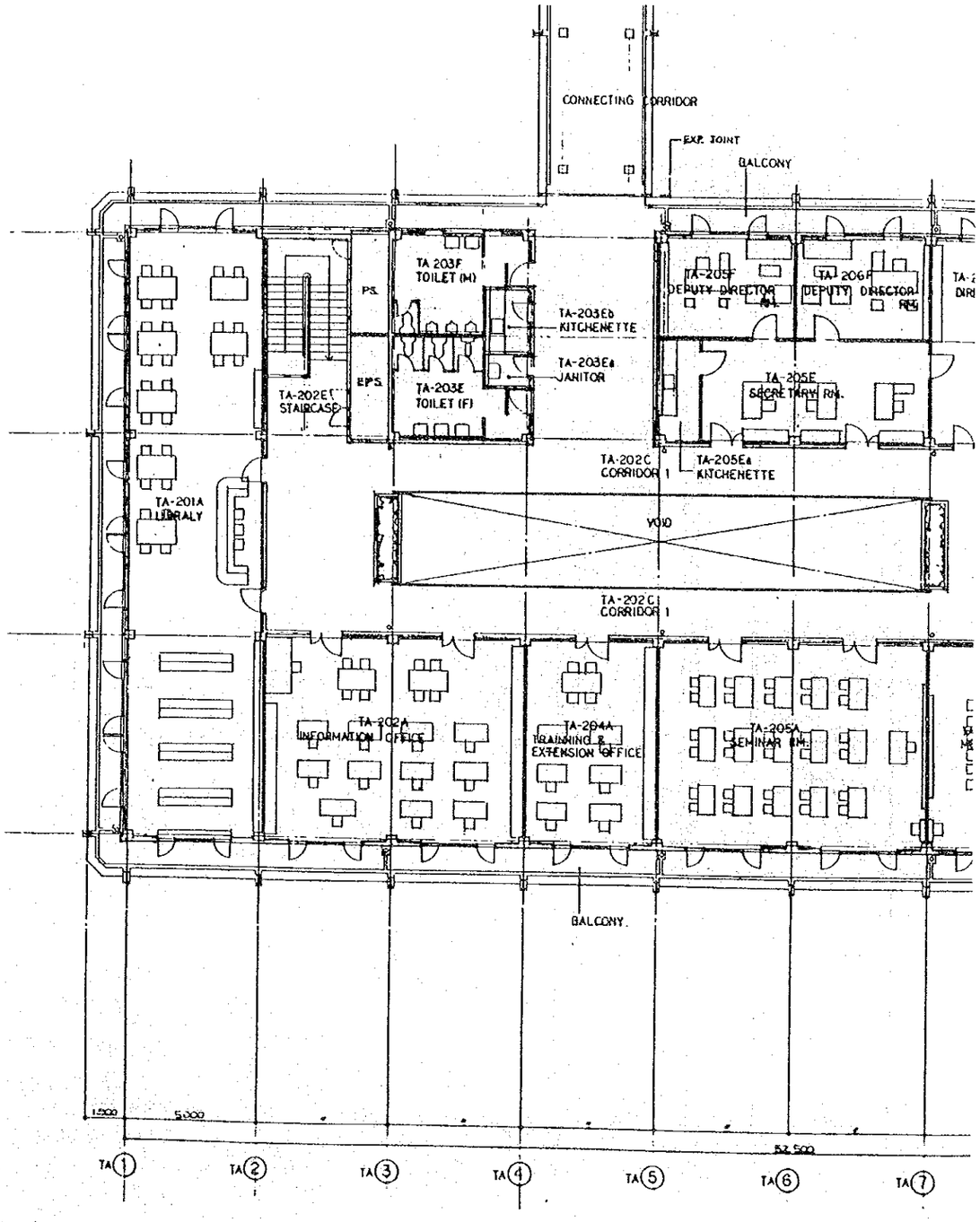
ROOF PLAN 1 : 200



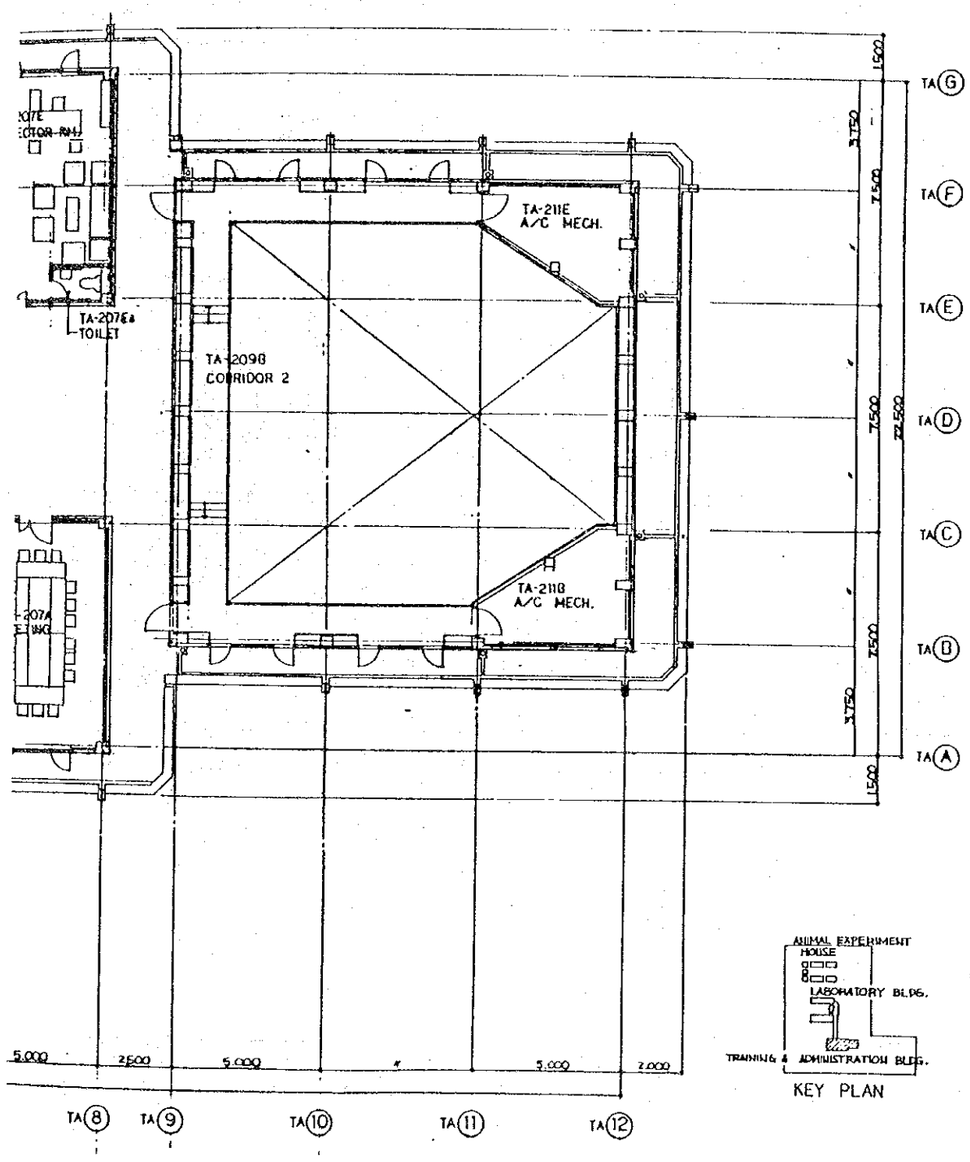
TRAINING & ADMINISTRATION



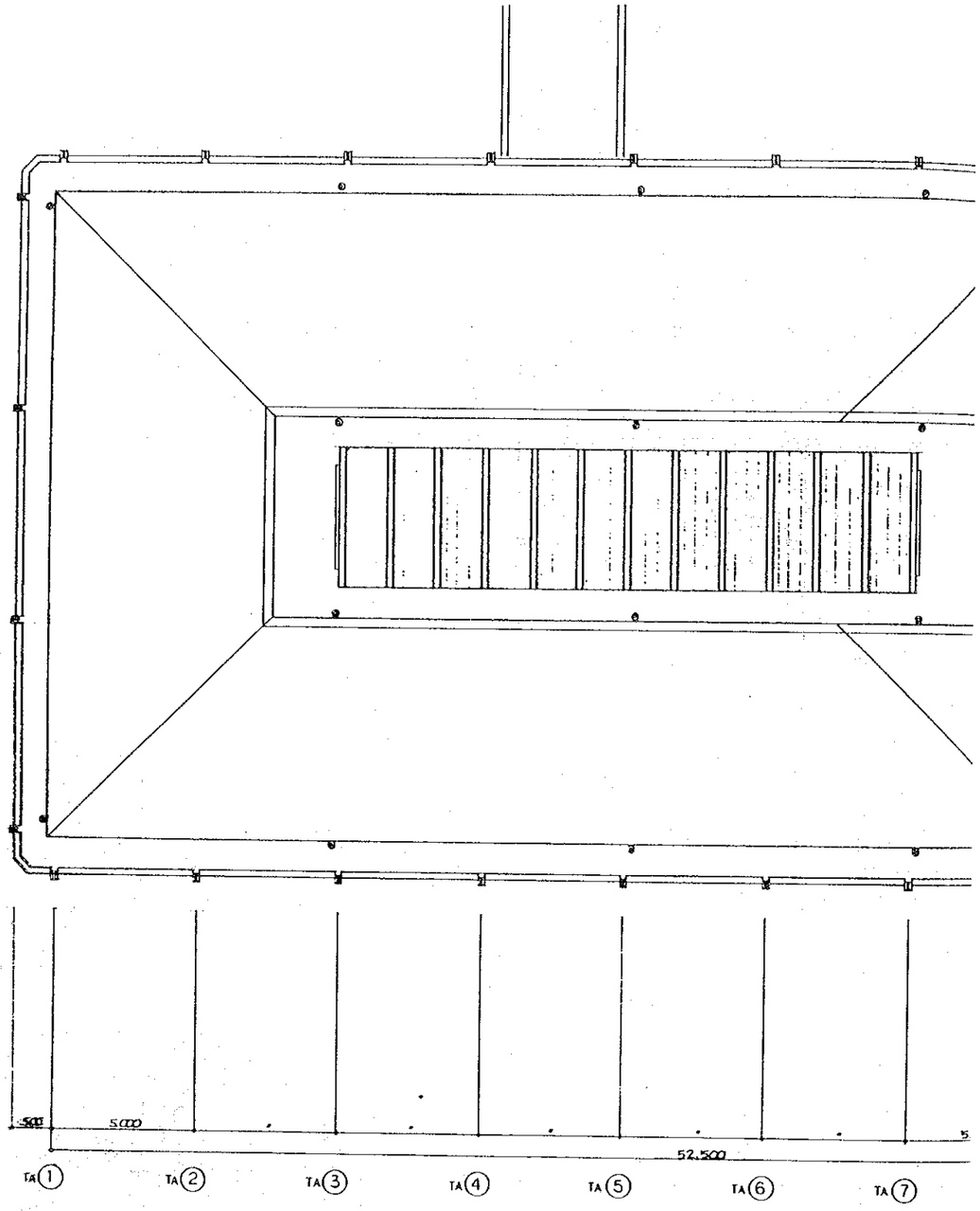
BUILDING 1ST FLOOR PLAN 1 : 200



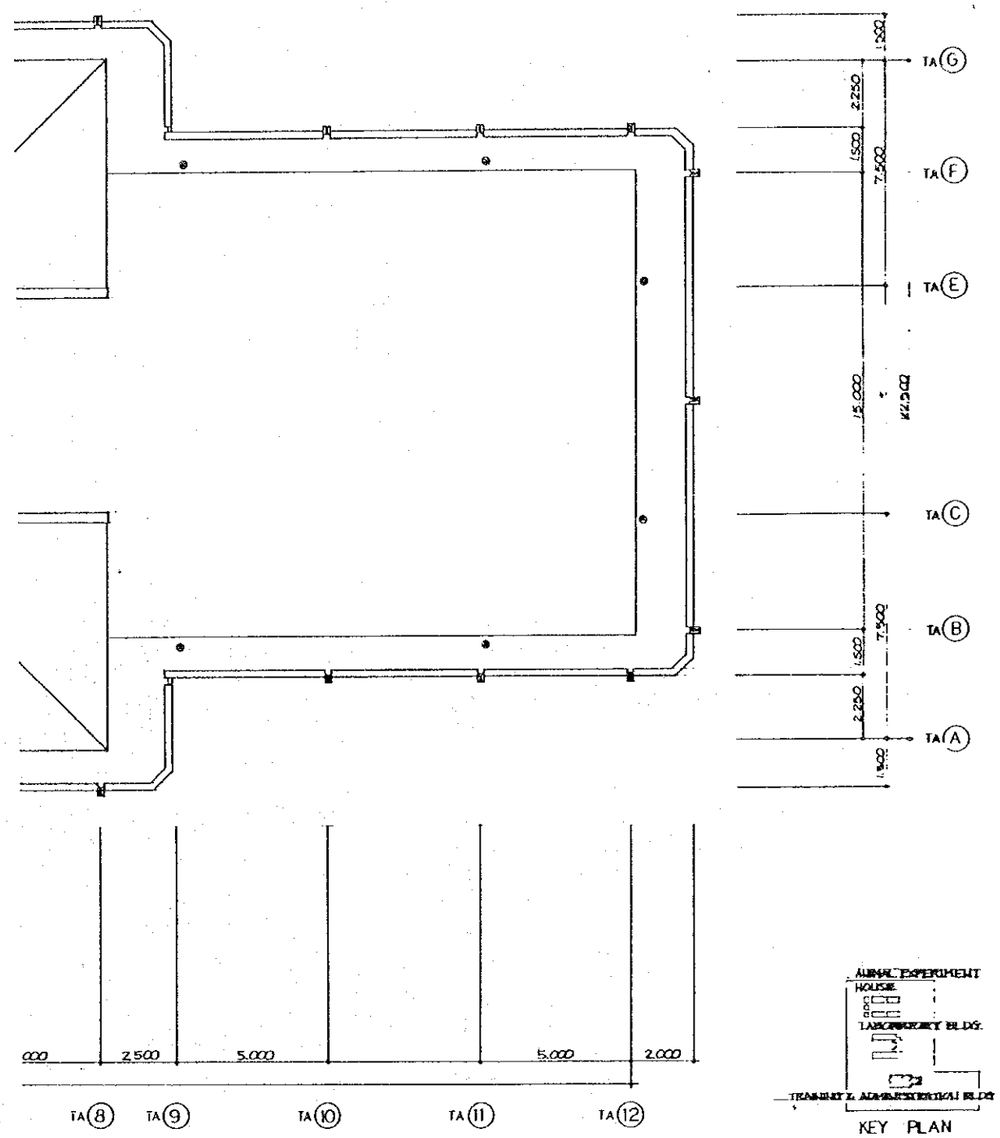
TRAINING & ADMINISTRATION BUILDING



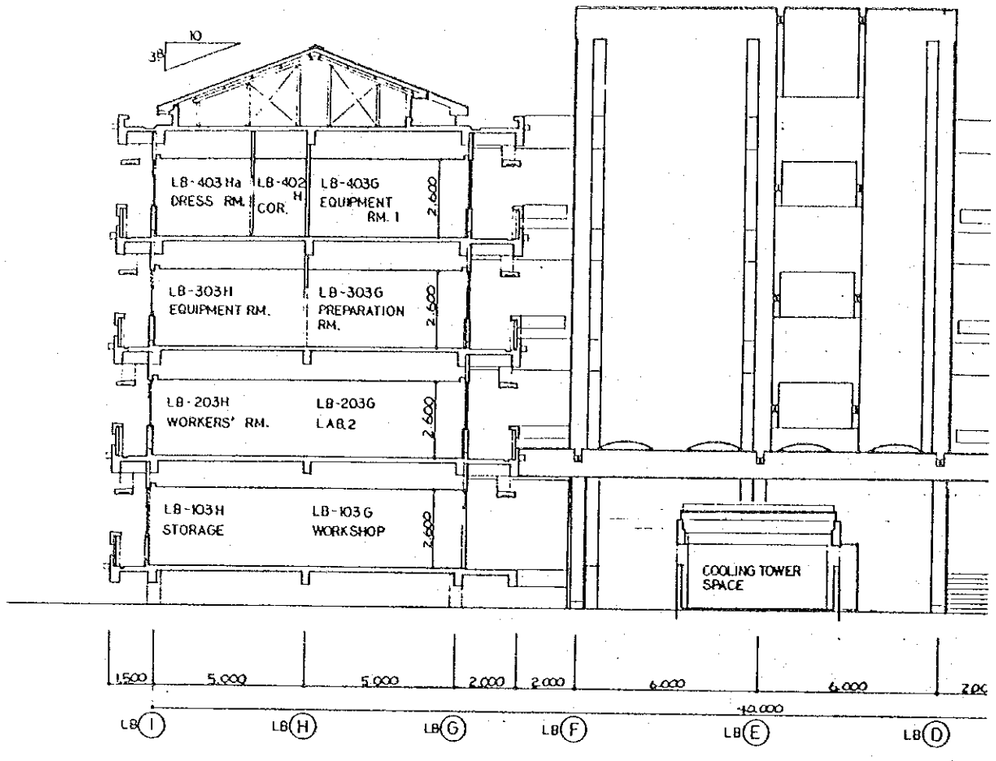
2ND FLOOR PLAN 1 : 200

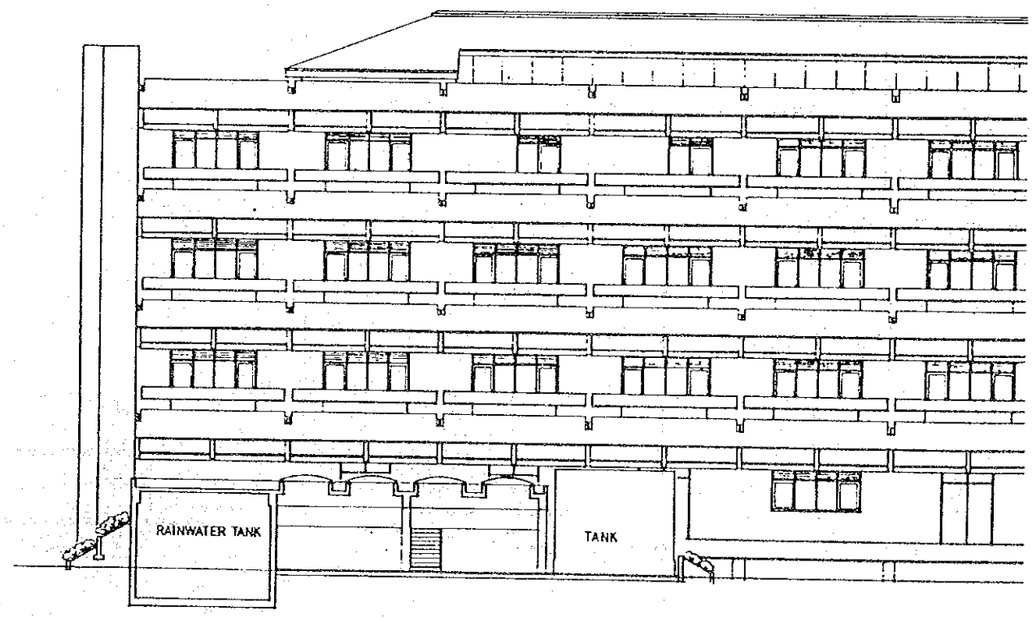


TRAINING & ADMINISTRATION BUILDING

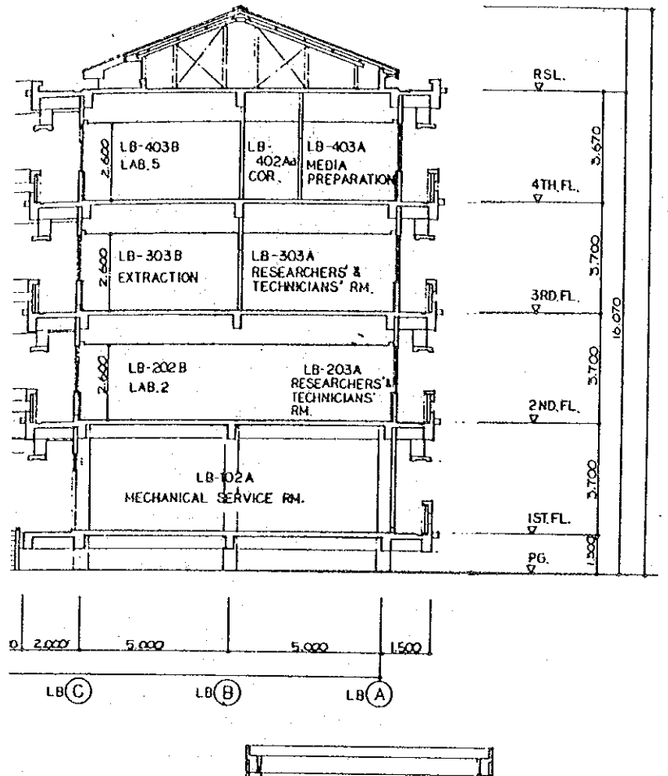


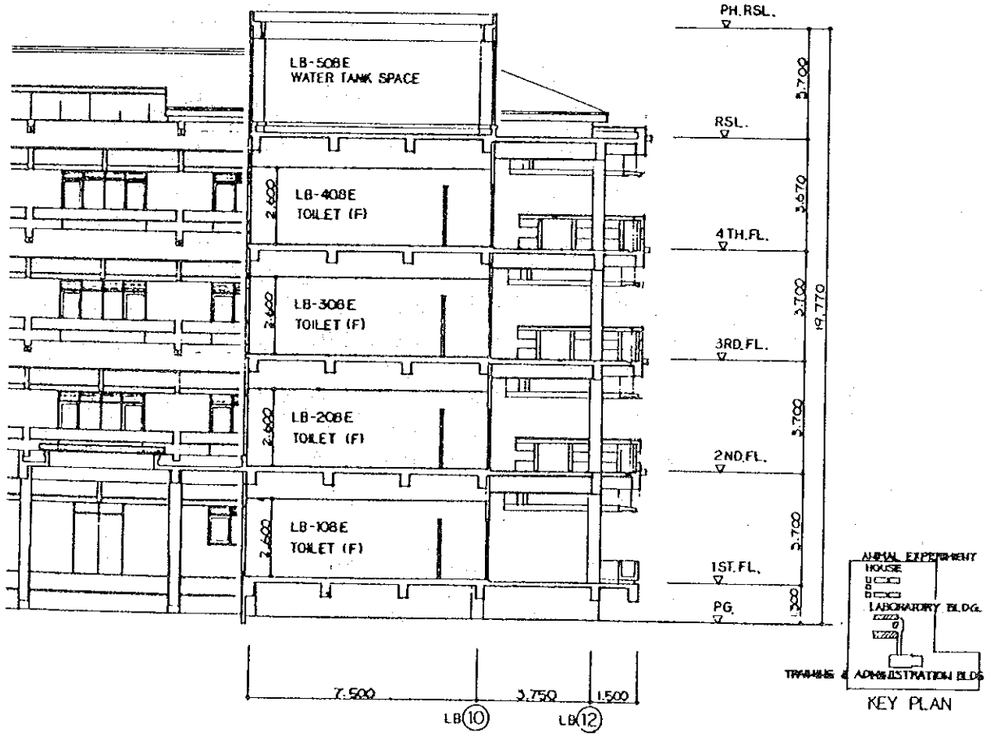
ROOF PLAN 1 : 200





LABORATORY BUILDING SECTION





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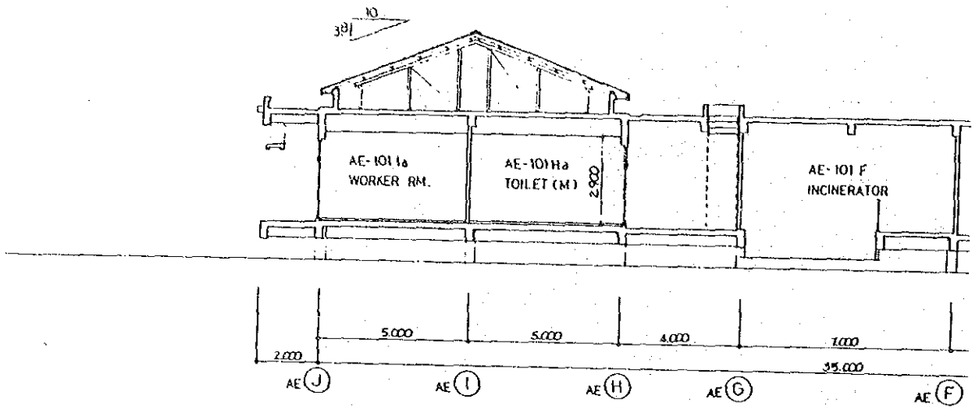
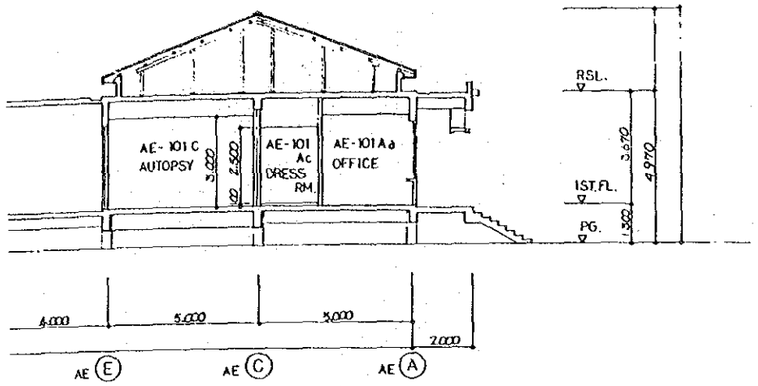
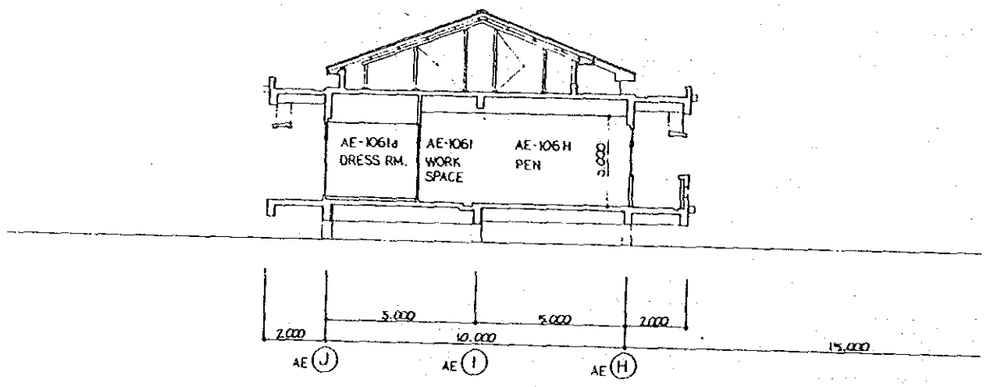
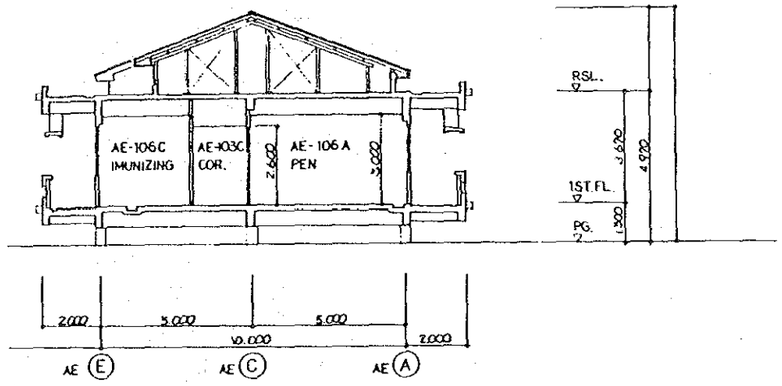
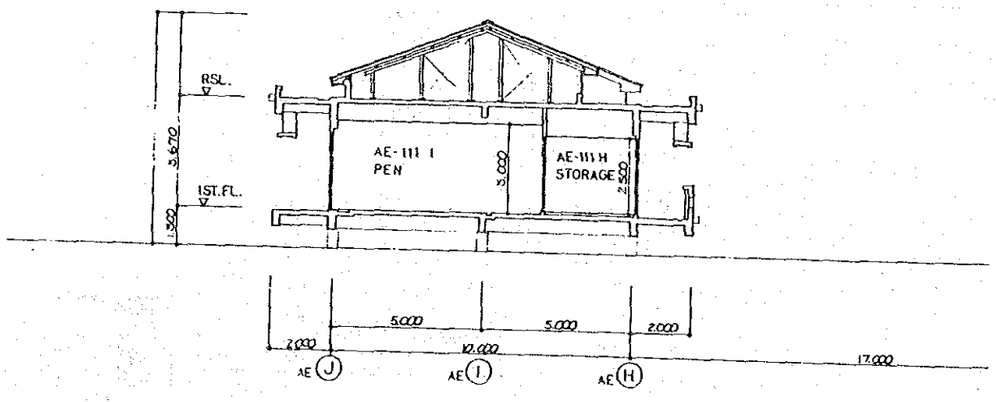
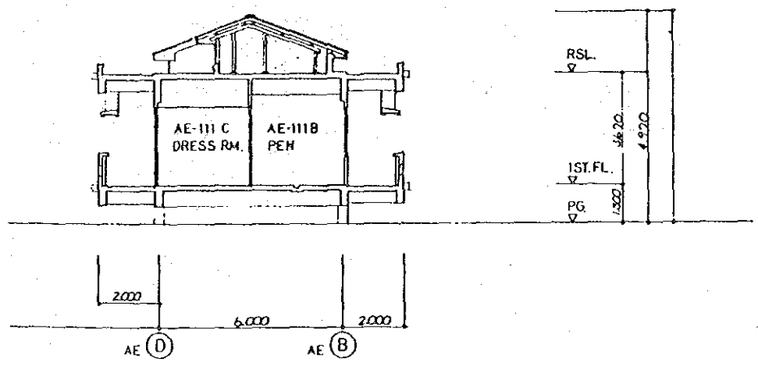






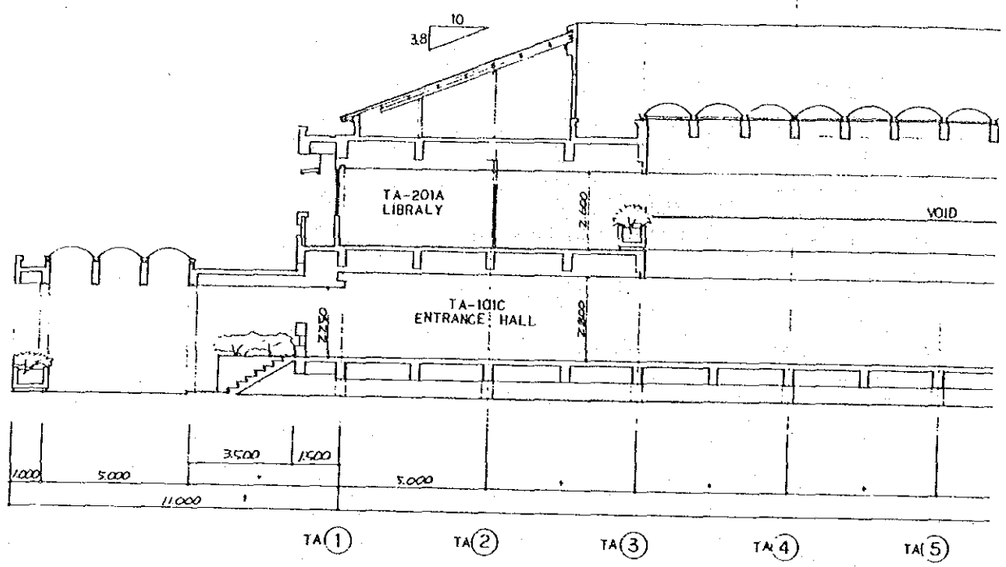


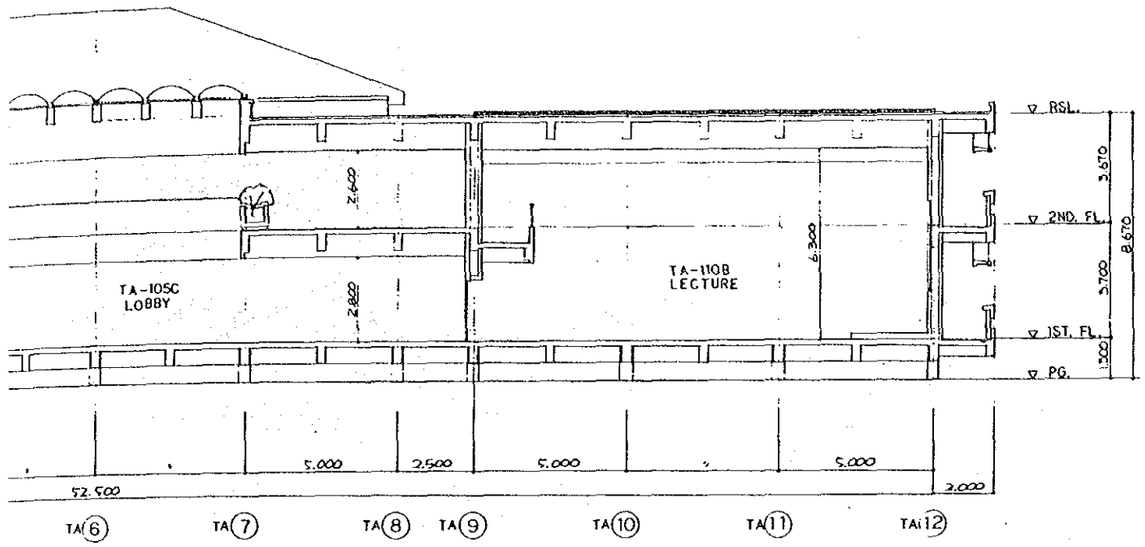


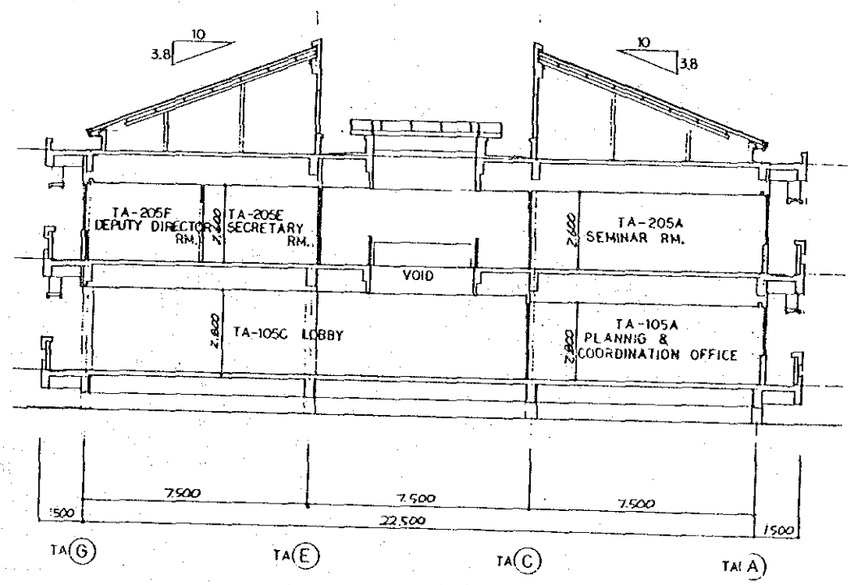


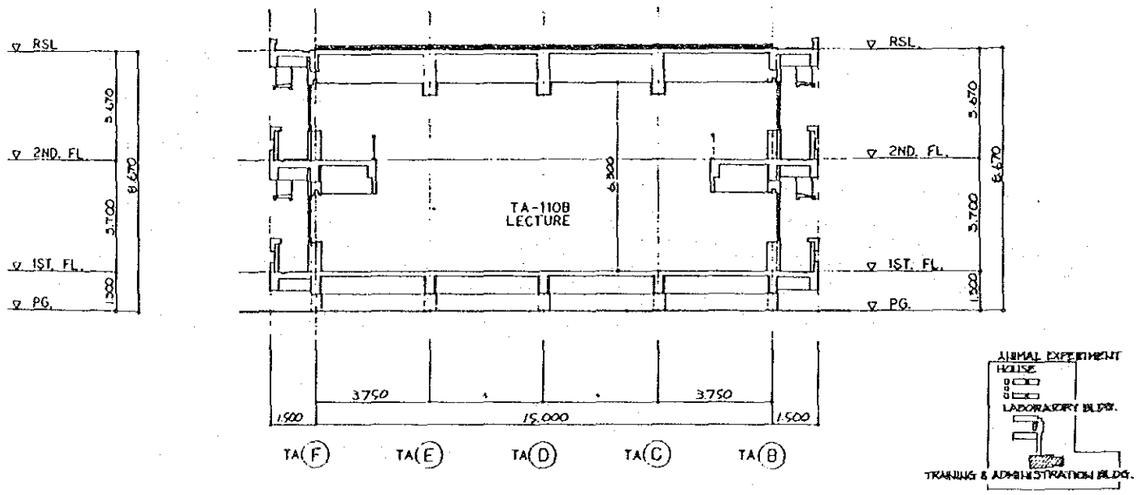
ANIMAL EXPERIMENT BUILDING

SECTION 1 : 200



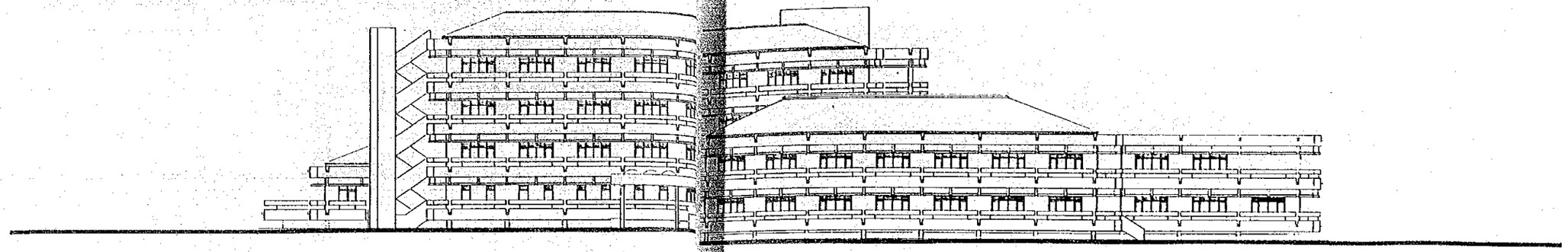




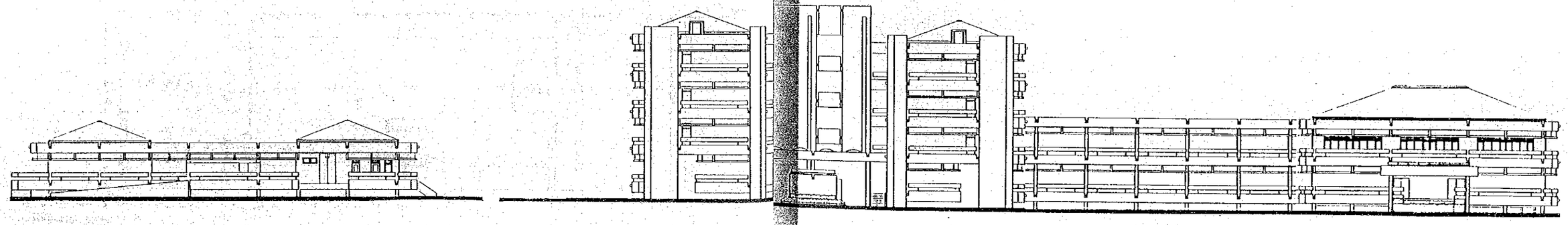


TRAINING & ADMINISTRATION

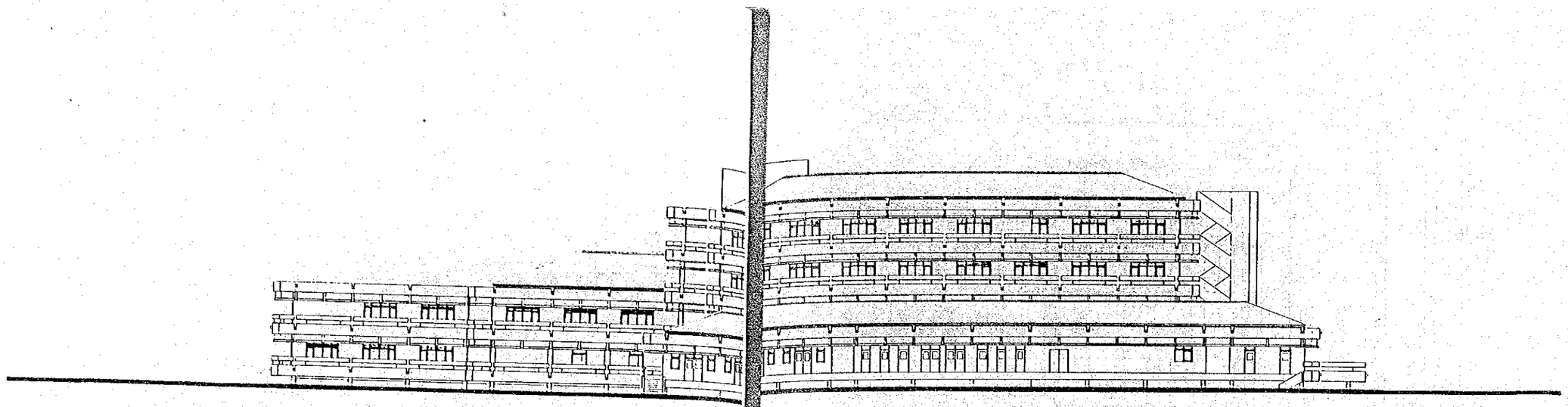
BUILDING SECTION 1 : 200



SOUTH SIDE ELEVATION 1 : 400



WEST SIDE ELEVATION 1 : 400



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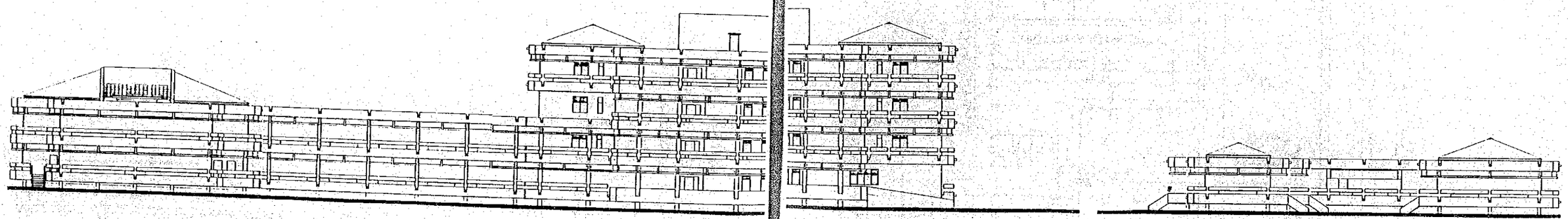

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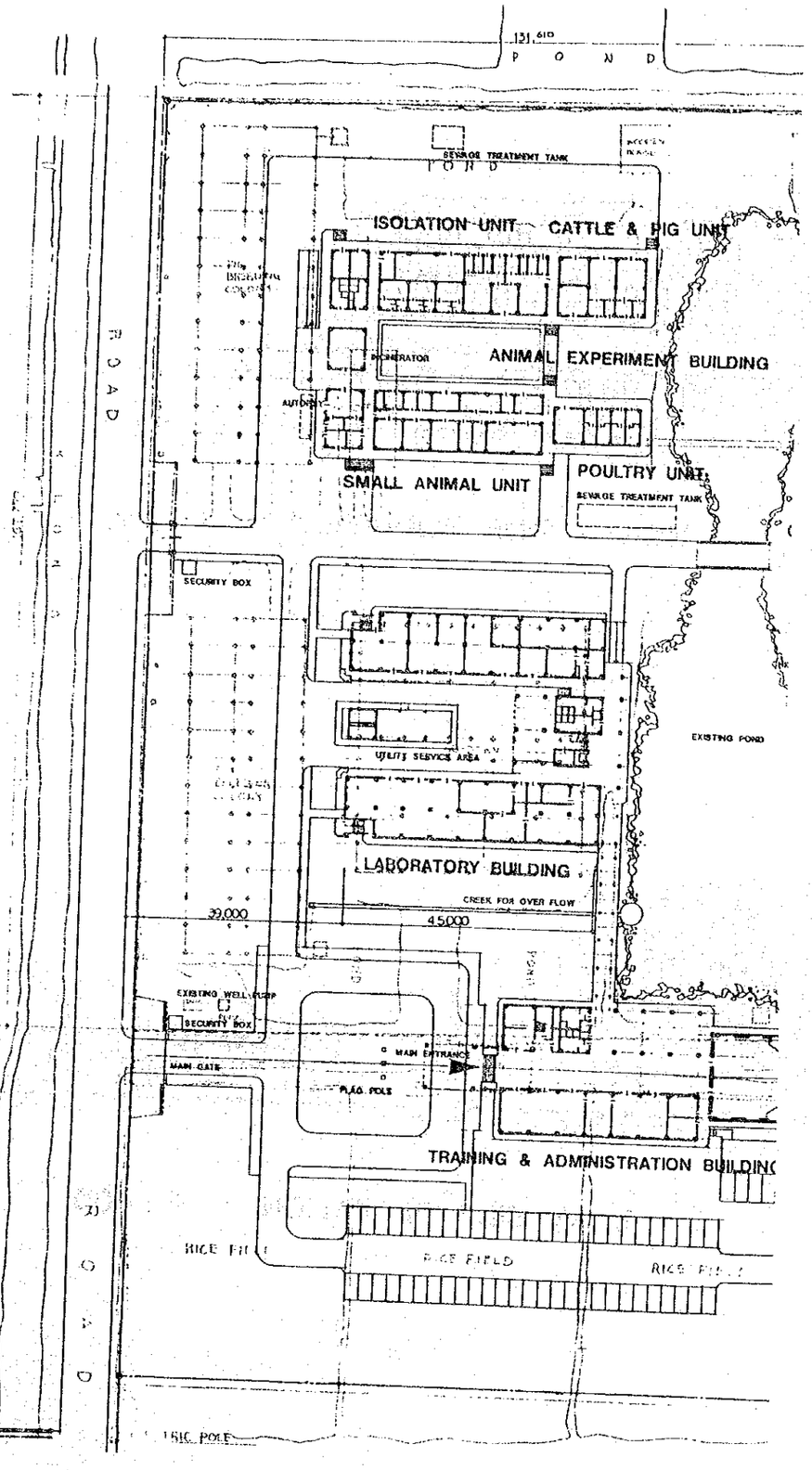
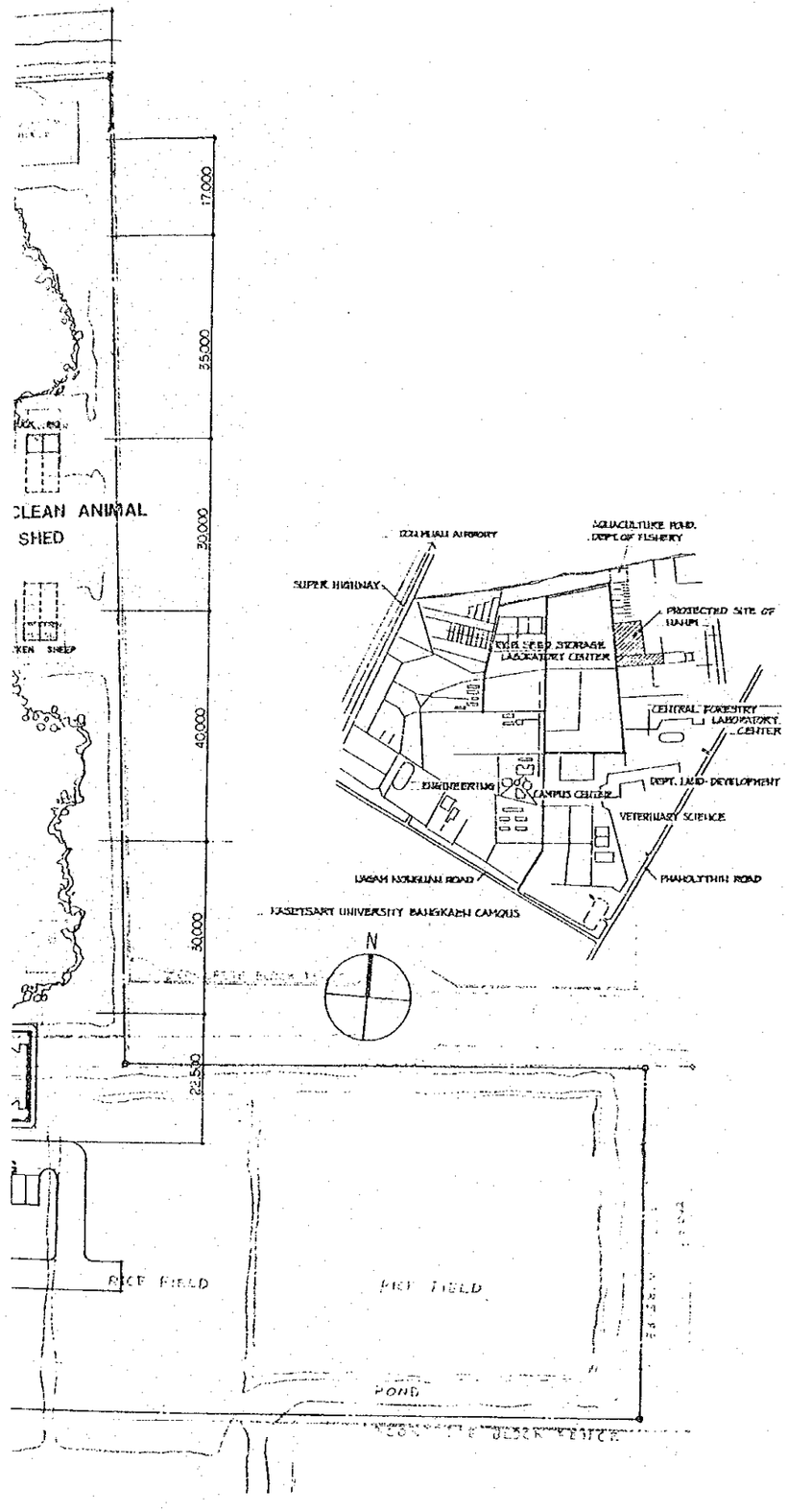


OVERLAP SITE PLAN OF EXISTING &



PROJECTED FACILITIES 1 : 1000

CHAPTER 5: OPERATION AND MAINTENANCE PLAN

CHAPTER 5: OPERATION AND MAINTENANCE PLAN

5-1 OPERATION PLAN

5-1-1 Mode of Operation

After the work related to the facilities and equipment of the Project is completed and they are handed over to Thailand, the agency responsible for their operation and maintenance will be the DLD, of the Ministry of Agriculture and Cooperatives. While the institute will be operated as an independent national research organization with its research activities, organization and personnel placement in accord, in terms of operation, maintenance and budgeting, with the objectives stated in Chapter 3, it is to be under the control of the DLD.

It follows that, if the present organization and personnel placement of the DLD is to remain unchanged, full realization of the desired functions of the NAHPI will be difficult, thus necessitating a structural reorganization of the DLD so that one section is mainly engaged in the routine tests and examinations, and another, the NAHPI, handles mainly the new research activities. The mode of operation of the NAHPI, together with the reorganization of the DLD, is now under review, and is to be implemented as indicated in 3-4-1 Organization.

However, in order to develop a system which will facilitate the functioning of the NAHPI, further concrete plans for the modes of operation including organization and personnel placement will be necessary, for research divisions currently in the DLD to be transferred as a whole to the NAHPI, for those to be partially transferred and for those to be newly created.

5-1-2 Personnel Plan

DLD, the parent body of the NAHPI, is a major organization with a total of about 600 staff, of whom about half are to be transferred to the NAHPI at the time of its completion.

With respect to the effectiveness of research, researchers are the pillars of research activities, and it is essential that long-term plans be made so that their abilities and their numbers are increased and secured.

The current personnel plan of the NAHPI is based on the following two requirements:

1. More doctors of Veterinary Medicine and other personnel qualified in the Natural Sciences are required.
2. Professionally trained personnel are urgently needed in advance in the following fields: computer operation, electron microscopy, maintenance, etc.

In the program of activities of the NAHPI, education and training programs in the respective special fields for senior class researchers and technical staff have been established and systematic training and personnel placement are under consideration.

The total number of staff in the NAHPI at the time of its completion is planned to be about 235 (as shown in Table 5-1-2 Projected Personnel in the NAHPI, and in Table 3-4, Summary of Projected Facilities and Staffing).

The estimated numbers of staff five years after the foundation of the above personnel program are as follows:

	Time of Completion	5 Years After
Total Number of Staff	235	260

Table 5-1-2 Projected Personnel in the NAHPI

5-1-3 Operation and Maintenance Costs Plan

The operation costs planned for the NAHPI are now under examination in the DLD, and a rough budget allocation program is as follows:

Total Budget 100%

Breakdown:
1. Salaries 60%
2. Running Cost for Facilities and Research Equipment, etc. 20%
3. Operation Cost of Supplies, Transportation Services, Training Seminars and Publications, etc. 20%

The above budget proposals seem to be appropriate when compared with the total expenditure budget of the DLD for 1984 (October 1983 to September 1984) as follows:

Item	Cost Amt. (฿)
1. Salaries and Wages	278,401,400
2. Public Services (Electricity, Telephone, Water, etc.)	7,782,000
3. Equipment (Research Equipment, Parts, Expendables and Drugs)	142,235,200
4. Supplies, Travel Expenses, Overtime, etc.	
5. Cost of Construction (Construction of Regional Medical Sciences Center, etc.)	78,805,900
6. Subsidies and Others	147,255,600
Total	685,721,300

Table 5-1-3 Expenditure Budget of DLD for 1983

The average monthly income per person is calculated from the above Salaries and Wages and Total Number of Staff as follows:

฿ 278,401,400 / Total Number of Staff (4,583 persons) / 12 months
= ฿ 5,062 / person . month

Similarly, annual gross expenditure per person is calculated as follows:

฿ 685,721,300 / year / Total Number of Staff (4,583 persons)
= ฿ 149,622 / person . year

5-2 MAINTENANCE PLAN

5-2-1 Maintenance Plan for Facilities

(1) Building

Maintenance of buildings consists mainly of daily routine maintenance such as cleaning, reconditioning of wear and tear due to utilization, and of deterioration arising from breakage and aging, and crime prevention. For routine maintenance, scrupulous and frequent cleaning, prompting careful usage and the early discovery of breakages and defects in the buildings, will ultimately result in the prolonged life of facilities, utility service equipment and research equipment.

The regular service of 8 to 10 persons will be necessary for the cleaning of the facilities.

As to repairs, provided that the expected life span of the buildings of the Project is 30 years, repair works involving the structural components will not be necessary, and repairs will be mainly concentrations on interior and exterior finishing. Remodeling and modification may be required according to the mode of operation of the users of buildings, so there may be alterations of the functions of the buildings, increases in staff number, and alteration of research activities. It is necessary to appoint persons from the Administration Division to take charge of facility control and to ensure systematic inspections and reconditioning.

In the inspection and repair of buildings, periodic execution of the following items is recommended.
Exterior:

Repair and repainting of exterior finish and inspection of cracks in crumbling concrete ..... once every 5 years

Repair, repainting and inspection of roof slabs
(inspection: once a year; others: once every 5 years)

Inspection and partial repair of roof waterproofing
(inspection: once a year; others: as occasion calls)

Periodical cleaning of downspouts, drains, etc.... once a month

Inspection, repair of sealing of exterior doors and windows
..... once a year

Repainting of exterior doors and windows ... once every 5 years

Periodical inspection and cleaning of drainage gutters, manholes, etc. ..... once every 5 years

Repainting of surrounding fences ... once a year

Periodical checkup of landscaping and gardening
..... (as occasion calls)

For crime prevention, it will be necessary to form a guarding system mainly aimed at stopping theft of research equipment, utility service equipment, research results and materials, dangerous articles, etc. by the checking of incoming and outgoing facility users and of of articles carried in and out, and by around-the-clock patrols.

(2) Utility Service Systems

With respect to the various utility service systems such as electric power, air-conditioning and ventilation, plumbing, special facilities, the elevator, etc., in addition to daily operation control and the periodic inspection of utility service equipment, maintenance such as repair in case of failure will be necessary. It is important to form a maintenance system to prevent breakdowns and accidents and to ensure the smooth operation of facilities by operating the equipment properly and executing daily inspections, and lubrication, adjustment, painting and repairs as required. The utility service systems of the NAHPI are, with respect to their purposes, to be highly

regarded compared with those of other facilities. At least six technicians functioning as maintenance personnel - 2 for electricity, 2 for air-conditioning and ventilation and 2 for plumbing - are considered to be necessary, and must be well versed in the operation, function and care of the facilities under their charge. Utility service equipment is to be periodically overhauled, deteriorated parts are to be replaced, and each piece of equipment is to be inspected and maintained at predetermined intervals from several months to several years. The general equipment itself is to be replaced at the end of the life spans indicated below:

Operating Lifespan of Equipment

(Electrical Equipment)	
Generator	15 to 20 years
Panel Board	20 to 30 years
Fluorescent Lamps	5,000 to 10,000 hours
Incandescent Lamps	1,000 to 1,500 hours
Telephone Exchange	40 years
Public Address System Equipment	10 to 20 years
Elevator	20 years
Dumbwaiter	15 years
(Plumbing Equipment)	
Pumps	10 to 15 years
Tanks	15 to 20 years
Pipes and Valves	10 to 15 years
Plumbing Fixtures	25 years
Fire Extinguisher	20 years
Gas Equipment	6 years
Sewage Treatment Equipment	7 years

(Air-conditioning and Ventilation Equipment)	
Pipes	10 to 15 years
Fans	10 to 15 years
Air conditioners	10 to 15 years
Package-type Air conditioners	5 to 10 years
Chilling Units	5 to 10 years

5-2-2 Maintenance Plan for Research Equipment, etc.

(1) Research Equipment

Since the precision of research equipment supporting the research activities should always be kept at a high level, and since the objects of research often include dangerous substances or disease-causing organisms and thus require the rigorous protection of researchers from danger at all times, daily inspection, maintenance and care in this area are essential.

Since the significance of the maintenance system for research equipment is as mentioned above, we consider that the system adopted in the establishment of NAHPI is appropriate, because it aims at efficient operation, centralizing daily maintenance and inspection, repair, and new purchasing solely in the Procurement Section of the Administration Division. It will be necessary to maintain a staff of expert technicians skillful in the mechanisms of research equipment, for the daily maintenance and inspection, and examination on purchase of new apparatus

A combined system is necessary where daily maintenance, inspection and repair are generally executed by the NAHPI technicians, leaving specific kinds of equipment to maintenance services under contract to other organizations such as the manufacturers of the equipment. Periodical execution of daily maintenance and inspection is advisable with respect to the items in the following table. The necessary cost for parts, if executed by the internal staff, and transportation fee, and fee for dispatching engineers as well as cost of parts, in the case of outside orders, should be taken into account in the budget.

	Internal Execution	Outside Order
Experimental apparatus for general use	(4 times/year)	(once/year)
Analytical apparatus	(inspection only, 4 times/year	(twice/year)
Optical apparatus	(twice/year)	(once/year)
Isolation, analytical apparatus	(inspection only, regularly)	(once/year)
Biohazard experimental apparatus	(twice/year)	(once/year)
Precision research apparatus	(inspection only, regularly)	(twice/year)
Sterilization apparatus	(3 times/year)	(once/year)

(2) Expendable Materials and Chemicals for Research

Expendable materials and chemicals substantially support the daily research and experiment activities, so that the quantity necessary for each research unit is to be purchased and replenished periodically. As to actual operations, the centralized operation system through the introduction of computers may be useful for such activities as purchase, distribution of units concerned, inventory control and collaboration. As the central supply center, the Procurement Section of the Administration Division is expected to coordinate the activities.

The following is the list of applicable expendable materials and chemicals.

Glassware for experiments
Reagents for research
Culture media for research
Antigen and antisera for research
Complementary expendable materials

Expendable parts for research apparatus
Special gas for experiments
Antiseptics and other chemicals

(3) Animal Experiment Facilities

While being planned as a joint utilization facility, the animal experiment facilities should be operated, with respect to the daily maintenance, by a responsible administrator and the requisite expert staff. The principal foci of its operation are maintenance of the living conditions of the animals, and application of rigorous preventive measures against mutual infection between animals as well as between animals and humans, so that a significantly high degree of precision is maintained for the research experimental activities conducted here.

Regarding operation and maintenance at the facilities, specific plans for the following items should be examined and the requisite cost for them should be secured in the budget.

1) Animal Purchase and Breeding Plans
2) Feed Purchase and Compounding Plans
3) Supplementary Materials Plans
4) Animal Disposal Plans

5-3 ESTIMATED COSTS FOR OPERATION AND MAINTENANCE

An estimate was made of the annual costs required for operation and maintenance of the facilities and equipment, to be covered by Thailand after the completion of the NAHPI. The items are divided into Personnel Costs, Running Costs for Facilities, Cleaning/Guarding Costs, Maintenance Costs for Research Equipment, etc. and calculations are based on the prices as of October 1984.

(1) Personnel Costs

An estimation will be made of Personnel Costs, which will take up a major part of the operation and maintenance costs of the NAHPI, according to the personnel plan and operation and maintenance plan for the NAHPI at the time of its foundation, outlined in 5-1 Operation Plan. The estimated average salary per employee is ฿ 4,000/person/month.

No. of employees at the time of foundation: 235 persons

235 persons x 4,000/person. month x 12 months = ฿11,280,000/year

(2) Running Costs of Facilities

The quantities of water, electricity, LPG, fuel oil and special gas to be consumed are estimated from the presumed daily usage, in order to calculate the annual running cost for the facilities.

1) Water

$50m^3$/day x 365 x 5/7 day x 5/m^3 = 65,200/year
$20m^3$/day x 365 x 2/7 day x 5/m^3 = 10,500/year
Sub-total ฿ 75,700/year

2) Electricity

Lighting/ Receptacles	140KW x 8hr/day x 365 x 5/7 day x ฿ 1.6/KW = ฿ 467,200/year
Research Equipment	200KW x 8hr/day x 365 x 5/7 day x ฿ 1.6/KW = ฿ 667,400/year
Refrige-ration Equipment	50KW x 0.3 x 24hr/day x 365 x ฿ 1.6/KW = B210,200/year
Special Aircondi-tioners	60KW x 0.5 x 24hr/day x 365 x ฿ 1.6/KW = ฿ 420,500/year
General Aircondi-tioners	120KW x 8hr/day x 365 x 5/7 day x ฿ 1.6/KW = ฿ 400,500/year
Ventila-tors	20KW x 3hr/day x 365 x 5/7 day x ฿ 1.6/KW = ฿ 25,000/year
Sewage Treatment	20KW x 3hr/day x 365 x ฿ 1.6/KW = ฿ 93,400/year
Water Supply	30KW x 3hr/day x 365 x 5/7 day x ฿ 1.6/KW = ฿ 37,500/year
Demand Charge	550KW x ฿ 98/KW x 12 mon/year = ฿ 646,800/year
	Sub-total ฿ 2,968,500

3) LPG (Liquefied Petroleum Gas)

Research Experiment Rooms	100 x 300 Kcal/hr x 5hr/day/11,000 Kcal/kg x 365 x 5/7 day x ฿ 10/kg = ฿ 35,600/year

4) Fuel Oil

Generators	10hr/mon x 12 mon/year x 200 KVA x 0.8 x 0.35L/KWH x ฿ 8/L = ฿ 53,800/year
Boilers	50,000 Kcal/hr x 5hr/day/9,300 Kcal/L = 365 x 5/7day x ฿ 8/L = B56,100/year

Autoclave	60,000 Kcal/hr, set x 2 set x 4hr/day/ 9,300 Kcal/L x 365 x 5/7 day x ฿ 8/L = ฿ 107,700/year	
	Sub-total	฿ 217,600/year

5) Special Gas

Liquid CO_2 gas	฿ 14.4/kg x 200 kg/year	= ฿ 2,800
Liquid N_2 gas	฿ 35/kg x 50 kg/year	= ฿ 1,750
N_2 gas	฿ 0.5/kg x 1,000 kg/year	= ฿ 500
He gas (imported)	฿ 1.6/l x 2,000 l/year	= ฿ 3,200
Ar gas	฿ 0.6/l x 2,000 l/year	= ฿ 1,200
H_2 gas	฿ 0.3/l x 10,200 l/year	= ฿ 3,000
	Sub-total	฿ 12,530
Grand Total (1) to 5))		฿3,309,830

(3) Cleaning and Security Costs

These can be regarded as personnel expenses for workers required for cleaning, and security guards.

1)	Cleaning Workers	8 persons
	฿ 2,000/mo. x 10/persons x 12/mo.	= ฿ 240,000/year
2)	Security Guards	6 persons (around-the-clock system, 4 persons on duty all the time)
	฿ 2,500/mo. x 6 persons x 12 mo.	= ฿ 180,000/year
	Total of 1) and 2)	฿ 420,000/year

(4) Maintenance Cost for Facilities

1) Buildings

Maintenance, inspection and repair cost for buildings can be regarded as Repair Expenses, which vary substantially depending on the age of the buildings. For example, while repairing expenses for buildings are presumed to be about ₱ 3/m^2 annually until about 5 years after completion, they will increase abruptly thereafter.

The following is an estimate, at the rate of ₱ 60/cm^2 for annual average expenses and an assumed life span of 30 years.

₱ 60/m^2/year x 8,200m^2 = 492,000/year

2) Utility Service Systems

As to the cost of inspection and maintenance of the utility service systems, there will be very few exchanges of parts up to 5 years after the completion of facilities, but the next 5 years will necessitate a large number of exchanges of parts and of whole systems. The average annual expenditure required for maintenance of systems, in a 10-year span, is approximately 5% of the total construction costs for the utility service systems.

₱ 65,000,000 x 5%/year = ₱ 3,250,000/year

Total of 1) and 2) ₱ 3,742,000/year

(5) Maintenance Costs for Research Equipment, etc.

1) Maintenance, inspection and repair costs for research equipment

Items	Costs per year for required parts		Costs per year for outside orders (transportation fee, fee for dispatched engineers)
	Q'ty	Cost	
a. Electron Microscope	2		2,000,000
b. Lamina Flow, filter H-600	7 x 2	1,120,000	
c. pH meter Elect. bar	3	600,000	
d. Ultrafiltration equipment (dialyzer)	5	300,000	
e. Water still	2	500,000	
f. Ultra HS Centrifuge			220,000
g. Ultraviolet Lamps		264,000	
GL-30	25x3 times		
GL-10	10x3 times		
h. Autoclave	3	300,000	
i. Copy machine		2,000	10,000
j. Printing machine		5,000	30,000
k. Measuring Equipment		50,000	
l. Analytical Equipment		50,000 8,000	
m. Spare parts, etc.		319,000	
n. Expenses			240,000
Total	¥3,518,000 = ฿ 390,900		¥2,500,000 = ฿ 277,800

Overall total of 1): ฿668,700

2) Costs for Expendable Materials and Drugs for Research

Items	Costs Yen/year
a) Glassware for experiments (general glassware for experiments, bottles for chemicals, etc., glass containers for culture media measuring instrument and concentration/ extraction apparatus made of glass, columns and absorbers for chromatography)	¥16,660,000
b) Reagents, Culture medium, Antigens and antisera for research	¥25,000,000
Sub-total	¥41,660,000/year ฿4,628,900/year

3) Costs for Operation and Maintenance of Animal Experiment Facilities

Items	Costs Bahts/year
a) Costs for purchasing animals	฿ 200,000
b) Costs for purchasing animal feed	฿ 350,000
c) Costs for supplementary materials	฿ 200,000
Sub-total	฿ 750,000
Grand total (1) to 3))	฿ 6,047,600/year

(6) Total Estimated Costs for Operation and Maintenance

1)	Personnel Costs	฿ 11,280,000/year
2)	Running Costs for Facilities	฿ 3,309,830/year
3)	Cleaning/Guarding Costs	฿ 420,000/year
4)	Maintenance Costs for Facilities	฿ 3,742,000/year
5)	Maintenance Costs for Research Equipment, etc.	฿ 6,047,600/year
	Grand total	฿ 24,799,430/year

CHAPTER 6: IMPLEMENTATION OF THE PROJECT

CHAPTER 6: IMPLEMENTATION OF THE PROJECT

6-1 ORGANIZATION

6-1-1 Client

As mentioned in 5-1-1 Mode of Operation, the DLD, of the Ministry of Agriculture and Cooperatives, will act as the executing agency for the implementation of the Project, or, in short, as the Client.

The Department of Technical and Economic Cooperation (DTEC) of the Office of the Prime Minister will assist the Client in the legal and administrative procedures necessary for the implementation of the Project within Thailand.

6-1-2 Consultant

A Japanese consultant shall be appointed by the DLD, and an agreement shall be concluded between the DLD and the Consultant in accordance with the guidelines of the Japanese Grant Aid Program, soon after the exchange of the Notes between the two Governments. Remuneration for the Consultant shall be covered by the Grant.

The services to be rendered by the Consultant shall be as follows:

(1) Working Design Stage

Preparation of working design documents consisting of drawings, specifications and other technicial documents.

(2) Tendering Stage

The Consultant shall take charge of tendering to select contractors for the execution of the Project and assist the DLD in concluding the contract with the selected contractors.

(3) Construction Stage

The Consultant shall, on behalf of the DLD, administer the execution of the construction contract, and the supply and installation of the equipment contract; and shall supervise the works by means of dispatching architect(s) and engineer(s) to the Project site.

6-1-3 Contractor(s)

For the execution of the construction work and the supply and installation of the equipment, Japanese companies shall be selected by tender on the basis of the documents prepared by the Consultant. The company that offers the lowest reasonable price will be awarded the contract in accordance with the guidelines of the Japanese Grant-Aid Program. The contractors shall execute and complete their scope of work in compliance with the contract documents and hand their work over to the Client at the end of the contract period.

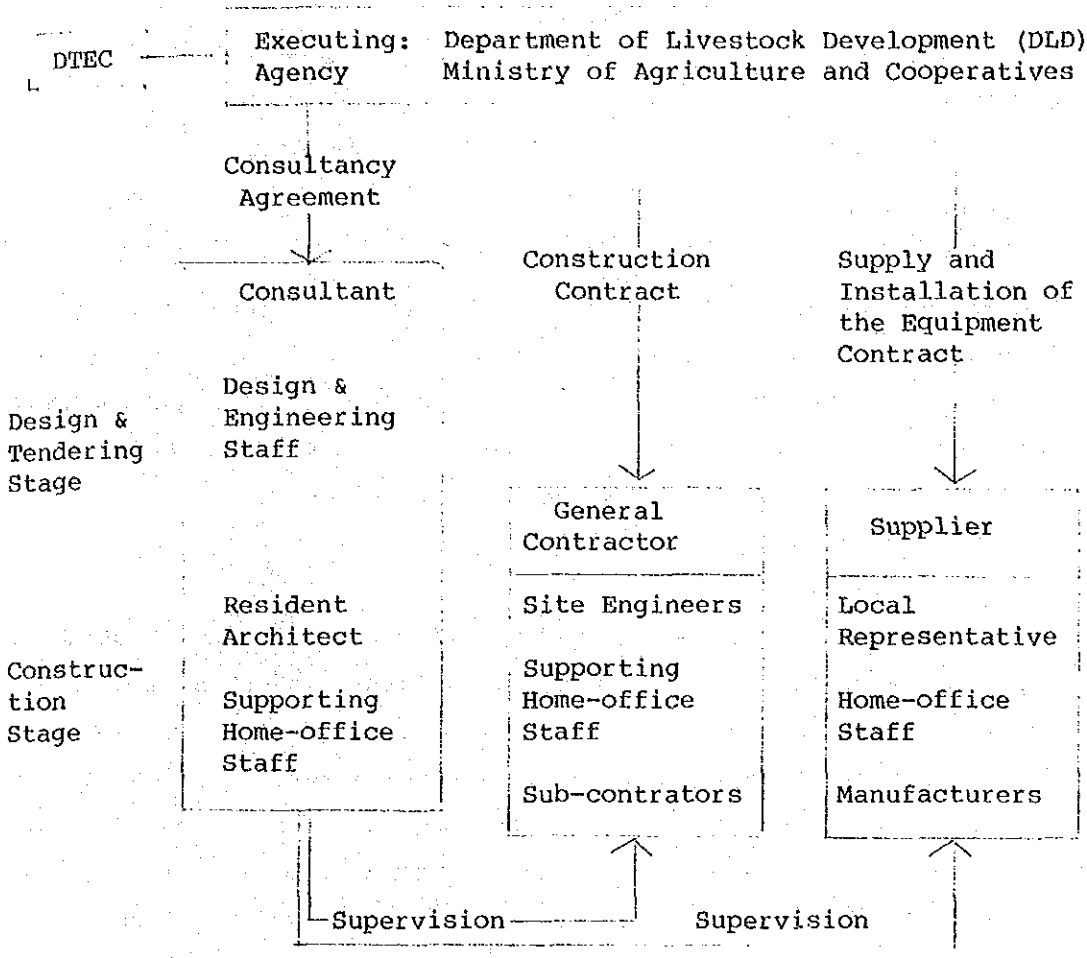


Fig. 6-1-3 Organization of Implementation

Remarks: In the course of the implementation of this Project, a Project Manager of a rank equivalent to a Director of the existing DLD shall be assigned.

6-2 CONSTRUCTION PROGRAM

6-2-1 Construction Plan

The Project Site is situated within the campus of Kasetsart University in Bangkhen, 20 or 30 minutes by car from the center of Bangkok, and therefore the transportation of materials and labor is not a difficult undertaking. Moreover, with the additional convenience of both communications and travel conditions, the site offers many advantages.

Construction work will be carried out within the framework of the Japanese Grant Aid program. Since this means that Phase 1 of the construction work must be carried out by the end of fiscal 1985 (including the extension of the Exchange of Notes), it gives only a 12-month working period. In view of this time limitation, construction must be planned in such a way that materials are obtained locally and that the usual Thai construction methods are employed, since these conditions will make for the smooth and efficient progress of the Project.

Having a total floor area of approximately 8,300m^2, the planned facilities will be moderate in scale. Of this, about 5,000m^2 is taken up by the floor area of the four-story reinforced-concrete Laboratory Building which forms the principal facility of the Project. This building has been designed with a ground plan having a squared-off U shape so that construction on all of its three parts, or wings, can commence simultaneously and proceed in parallel in the interest of speed. Moreover, work on the other two buildings in the Project - the Animal Experiment Building, with its three wings, and the Training and Administration Building - can also be carried out independently and simultaneously.

The Laboratory Building will contain many laboratory rooms with different functions and characters, and many types of equipment, according to the varied nature of the experimental facilities and of the research work to be performed in it, so that it will be a relatively complicated building. Consequently, in the planning of its construction, the scopes of work and the areas of responsibility related to building operations, provision of facilities and equipment work should be very clearly defined and demarcated. It will then also be essential to mutually coordinate all such operations, and pay a great deal of attention to accurate scheduling. (In the Laboratory Building, the spacing between the columns is short, only 5 meters, and this short-span design will not only facilitate construction but also add strength to the entire structure.)

Before construction is begun, the execution of site preparation work by the Thai Government (described below) - in particular, the removal of existing structures and the earthfilling work - must be fully coordinated with the scheduling of the construction work to be carried out by the Japanese side, so that the latter may begin on time at all the relevant points on the Site. This will be a vital factor in the timely completion of the Project.

6-2-2 Supervision Plan

In order to carry out the construction work satisfactorily, good supervising and control of the progress and quality of the works are essential. A close coordination between the resident supervisors at the site and supporting staff at the home office in Japan is required for that. In the event that the construction work and the supply and installation of the equipment are carried out by different contractors under separate contracts, a clear division of the scope of the works, careful adjustment of the work schedule between the two and organization of a communication network will become very important.

6-3 SCOPE OF WORK

According to the outline of the Grant-Aid Program of the Government of Japan, the scope of work to be covered by the Japanese side comprises the construction of the facilities and procurement of equipment for the NAHPI whereas the work to be covered by the Government of Thailand is the execution of the preparatory work for the Project site such as earthfilling and grading, removal of existing buildings and facilities on the site and connection of infrastructure, and to operate and maintain the facilities and equipment after completion of the Project.

The scope of work for each party has been specified in the Minutes of Discussion dated November 25, 1983, and approved by the DMS, Ministry of Public Health. There are some items to be covered by the Government of Thailand simultaneously with, or prior to, the work by the Government of Japan, and these are indispensable to a smooth implementation of the Project.

6-3-1 Works to be undertaken by the Government of Japan

(1) Construction of facilities for NAHPI

1) Laboratory Building
2) Animal Experimental Facilities
3) Training and Administration Building
4) Others

(2) Procurement of equipment for NAHPI

1) Research Equipment
2) Animal Experiment Equipment
3) Training and Others

6-3-2 Works to be undertaken by the Government of Thailand

(1) To carry out the Project Site preparation such as clearing, leveling and removal of existing buildings and facilities on the site before the commencement of construction works.

(2) To undertake incidental civil works such as installation of gates, fencing, guard houses, garage, gardens and exterior lighting if needed.

(3) To improve the roads outside the Project Site, including preparation of the approach roads and paving of the road running past the west side of the Site.

(4) To provide facilities for distribution of electricity, water supply, drainage and telephone system as follows.

a. The distributing line of electricity to the Project Site.
b. The city water distribution main to the Project Site.
c. The drainage city main (for storm, sewer and others) to the Project Site.
d. The telephone trunk line to the main distribution frame/panel (MDF) of the Laboratory Building of the Project.

(5) To provide general furniture such as tables, chairs curtains and others.

(6) To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

a. Advising commission of Authorization to pay
b. Payment Commission

(7) To ensure unloading, customs clearance, bounded warehouse charges, tax exemption for the products at the unloading port in Thailand.

(8) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Thailand with respect to the supply of the products and services under the verified contracts.

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

(10) To bear all expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment.

(11) To maintain and use properly and effectively the facilities constructed and equipment purchased under the Grant.

(12) To provide responsible counterparts, both technical and administrative, in sufficient numbers and at appropriate levels.

(13) To provide the space for a Site Office, Workshop, Warehouse and Courtyard for the building materials that are necessary for the construction work.

(14) To undertake incidental civil work for installing a temporary electric power supply, water supply and telephones that are also necessary for the construction work.

6-4 TENTATIVE OVERALL SCHEDULE

Because the construction period for the Project is estimated to be 18 months, the implementation of the Project shall be carried out in two phases in accordance with the procedures of the Japanese Grant-Aid Program, and as indicated below. As shown in the schedule, the Thai Government's preparation works are to be executed in line with the overall schedule, prior to the commencement of the main construction work or during it.

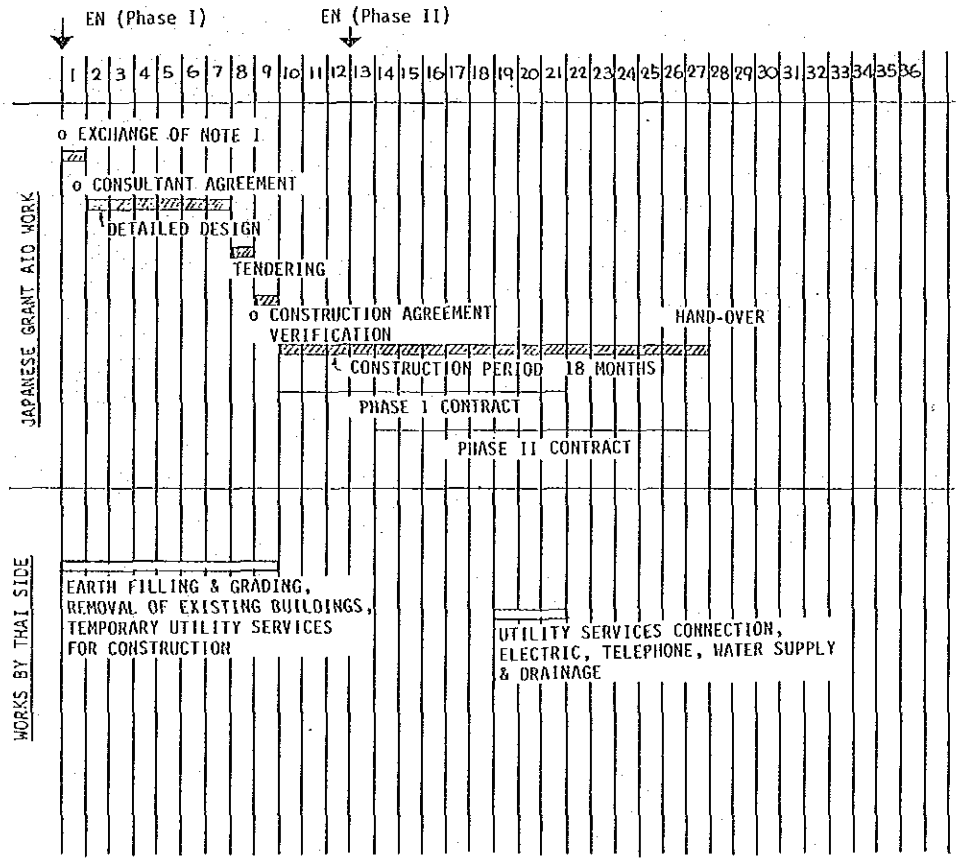


Fig. 6-4 Tentative Overall Schedule

6-5 COST ESTIMATE OF THE WORKS UNDERTAKEN BY THE GOVERNMENT OF THAILAND

The cost for the work above to be undertaken by Thai government are estimated as follows.

(1) The project site preparation .....฿ 1,400,000
clearning and removal of existing building

(2) The earth filling and grading .....฿ 4,400,000
on existing pig breeding station site including
filling and grading in existing ponds

(3) The earth filling and related works
to additional site area .....฿ 8,100,000
including construction of fences, etc

(4) The provision of infrastructure facilities .....฿ 4,100,000
distribution of electricity, water supply,
drainage and telephone system including
temporaty facilities used in the construction work

Total ฿ 18,000,000