

## **CHAPTER 3: OUTLINE OF THE PROJECT**



## CHAPTER 3: OUTLINE OF THE PROJECT

### 3-1 OBJECTIVES OF THE PROJECT

The high prevalence of various animal diseases causes losses of animal resources and lower productivity, and threatens sound livestock development in Thailand. One factor in this is the suitability of the climatic conditions for the growth and spread of pathogenic agents. Another is the lack of an adequate system of research, diagnosis control, etc.

To improve animal health, both an animal health control system and the proper materials and staff are required. For example, there is a need for an information network, improved diagnostic technology and animal health control, training of veterinary staff and the dissemination of animal health technology information. For the improvement of animal health, with consequent development of the livestock industry, the Government of Thailand plans to establish a central research organization as the central body for promoting animal health activities, and has requested the Government of Japan for cooperation to this end.

Improving animal health in order to develop the livestock industry is a principle that is equally valid in South-East Asian countries and Japan as in Thailand, and economic development also benefits.

For effective animal health activities, a research sector of the DLD will be set up and be provided with adequate facilities and equipment. The establishment of such an institution will contribute to animal health, the livestock industry and the supply of safe, good-quality feed and livestock products.

Assisting in the animal disease diagnostic activities of the DLD in the central region, the Institute will act as a reference laboratory for regional veterinary diagnostic laboratory centers in the northeast, northern and southern regions of Thailand.

### 3-2 ACTIVITIES OF THE PROJECT

In view of the present situation in the field of animal health in Thailand, the NAHPI should be established both for the execution of research work on immediate problems and for the up-to-date response to the rapid progress in veterinary science and husbandry.

At first, the activities of NAHPI will mostly be limited to animal health work and the investigation of feed and animal-product quality control. Respecting the intention of Thai side to expand the facilities related to future animal production, the word "production" is left in the name of the new institute.

The principal activities will be as follows:

- 1) Research into developing and improving of diagnostic procedures for animal and poultry diseases.
- 2) Research into the development and improvement of veterinary biologics and diagnostic reagents, and of procedures for the quality control of biologics. Routine vaccine production and quality assays are not included here.
- 3) Research into improved assay procedures for quality and safety control of feed and animal products. Routine assay work is not included here.
- 4) Diagnostic services as a reference center for regional diagnostic laboratory centers.

- 5) Collection, analysis and distribution of information in the field of animal health and livestock development.
- 6) Training and extension of livestock development technology for animal health personnel.
- 7) Technical cooperation with related organizations.

The research, training and administration activities at NAHPI are described in detail below.

### 3-2-1 Research Activities Plan

#### (1) Bacteriology

##### 1) Research Activities

- a. Research on epidemic diseases caused by pathogenic aerobes (hemorrhagic septicemia of buffalo and cattle, infectious coryza of poultry, infectious atrophic rhinitis, etc.)
- b. Research on infectious diseases caused by aerobes (swine dysentery, black leg, gas gangrene, malignant edema, etc.)
- c. Research on intestinal infections caused by enteric bacteria (salmonellosis, colibacillosis, etc.)
- d. Research on respiratory infections caused by mycoplasmas (chronic respiratory disease in poultry, enzootic pneumonia of pigs, etc.)
- e. Research on bacteria zoonoses (tuberculosis, brucellosis, melioidosis, anthrax, swine erysipelas, etc.)

- f. Research on infectious diseases caused by pathogenic fungi (aspergillosis, candidiasis, cryptococcosis, mycotic abortion, dermatomycosis, mycotoxicosis, etc.)
- g. Research on drug-resistance
- h. Research on bacterial vaccines and bacterial antigens
- i. Standardization of culture methods and maintenance of bacterial strains

## 2) Research Methods

The methodology will deal with applied as well as basic researches by using experimental animals, tissue culture, genetic engineering and conventional microbiological methods. The research on pathogenicity may involve physicochemical and biological studies of microbial toxins and other biologically active substances. The research on the genetics of organisms will be related to drug resistance and the development of vaccines and antigens.

## (2) Virology

### 1) Research Activities

- a. Research on viral diseases of poultry (Newcastle disease, avian influenza, duck virus enteritis, infectious bronchitis, etc.)
- b. Research on viral diseases of pig (Aujeszky's disease, infectious gastroenteritis, swine fever, etc.)
- c. Research on viral diseases of cattle (infectious bovine rhinotracheitis, malignant catarrhal fever, mucosal disease complex, etc.)

2) Research Methods

- a. Physical and morphological research on virus particles (transparent and scanning microscopes, ultracentrifuge and density gradient fractionator, etc.)
- b. Development of virus vaccines with domestic isolates as the seed viruses.
- c. Serological investigation of distribution and ecology of virus diseases.
- d. Standardization of the procedures of diagnosis and prevention of viral infections.

(3) Parasitology and Epidemiology

1) Research Activities

- a. Research on the main parasitic diseases caused by endoparasites
- b. Research on the main parasitic diseases caused by ectoparasites
- c. Research on the degree of parasitic infections in the various conditions.
- d. Research on anthelmintic activity in controlling parasites
- e. Research on effect of parasites on production
- f. Study of tuberculosis in dairy cows
- g. Study of prevention of brucellosis in dairy cows

2) Research Methods

- a. Study of the ecology of endoparasites in the host, their pathogenicity, and prevention of infections by them.

- b. Study of the ecology of ectoparasites in or on the host, their pathogenicity and prevention of infections by them.
- c. Comparison of the number of parasite eggs in feces and the number of parasites in animals in different raising conditions.
- d. Comparative testing of parasites in the field, and in controlled and extreme environments.
- e. Study of the effects on reproduction in parasite-free and parasite-infected animals.
- f. Tuberculin testing on dairy farms and further milk and sputum testing of tuberculin-positive cows.
- g. Administration of strain 19 brucella vaccine to 3-4 month-old calves. Serological survey of brucellosis by the stepwise combination of rapid plate agglutination tests, serum agglutination tests, and complement fixation tests. Establishment of brucellosis-free herds.

#### (4) Pathology

##### 1) Research Activities

- a. Research on pathological lesions of epidemic diseases such as foot-and-mouth disease, pseudorabies, swine fever, transmissible gastroenteritis, infectious bovine rhinotracheitis, ephemeral fever, Newcastle disease, infectious laryngotracheitis, infectious bronchitis, variola, etc.
- b. Study of bovine mastitis as part of research on prevalence of infectious bovine rhinitis and fever in dairy herds.
- c. Comparative study of pathological changes in alimentary tract of diarrheal pigs.



- d. Study of hematological changes in parasitic and epidemic diseases.
- e. Study of immunological responses in swine aflatoxicosis.
- f. Coordinate research work with other divisions.

2) Research Methods

- a. Use of cross-pathology, histopathology and immunopathology
- b. Cooperation with bacteriology, virology, hematology and epidemiology researchers, and occasionally also with parasitology or biochemistry researchers.

(5) Toxicology and Biochemistry

1) Research Activities

- a. Research on pesticide residues in feed, animal products and tissues
- b. Research on heavy metals in blood and tissues of farm animals
- c. Research on mycotoxin in feed, animal products and tissues
- d. Research on proper use of feed additives and drug residues in animal products
- e. Improvement of techniques of analyzing feed additives
- f. Study to improve feed additive standards
- g. Analysis of residues and toxic substances in feed
- h. Clinical biochemistry of animal diseases
- i. Immunochemical research on animal diseases

## 2) Research Methods

- a. Extraction either by partition chromatography or digestion, followed by concentration and analysis. The equipment necessary for analysis includes: Spectrophotometer, atomic absorption spectrophotometer, gas chromatograph, thin-layer chromatograph, and high speed liquid chromatograph.
- b. Comparison of techniques of analyzing feed additives are compared to find the most suitable methods.
- c. Study of the domestic and overseas information on feed additives; search for suitable levels of feed additives for improvement of feed additive standards.
- d. Chemical analysis to clarify the types and quantities of residues and toxic substances in feed.
- e. Accumulation of clinical data by chemical methods. Improvement and development of biochemical diagnostic procedures.
- f. Basic and applied research on antibodies.

### 3-2-2 Training and Administration Activities Plan

#### (1) Training Activities

- a. Training of researchers - On job training at research laboratories of each division.
- b. Training of livestock officers and personnel concerned with livestock to train technicians in the diagnostic laboratories in 72 provinces.
- c. Technical cooperation and joint research with guest researchers from abroad.

- d. Exchange of information and technology through scientific conventions among ASEAN countries and other international meetings (symposiums, seminars, workshops).

(2) Information Activities (including Library)

- a. Animal health and livestock development information reference collection and supply services.
- b. Compilation and publication of the Institute's reports.
- c. Exchange of information with related organizations.

(3) Administrative Activities

- a. Accounting work such as drafting of budget, settlement of accounts and provision of supplies.
- b. General affairs such as personnel administration and staff salary payment.
- c. Maintenance, repair, cleaning and sterilization.
- d. Staff welfare activities

(4) Filing and Recording

Storing of documents and various data.

### 3-3 ORGANIZATION AND PERSONNEL PLAN

#### 3-3-1 Organization

The NAHPI will be established to promote such activities as research into and improvement of animal health and quality control of feed and animal products. The NAHPI will be under the direct control of the Director General of the DLD, and its Director will have the same rank as the Deputy Directors General of the DLD, so as to ensure the smooth functioning of the institute.

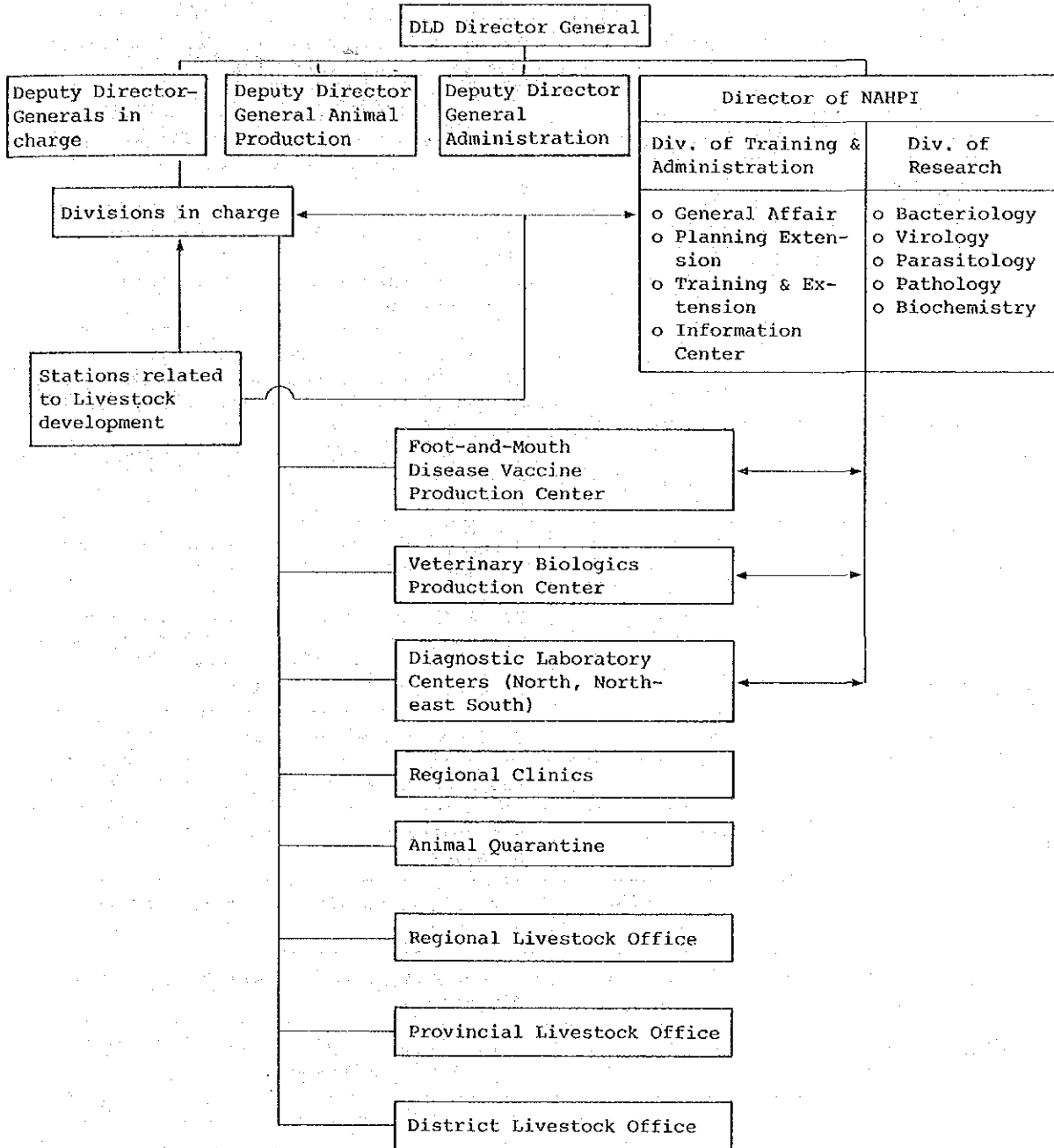
In parallel with the work of establishing the NAHPI, the reorganization of the DLD will be considered by the authorities of Thailand. The proposal for reorganization of the DLD is illustrated in Fig. 3-3 (a). The detailed organization and activities of the NAHPI are shown in Table 3-3 (a).

#### 3-3-2 Staffing

The projected numbers of staff for the NAHPI are: 161 in the Research Division and 74 in the Administration Division (235 in total) at the time of establishment. The detailed staffing for each unit is as indicated in Table 3-3 (c).

Training of the necessary members in laboratory animal care, statistics, electron microscopy, micro-computer application, etc., is urgently required before the establishment of the NAHPI.

Fig. 3-3 (a) Organization Chart of DLD after Establishment of NAHPI



Remarks:

← Technical transfer, distribution of information, training and collaboration

→ Supply of information, technical problems, research results and collaboration

Table 3-3 (a) Detailed Organization and Activity of NAHPI

Division	Section	Group	Activities
RESEARCH	BACTERIOLOGY	Aerobic bacteria	Research on causative agents, disease, diagnosis, and prevention
		Anaerobic bacteria and enterobacteria	Research on causative agents, disease, and diagnosis and prevention of infections caused by anaerobic bacteria and enterobacteria
		Mycoplasma and Mycobacteria	Research on causative agents, disease, diagnosis and prevention of infections caused by mycoplasma and mycobacteria, diagnosis and prevention
		Fungi	Research on causative agents, disease, diagnosis and prevention of infections caused by fungi, diagnosis and prevention
	VIROLOGY	Bovine disease	Research on virus disease, diagnosis and prevention of viral bovine and buffalo disease
		Swine diseases	Research on virus disease diagnosis and prevention of swine viral infections
		Poultry diseases	Research on virus diseases, diagnosis and prevention of poultry viral infections
	PARASITOLOGY	Ectoparasitology	Research on ectoparasites
		Endoparasitology	Research on endoparasites
		Protozoa	Research on epidemiology of various diseases
	PATHOLOGY	General pathology	Histopathological research on various diseases
		Clinical pathology	Clinical pathological research on various diseases
		Immunopathology	Immunopathological research on various diseases
	BIOCHEMISTRY	Toxicology	Research on residual toxicity of various medicaments and heavy metals
		Clinical biochemistry	Clinical biochemical research on various diseases
		Immunochemistry	Research in immunochemistry
Feed quality safety		Research on the quality and safety control of feed and animal products	

Division	Section	Group	Activities
ADMINIS- TRATION	GENERAL AFFAIRS	General affairs Personnel affairs Accountancy Procurement, Maintenance & Preparation	General affairs, personnel affairs, accounting, procurement, maintenance, washing and sterilization, and supply (materials, power, water.)
	PLANNING & COORDINATION	Planning	1) Layout of research theme 2) Allocation of research budget 3) Summarization and evaluation of research activities
		Coordination	1) Reception of diagnosis specimens 2) Settlement of field testing 3) Contact and coordination with other government offices and other organizations
	TRAINING	Training	1) Planning and implementation of training (Trainees are senior administrators and researchers in DLD.) 2) Individual and mass training
		Extension	1) Training of Thai veterinarians and researchers 2) Contract and arrangement with foreign countries on technical cooperation 3) Care of visitors
	INFORMATION	Statistics	Statistics on animal health
		Public relations	Collection, analysis and distribution of animal health information. Emergency information on special outbreaks of animal diseases
		Publication	Preparation of training text-books, research reports, and audio-visual teaching materials.
		Library	Collection, maintenance and lending of books, journals and reference materials.

Remarks:

- 1) "Division level" is equivalent to the level of an existing Division of the DLD.
- 2) "Section level" is equivalent to the level of an existing subdivision of the DLD.
- 3) "Group level" is equivalent to the level of an existing section of the DLD.
- 4) The Animal Experiment Building shall be managed by the Bacteriology Section.

Table 3-3 (b) Project Staffing

DIVISION	SECTION	ROOM	NUMBER OF STAFF MEMBERS					TOTAL
			RESEARCHER Ph.D., M.S. D.V.M.	TECHNICIAN D.S.	ASSISTANT (Para-Vet)	WORKER	ADMIN STAFF	
RE- SEARCH	BACTERIOLOGY	o BACTERIOLOGY	10	10	6	7	-	33
		o ANIMAL EXPERIMENT	7 + (3)	7 + (3)	4 + (2)	5 + (2)	-	23 + (10)
	VIROLOGY	o VIROLOGY	10	9	5	6	-	30
			5 + (5)	2 + (7)	2 + (3)	4 + (2)	-	13 + (17)
	PARASITOLOGY	o PARASITOLOGY	8	9	5	6	-	28
		o EPIDEMIOLOGY LAB. o SPECIAL STUDY	5 + (3)	2 + (7)	2 + (3)	3 + (3)	-	12 + (16)
	PATHOLOGY	o PATHOLOGY	7	7	4	4	-	22
		o ELEC. MICROSCOPY o PHOTOGRAPHY o AUTOPSY	5 (2)	3 (4)	2 (2)	3 (1)	-	13 + (9)
	BIOCHEMISTRY	o TOXICOLOGY	15	15	8	10	-	48
		o CLINICAL BIOCHEM. o IMMUNOCHEM. o FEED QUALITY CONT.	10 + (5)	11 + (4)	6 + (2)	5 + (5)	-	32 + (16)
	SUB TOTAL	50	50	28	33	-	161	
		32 + (10)	25 + (25)	16 + (12)	20 + (13)	-	93 + (68)	
ADMINI- STRATION	GENERAL AFFAIRS	o GENERAL AFFAIRS o PERSONNEL AFFAIRS o ACCOUNTING o PROCUREMENT, MAINTENANCE, WASHING, STERILIZATION MATERIAL SUPPLY, POWER AND WATER SUPPLY	3	11	-	20	8	42
			(3)	(11)	-	(20)	(8)	93 + (42)
	PLANNING & COORDI- NATION	o PLANNING o COORDINATION	2	3	1	3	3	12
			(2)	(3)	(1)	(3)	(3)	(12)
	TRAINING & EXTENSION	o TRAINING o EXTENSION	-	2	1	1	2	6
			(-)	(2)	(1)	(1)	(2)	(6)
	INFORMATION	o STATISTICS o PUBLIC RELATIONS o PUBLICATIONS o LIBRARY	1	4	-	4	5	14
		(1)	(4)	(-)	(4)	(5)	(14)	
	SUB TOTAL	6	20	2	28	18	74	
		(6)	(20)	(2)	(28)	(18)	(74)	
	TOTAL	56	70	30	61	18	235	
		32 + (24)	25 + (45)	16 + (14)	20 + (41)	(18)	93 + (142)	

235 — ①  
93 + (142)  
② ③

Remarks: 1: Total number of staff members  
2: Number of staff members transferred from the existing research division of the DLD  
3: Number of staff members drafted from the outside of the DLD's research division



### 3-4 NECESSARY FACILITIES AND EQUIPMENT

#### 3-4-1 Necessary Facilities

On the basis of the planned activities and staffing for NAHPI, detailed above, it was decided that the following facilities would be required for the Project Research activities will be conducted mainly in 1 and 2 below, and training and administrative work will take place in 3. However, some of the training activities will utilise the laboratory and other facilities of 1 and 2.

1. Research Laboratory Building .....	Approx. 5,085 m <sup>2</sup>
2. Animal Experiment Building .....	Approx. 1,038 m <sup>2</sup>
3. Training and Administration Building ....	Approx. 1,921 m <sup>2</sup>
4. Covered way and other facilities .....	Approx. 200 m <sup>2</sup>
<u>Total Floor Area</u>	<u>Approx. 8,244 m<sup>2</sup></u>

The appropriate sizes of the individual facilities within each building have been determined in accordance with the objectives of the Project, taking into account the methods of operation, maintenance and management and efficient utilization, and including a centralized system for the common use of some of the facilities and equipment. The details of the individual facility sizes are shown in Chapter 4, Basic Design.

#### 3-4-2 Necessary Equipment

A careful investigation was made of what necessary equipment, in the following three categories, would help to ensure the smooth and efficient conduct of the work of the NAHPI. For the basic planning of the equipment for the Project, see 4-3-6 Equipment Planning.

- Equipment for Research Laboratories
- Equipment for Animal Experiment Facilities
- Equipment for Training and Information

Table 3-4 Summary of Projected Facilities and Staffing

<u>FACILITIES</u>		<u>NO. OF STAFF</u>	<u>REFERENCE</u>	
1. <u>RESEARCH LABORATORY BUILDING</u>				
	Total floor area	5,085m <sup>2</sup>	For Activities see:	For Facilities see:
<u>4F</u>	VIROLOGY SECTION	30	3-2-1(2), Page 61	Page 104
	BACTERIOLOGY SECTION	33	3-2-1(1), Page 60	Page 102
<u>3F</u>	PARASITOLOGY SECTION	28	3-2-1(3), Page 62	Page 108
	BIOCHEMISTRY SECTION II	13	3-2-1(5), Page 64	Page 106
<u>2F</u>	PATHOLOGY SECTION	22	3-2-1(4), Page 63	Page 112
	BIOCHEMISTRY SECTION I	25	3-2-1(5), Page 64	Page 110
<u>1F</u>	ELECT SER. RM. CENTRAL SUPPLY & DISTR. RM.	Assigned from General Affairs Section	3-2-2(3)C, Page 66	Page 115
	MECH. SER. AND WASH-UP & STERILIZ. UNITS			

FACILITIES

NO. OF STAFF

REFERENCE

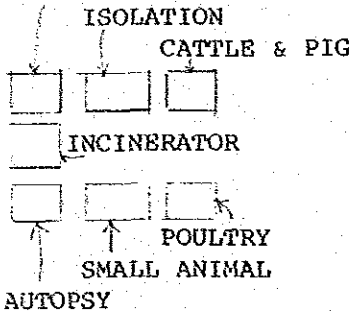
2. ANIMAL EXPERIMENT BUILDING

Floor area 1,038m<sup>2</sup>

For  
Activities see:  
Page 61 - 64

For  
Facilities see:  
Page 116 - 121

WORKER'S RM



Facility is used  
by staff from  
each Laboratory  
and maintained  
by Staff of  
Bacteriology  
Section

3. TRAINING AND ADMINISTRATION BUILDING

Total floor area 1,921m<sup>2</sup>

1F 

GENERAL AFFAIRS PLANNING & COORDINATION
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 54

For activities see: 3-2-2(3) Page  
For facilities see: Page 122

2F 

TRAINING EX- TENSION, INFORMATION
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 20

3-2-2(1)(2), Page Page 124

4. COVERED WAY AND ANCILLARY BUILDINGS

Floor area 200m<sup>2</sup>

COVERED WAY, ANCILLARY BUILDINGS
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 None



## **CHAPTER 4: BASIC DESIGN**



## CHAPTER 4: BASIC DESIGN OF THE PROJECT

### 4-1 Conditions of the Project Site

#### 4-1-1 Location and Current Conditions of the Project Site

##### (1) Location

The projected site of the NAHPI is within the Kasetsart University compound at Bangkhaen, Bangkok city, about a half-hour drive north from central Bangkok. The necessary land area for the Project is about  $34,150\text{m}^2$  (22rai). It consists of an area occupied by the Bangkhen Pig Breeding Station of  $23,000\text{m}^2$  (15rai) belonging to the DLD, and  $11,150\text{m}^2$  (7rai) of fallow paddy land belonging to the Department of Agriculture.

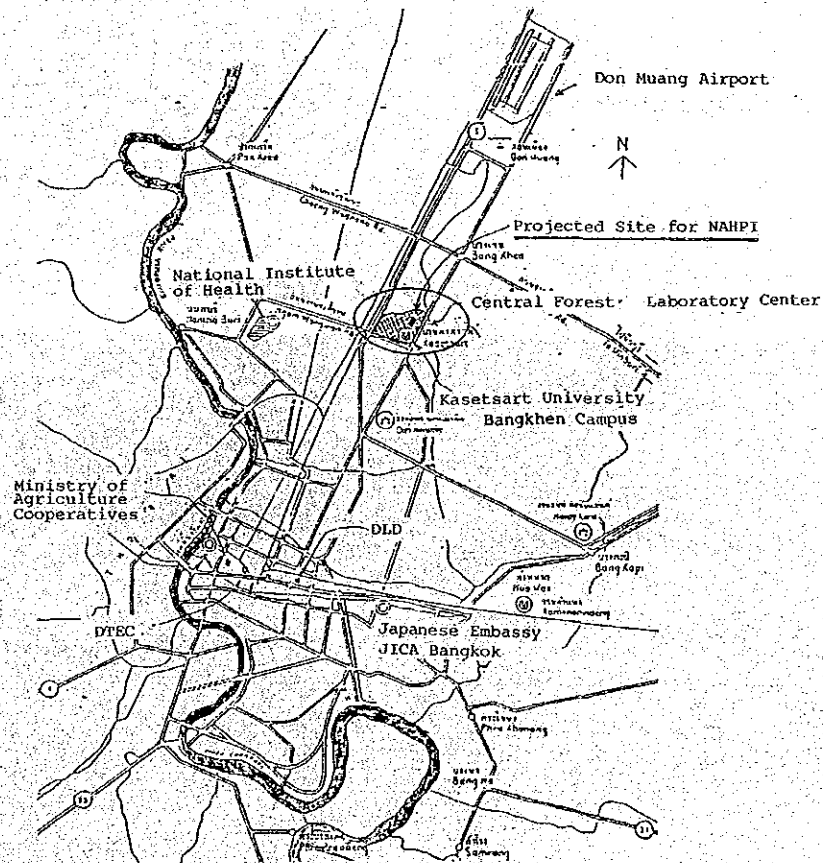
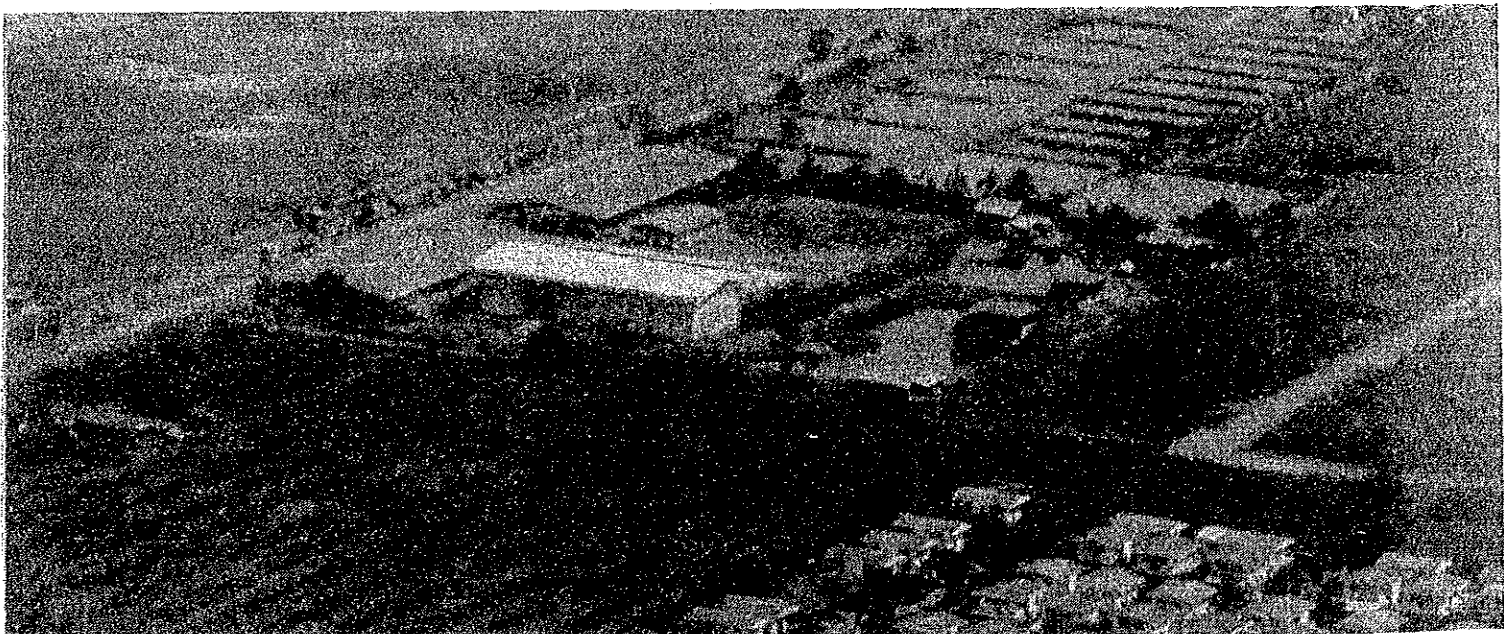
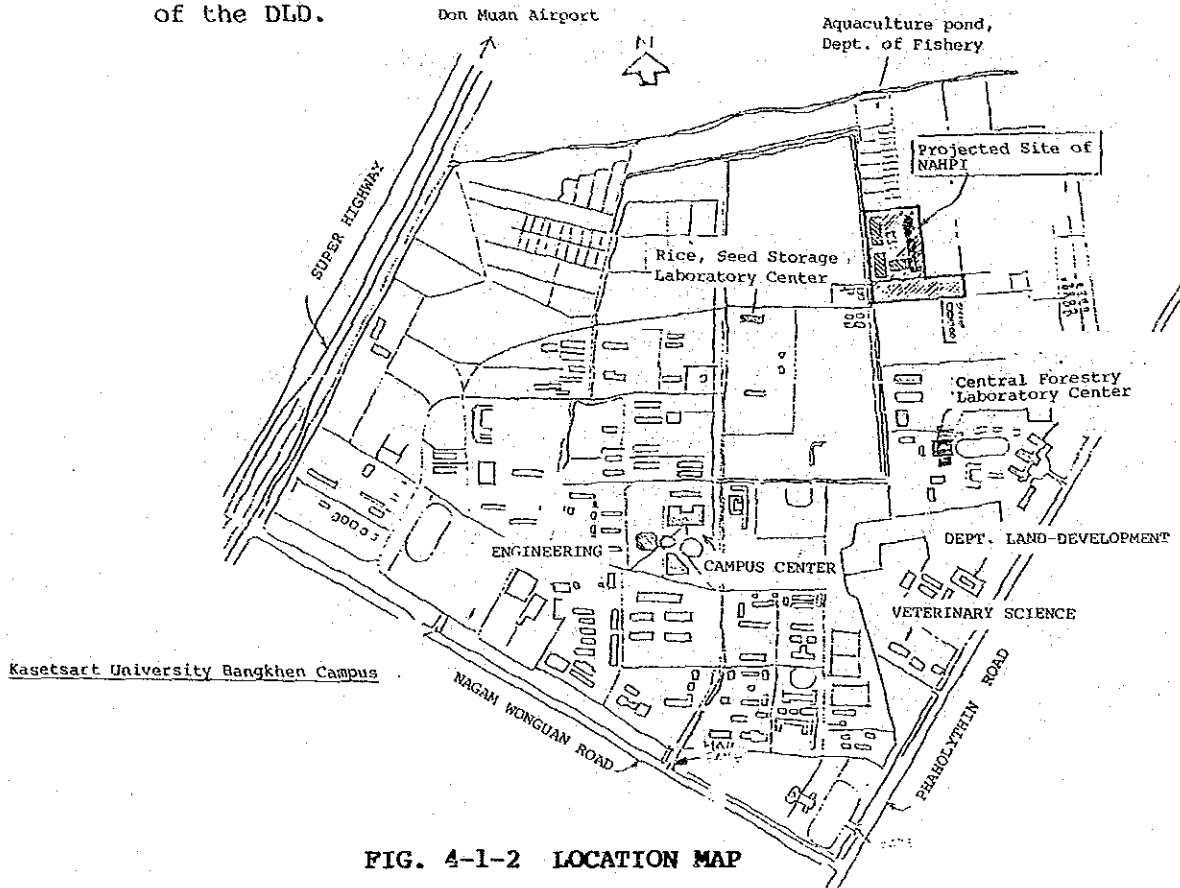


FIG. 4-1-1 MAP OF BANGKOK

This fallow land adjacent to the south side of the Pig Breeding Station is scheduled to be transferred from the Department of Agriculture to the DLD. Preceding the official disposal and measurement of the land, the transfer was guaranteed by a letter of approval from the Director-General of Department of Agriculture addressed to the Director-General of the DLD.





(2) Current Conditions

At the DLD's Pig Breeding Station site, there are two pigsties, one feed storehouse and one office building. These facilities are scheduled to be moved to Tabu Kuan Breeding Center in Salaburi Province by the time the construction work commences.

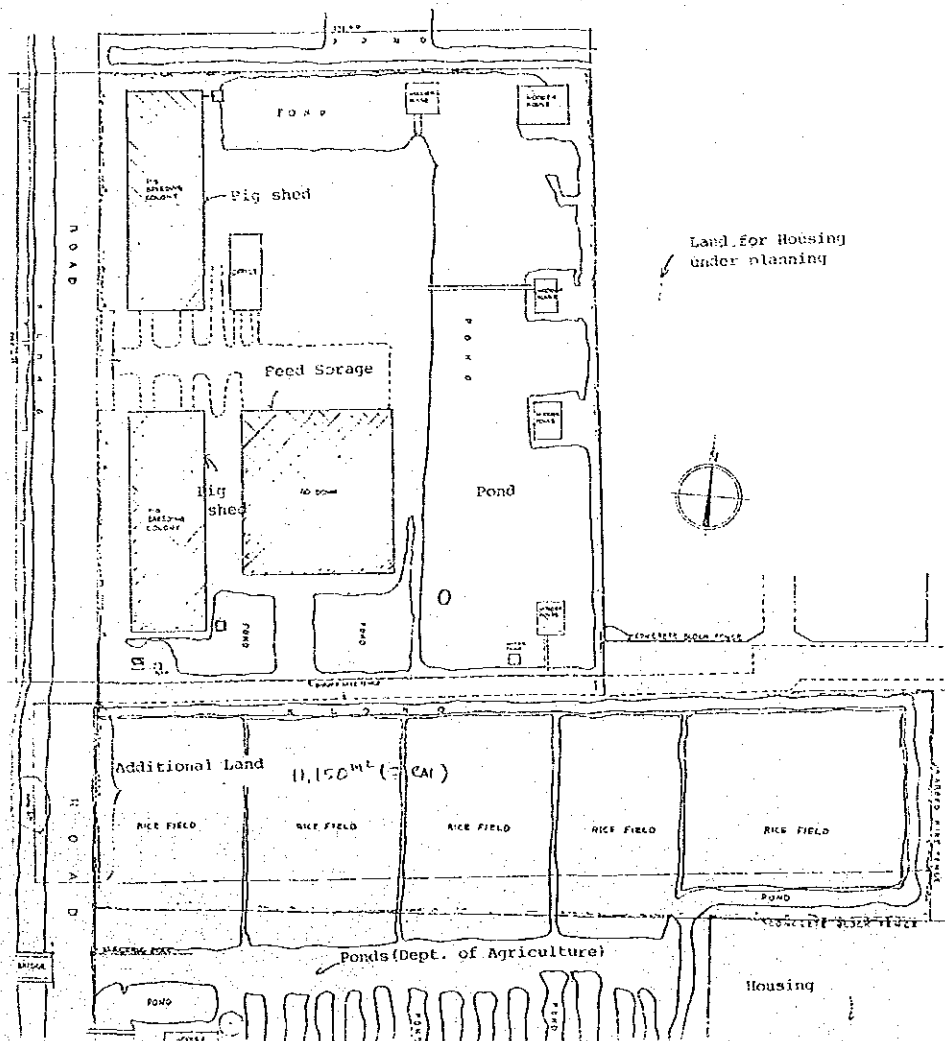


FIG. 4-1-3 CONDITION OF PROJECT SITE

(3) SITE PREPARATION

The area on and around the Project Site is covered by water during the rainy season. This necessitates the filling and grading of the land. After discussions between the two parties involved in the project, it was decided that the Thai Government would carry out the work of filling the land up to a level 50cm higher than the current level of the Pig Breeding Station site. The level of the adjoining land belonging to the Division of Agriculture is about one meter lower than the level of the Pig Breeding Station site, and so about 1.5m of filling will be required. Also, the existing ponds will require partial reclamation, leaving suitable sections for use in the landscape planning of the site.

(4) Boring Test

The Thai Government will perform two boring tests without delay in order to acquire the basic data in support of the facility design of the Project.



PHOTO 4-1-1 PROJECT SITE

#### 4-1-2 Infrastructure Around the Project Site

##### (1) Electrical Power

A 12,000-volt high-voltage wire provides the electrical power for the existing facilities via a 100 KVA transformer. This high-voltage wire leads from the service line of Ngam Wongwan Road from a point near the front gate of the Kasetsart University compound, and supplies some of the facilities inside this compound. This lead-in service line ends near the Project Site. According to the M.E.A. (Metropolitan Electricity Authority), the capacity of this branch service line will be insufficient to carry the additional load imposed by the NAHPI, and therefore increase of the capacity by installation of a new cable will be necessary.

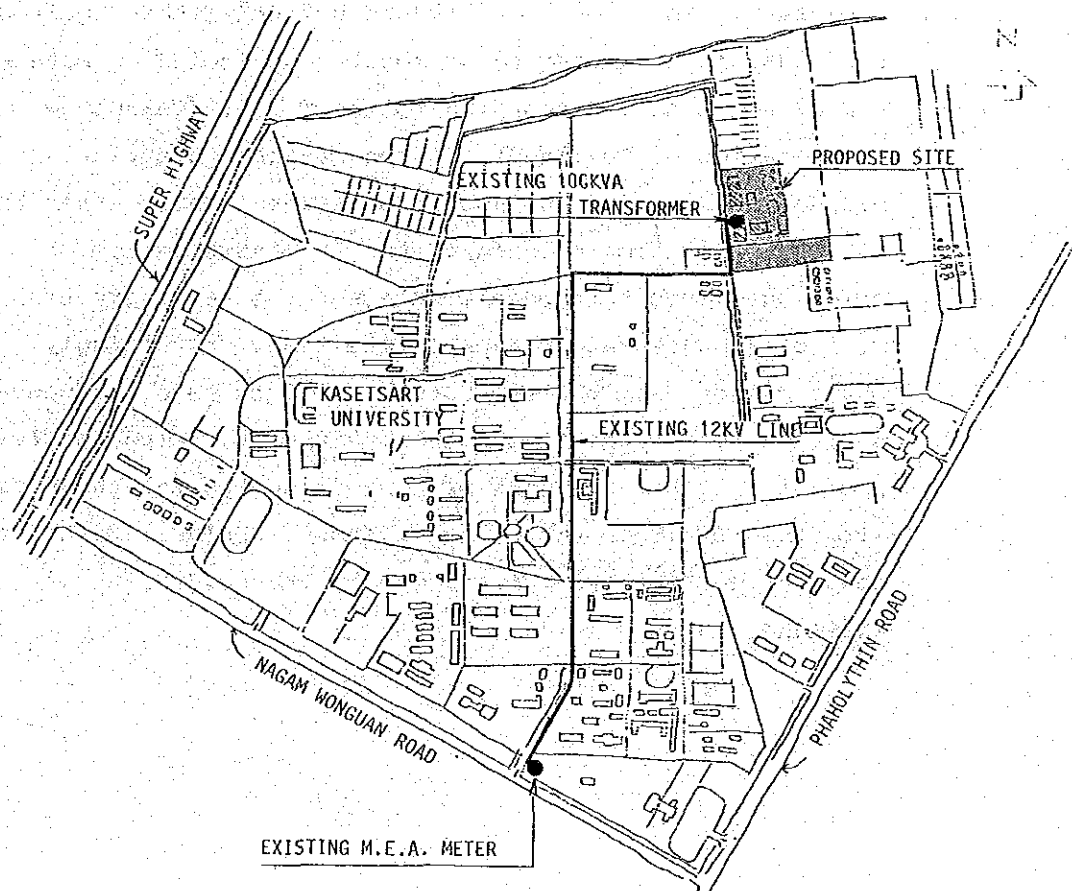


FIG. 4-1-4 EXISTING ELECTRICAL DISTRIBUTION

In addition, there are two procedures for transformer installation - one in which the user carries out the work, and the other in which the M.E.A. performs it at the expense of the user. Usually, either is acceptable, but because this Project requires an increase in transformer capacity, it will be necessary to replace the present transformer at the expense of the user. The Basic Design Team explained to the DLD that the cable replacement works would be within the scope of work of the Thai Government and requested that arrangements for its execution be made with the M.E.A. in the near future.

(2) Telephone Lines

At present, only one trunk line is available for the existing site facilities. To satisfy the requirements of the NAHPI, the installation of new cables of considerable length will be necessary. The number of telephone trunk lines required by the NAHPI is estimated to be about ten, including both main and direct lines. According to the T.O.T. (Telephone Organization of Thailand), in the Bangkok district, it is planned to increase the number of trunk lines. After this year's application procedures for the installation of telephone lines have been completed, the necessary trunk lines will be supplied at an appropriate time. Accordingly, the Basic Design Team has requested to DLD to take the necessary measures for application within this year. Also the Team pointed out that the work of connecting the telephone cables with the MDF (Main Distribution Frame) would be within the scope of works to be carried out by the Government of Thailand.

(3) Water Supply

In order to ensure the potable water supply of 50m<sup>3</sup>/day required for the existing Pig Breeding Station, a deep well was bored, but the main pipes leading from it have a high iron and manganese content, and so water treatment facilities will be required for the NAHPI. There are no city water lines around the Site, but a main pipe system (radius 150mm, depth GL -0.6m, water pressure 1.0kg/cm<sup>2</sup>) is scheduled to be installed.

It was confirmed at the meeting with the Metropolitan Water Works Authority (MWWA) that the total amount of water supplied by the existing well and the newly planned city water lines will suffice for the needs of the NAHPI. The scope of work for the lead-in of city water and of well water, both to be performed by the Thai side, is confined to the installation of piping as far as the water reservoir.

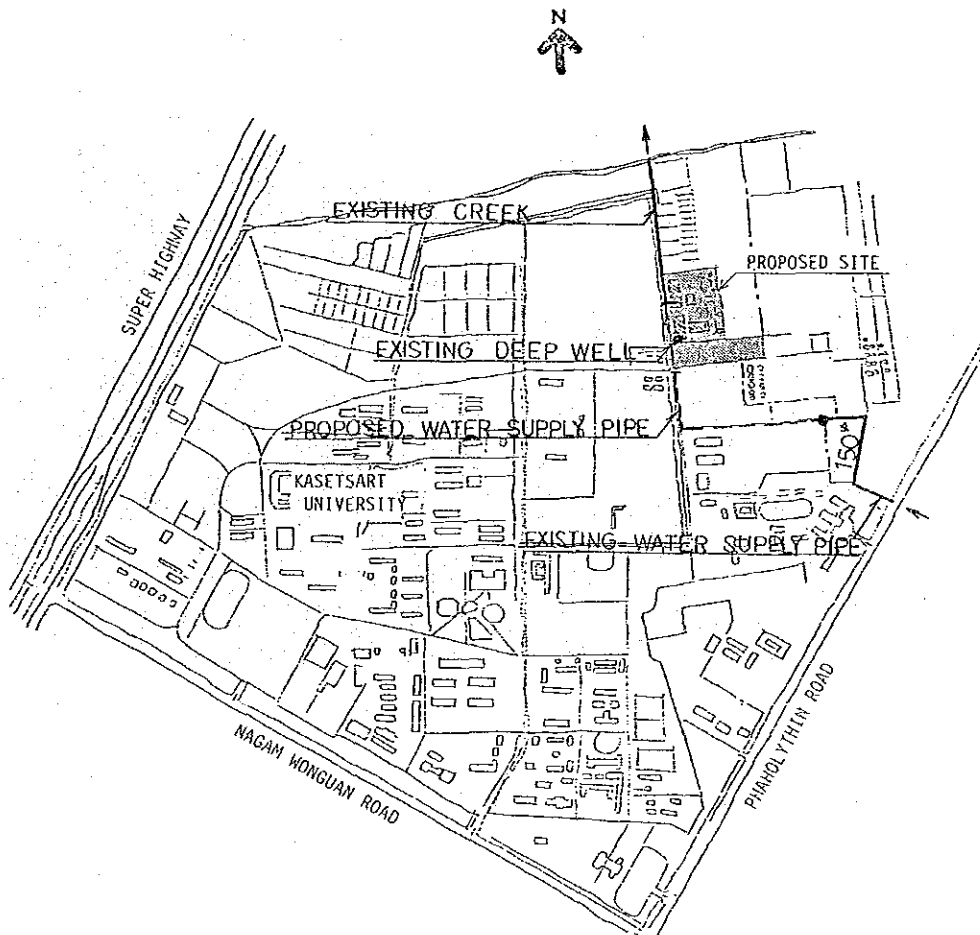


FIG. 4-1-5 EXISTING WATER SUPPLY

(4) Drainage

At present, there are no drainage facilities at the Site, and waste water from the existing Pig Breeding Station is discharged into the nearby waterway and ponds.

The water drainage regulations for manufacturing plants are set out in the Factory Act currently in force. However, legal control does not yet extend to research facilities, and so it was confirmed with the DLD that waste water would be treated by drainage water treatment facilities until the BOD was below 90 ppm, and would then be discharged into the nearby waterway.

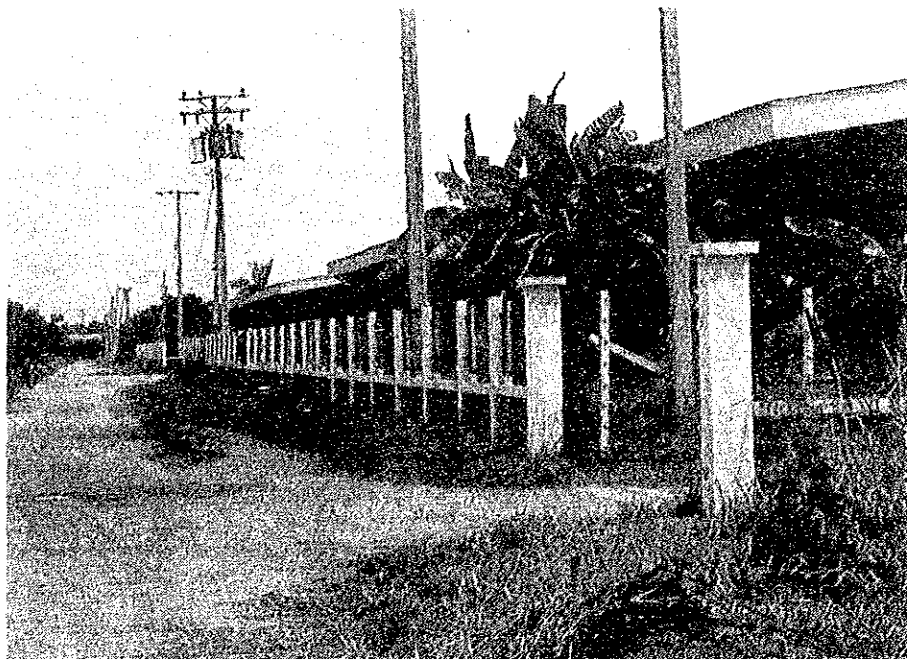


PHOTO 4-1-2

## 4-2 Basic Principles

### 4-2-1 Basic Design Policies

As described in 3-1, Objectives of the Project, the Project for establishing the NAHPI was drawn up for the purpose of effectively implementing research work for technical improvement, development, and provision of service activities in the fields of animal health and animal production. The Basic Design Team has gained a clear understanding of the background, circumstances, objectives and functions of the Project and has drawn up the Basic Design both in accordance with this understanding and following the policies laid out below so that the facilities and equipment may be used with the maximum effectiveness and convenience.

- (1) To plan a research facility taking into account the importance and urgency of research activities, principally in the direction of technical improvements and developments in animal disease prevention so as to ameliorate animal health conditions in Thailand.
- (2) To take into account, in the design, both the background and the present situation in this field in Thailand, as well as the projected organization of research activities.
- (3) To design a facility in which the Virology, Bacteriology, Pathology, Parasitology and Biochemistry Sections are able to carry out their research activities with ease for the development and improvement of animal disease diagnostic techniques and of disease appraisal in the central region of the Kingdom of Thailand.
- (4) To produce a facility in which the Sections mentioned in (3), above, are able to perform research leading to the development and improvement of biological products for veterinary use, to

the improvement of quality and safety of inspection techniques, and the development and improvement of testing technology for feed and animal products.

- (5) To establish an institute conforming to the master plan of Kasetsart University and in harmony with the surrounding conditions, with regard to the fact that the Site is situated inside the Kasetsart University campus and that certain research facilities of the DLD are located near the Site; and also to make full allowance for existing facilities, ponds and obstacles on the Site.



#### 4-2-2 Outline of the Project

Project Name: National Animal Health and Production Institute (NAHPI)

Objectives: Establishment of an institute to carry out research and related services in the field of animal health and animal production.

Research and related activities:

- a. Research related to animal disease surveys and diagnosis; to testing of the quality of feeds and animal products; and to the development and assay of biological products for veterinary use.
- b. Service activities connected with surveying and diagnosis of animal diseases.
- c. Collection, analysis and distribution of information in the role of a national center.
- d. Training of animal health personnel
- e. Technical cooperation with related organizations in the DLD.

Executing Agency: Department of Livestock Development (DLD)

Project Site: Kasetsart University campus, Bangkok, Kingdom of Thailand

Site Area: Approximately 34,150m<sup>2</sup> (22rai)

<u>Outline of Facilities:</u>	<u>Floor area</u>
1. Laboratory Building, four stories, reinforced concrete .....	5,085m <sup>2</sup>
2. Animal Experiment Building, one story, reinforced concrete .....	1,038m <sup>2</sup>
3. Training and Administration Building, two stories, reinforced concrete .....	1,921m <sup>2</sup>
4. Connecting Corridor, two stories, reinforced concrete .....	200m <sup>2</sup>
<hr/>	
Total area	8,244m <sup>2</sup>

Other Installations: Sewage treatment facilities, oil tank, etc.

Outline of Finishes, Exterior

- a. Roofs: Rooftiles, partially waterproof mortar
- b. Walls: Ceramic blocks, partially ceramic tiles
- c. Floors of balconies: Waterproof mortar
- d. Doors and windows: Aluminum sashes (electrolytically colored)

Outline of Finishes, Interior

- a. Floors: PVC sheeting (long size), partially terrazzo polished at site
- b. Walls: Mortar finished with paint, partially asbestos and painted calcium silicate board
- c. Ceiling: Calcium silicate asbestos, painted
- d. Doors and windows: Wooden, painted

Equipment Outline

- a. Research equipment
- b. Animal experiment equipment
- c. Training equipment
- d. Equipment for other purposes

#### 4-2-3 Facility Size

##### (1) Determining the Size of the Facilities

On the basis of the conclusions of the Basic Design Study of research activities, research areas, room names, staffing, and experimental and research equipment required, and with reference to data on research activities in individual fields and comparative studies of similar facilities in Japan, the following figures were obtained in an assessment of the sizes and scales of the various NAHPI facilities.

Category of Facility	Research Unit & Facilities & Workers	No of Researchers incl. Assistant	Proposed Floor area (m <sup>2</sup> )
Research Laboratory	(1) Bacteriology section	33	422.5
	(2) Virology section	30	422.5
	(3) Parasitology section	28	422.5
	(4) Pathology section	22	422.5
	(5) Biochemistry section	48	845.0
	Sub-Total (1) - (5)	161	2,535.0 *1
	(6) Wash-up & sterilizing	Assigned from	
	(7) Central supply	Administration	475.0 *2
	(8) Cold storage		
	(9) Animal Experiment Building		
	• Small animal unit	Activities by Research staff	300.0
	• Cattle and pig unit		150.0
	• Poultry unit		90.0
	• Isolation unit		300.0
	• Autopsy Incenerator, worker's unit including normal animal unit		162.0
	Sub-Total (9)		1,038.0 *3
	Total *1 + *2 + *3		4,048.0
Training & Administration		74	1,282.8
Utility Service	Mechanical, Electrical Service		585.0
Others	Corridor stairway, P.S. toilet, covered way etc.		2,328.2
GRAND TOTAL		235	8,244.0

TABLE 4-2-1 PROPOSED FACILITY SIZE

(2) Determining the Numbers of Stories of the Facilities

Based on a study of the intended function of the facilities and on the size of the project, the following points were taken into account in determining the number of floors each planned building should have.

The Project site has an area of 34,000m<sup>2</sup>, which is rather small for this type of facility, so the Laboratory Building, the main facility of the Institute, should have the maximum number of floors, but at the same time, the limitation of four stories that applied in this area must be observed.

The Animal Experiment Building has been planned as a single-story building for the following reasons: It must have direct access to and from the outside for animals, and each laboratory unit within it must have not only at least one external wall, but also direct access to the roof for mechanical installations such as exhaust fans and ducts.

From the viewpoint of the functions and circulation of the Training and Administration Building, a two-story building represents the optimum design and the most economical structure for it.

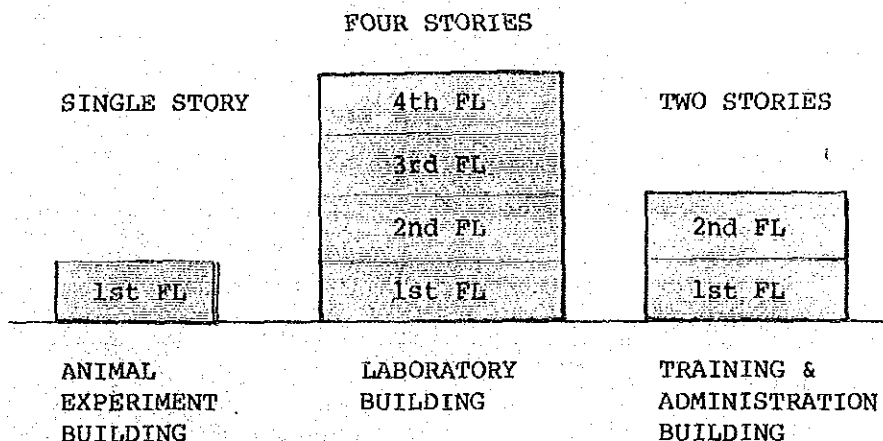


FIG. 4-2-5 NUMBER OF STORIES OF EACH BUILDING

4-3 BASIC DESIGN

4-3-1 Block Layout

(1) Access road to the Project Site

The Project site is located in the north-east portion of the Kasetsart University Bangkhen campus. It is already provided with an access road leading northwards from the University's Main Gate, which faces Ngam Wongwan Road, along the main campus road, and splitting into route A and B as shown in the map, before finally uniting and passing the entrance to the Site. The distance from the University Main Gate to the Site is approximately 1,500 meters. The generally used route is route A, because there is a bridge that is impassable for vehicles on route B.

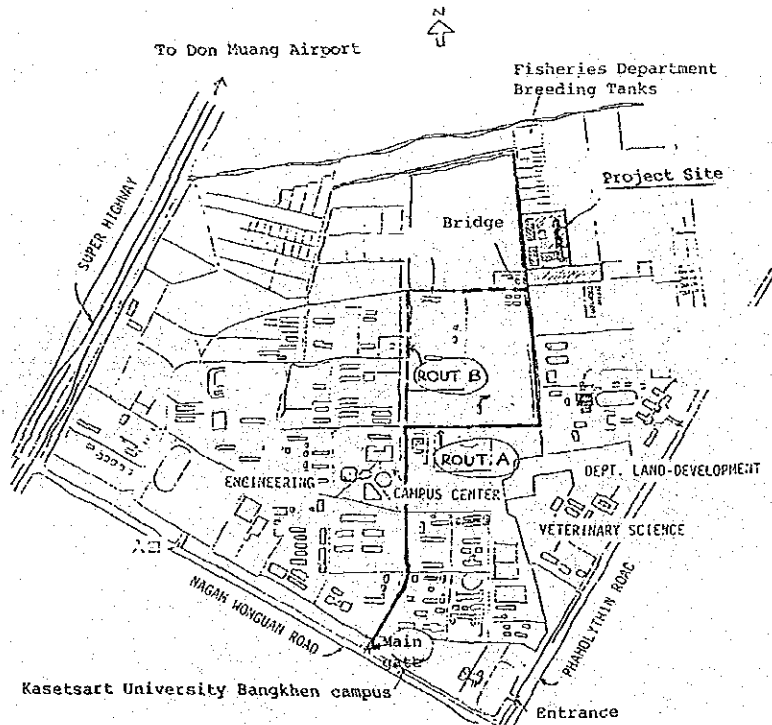


FIG. 4-3-1 ACCESS ROAD

(2) Site Preparation

As has been stated (in Section 4-1-1), the Project Site is at present occupied by the Pig Breeding Station, but includes an expansion to the south into what is currently paddy land 7 rai in area. Site preparation of both sections is required. The present Pig Breeding center has two Pig Breeding Colonies, one Go-down for feed, an office building and five houses, but it has been decided that these will be removed by the Government of

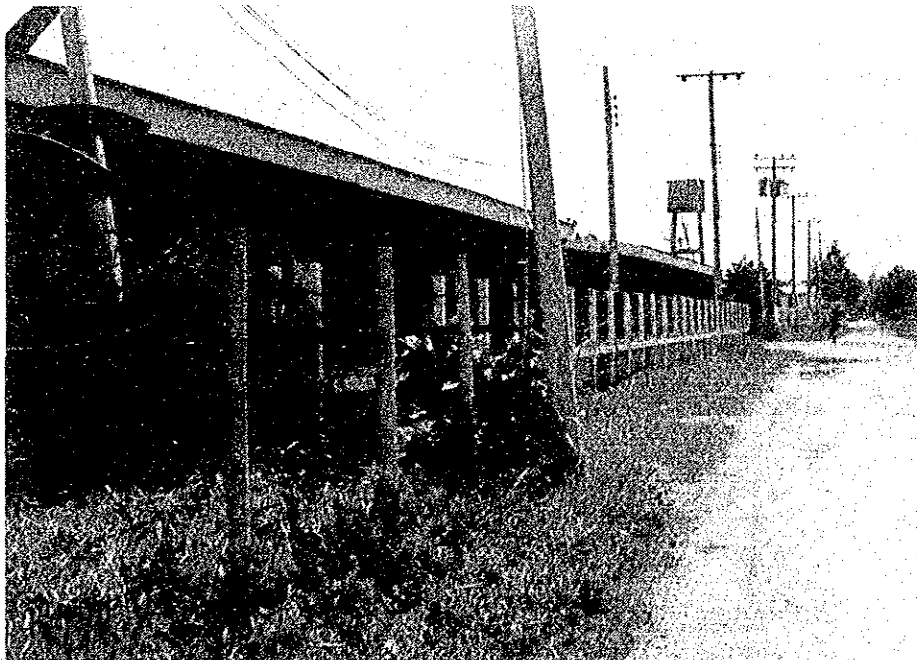


PHOTO 4-3-1 ACCESS ROAD

the Kingdom of Thailand before construction work on this Project begins. In addition, two elevated water tanks, the surrounding fence and other facilities are also to be removed. There is also a pond on the Site, which is to be partly filled in for site planning purposes. The remaining pond area will be left in order to separate the new facilities from the neighboring housing development on the east side, and will play a part in site drainage plans.

The extension of the Site towards the south will cover what is now fallow paddy land, which is approximately 1,200mm below the level of the current Pig Breeding Station site. It is planned to carry out earthfilling both of these 7 rai of paddy fields and of the Pig Breeding Station land to raise the levels until the entire Site is 50cm above the level of the present Station site. A footpath will be built along the southern border of the extension, and it is planned to erect a fence on the inner side of this footpath.

Site preparation work other than the above is to be performed by the Government of Thailand, and all other work of the project - construction and external work - is to be carried out by the Japanese side.

(2) Site Preparation Plan

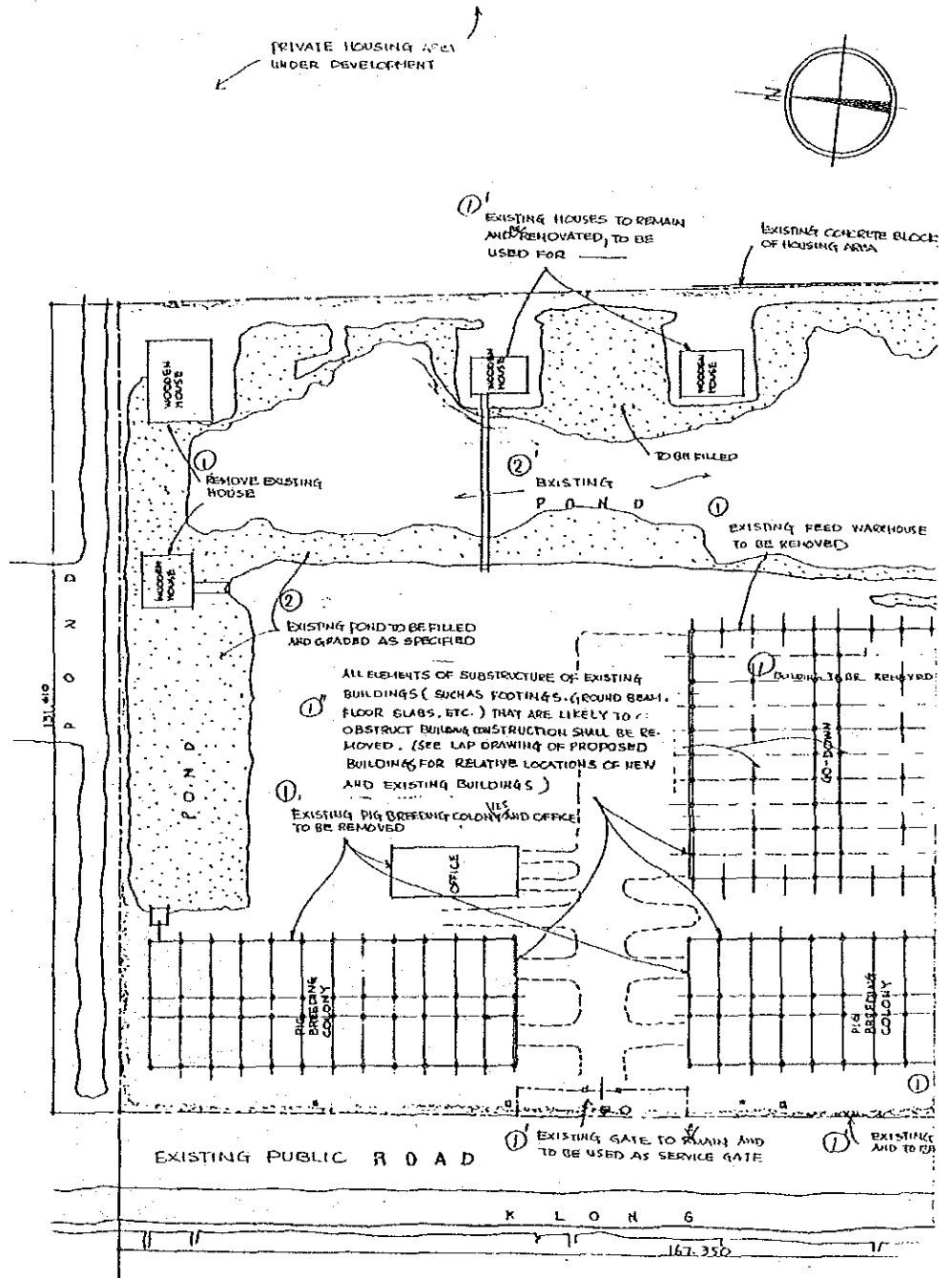
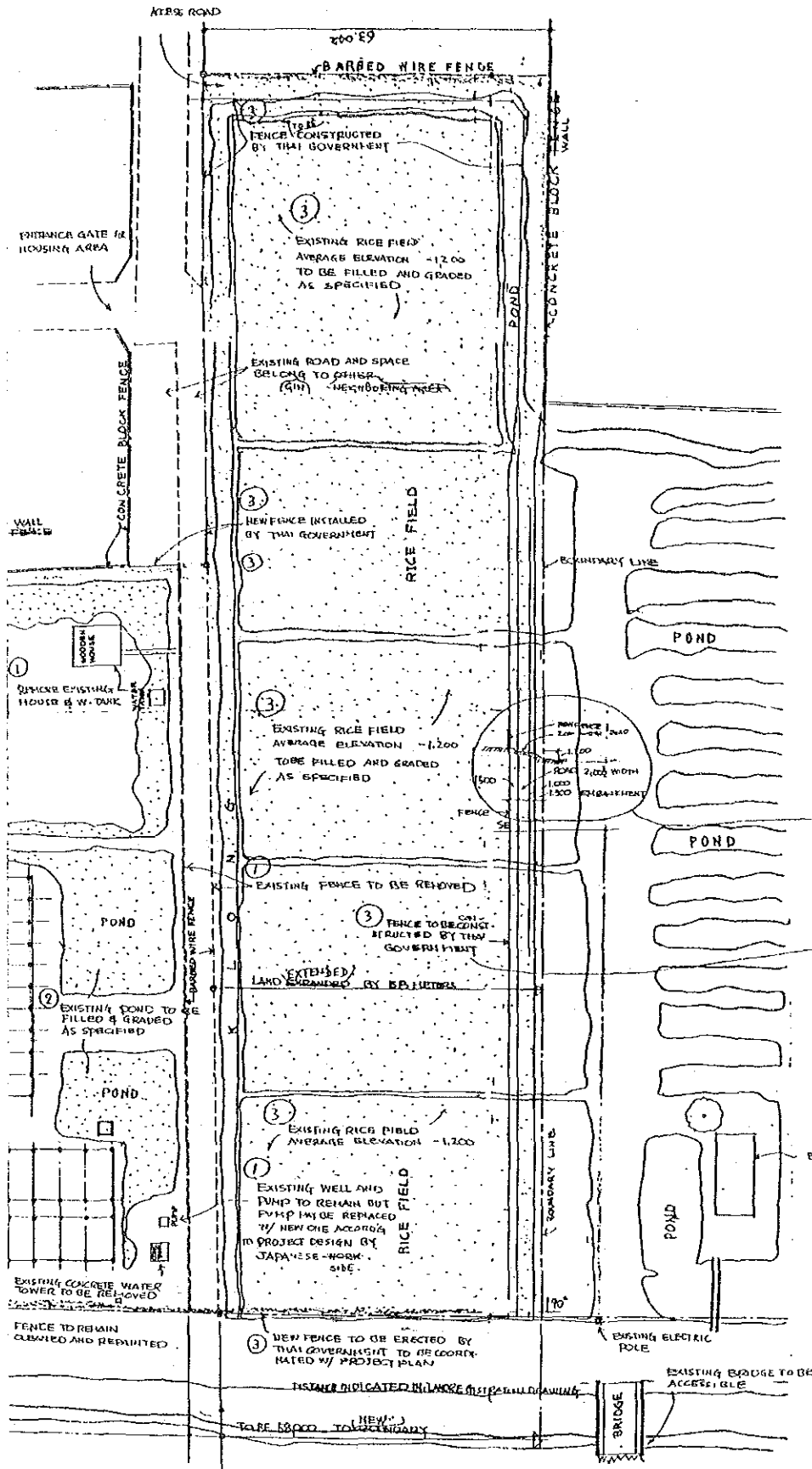


FIG. 4-3-3 DRAWING OF SITE PREPARATION WORK





LAND BELONGS TO DEPARTMENT OF AGRICULTURE HOAC

TO BE DELETED  
DEC 24 1984

ADDITIONAL NOTE  
FENCE TO BE MOVED TO  
BOUNDARY LINE  
LEGENDS

AREA TO BE FILLED AND GRADED  
UP TO ELEVATION SPECIFIED

EXISTING ROUTE

PLAN OF  
SITE PREPARATION WORK TO  
BE PERFORMED BY THAI GOVERNMENT  
PREPARED BY B.D. JEAN-1  
OCT 11 1984  
REV 1 NOV 16

2

### (3) Layout of Facilities

The facilities will be divided according to their various functions between the Research Section and the Administration Section (including training and information). The Research Section will be further divided into the Laboratory Building and the Animal Experiment Building. The resulting three facilities will be arranged so that the Laboratory Building is in the center, the Animal Experiment Building in the northern part, and the Training and Administration Building in the southern part, of the Site, as described below.

- 1) The Laboratory Building, which has the greatest floor area, forms the principal building of the NAHPI, and is therefore placed in the center of the site. It has been located some distance away from the main access road passing the west side of the site so as to allow space for future expansion of the facilities. On the east side, this building will face the existing pond, mentioned under 4-3-1 (2) Site Preparation, and will be separated by it from the eastern border of the Site. The current Pig Breeding Station (to be removed) is served by a road and an entrance - exit gate which will be left to perform a useful function as the normal access route to the Laboratory Building service facilities, and this was also taken into account in planning the location of the building. The first floor will house the infrastructure and energy facilities of the Institute, such as electric power equipment, water supply and drainage facilities, and so on, so that these may be located centrally on the site.
- 2) The functions required of the facilities of the Animal Experiment Building demanded its separation into independent wings that house the Small-animal Unit, the Cattle and Pig Unit, the Poultry Unit, the Isolation Unit, the Autopsy Unit, and the Incinerator Unit. These

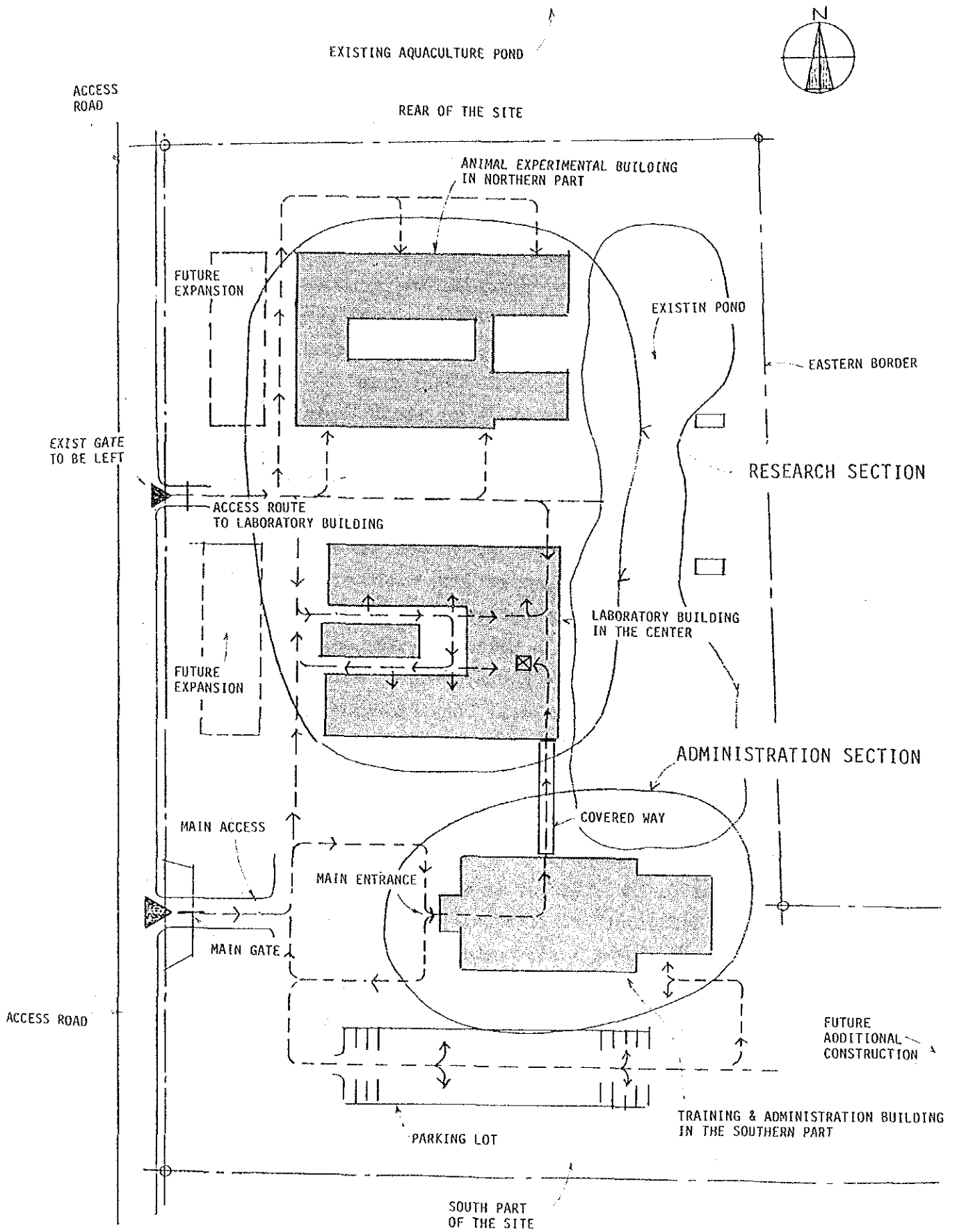


FIG. 4-3-4 LAYOUT OF FACILITIES

facilities will stand at the northern, or rear, end of the site. The neighboring area to the north is covered by aquaculture ponds and therefore will not become occupied by housing or other buildings in the foreseeable future, and so this northern part of the site is ideal for the type of facilities planned. To the west, between the building and the boundary made by the road, there is space that can be left for the future construction of further facilities.

- 3) At the front, or south, of the site is the Training and Administration Building. It is ideally situated to act as the main entrance and reception area for the entire NAHPI. The Main Gate of the Institute will be built near the south end of the Site and will open onto the main access road on the Site's western border. This gate will provide direct access, across a suitably wide approach area, to the lobby of this building. The unoccupied area around the Training and Administration Building has been left for any future additional construction that may be required by the Thai Government.

The arrangement of the new buildings is such that the area covered by the existing pond has been avoided. It is considered that, even if the pond is filled and its level is further raised, it will not be possible to obtain sufficient stability with foundation piles to support a building of a reasonable size.

## 4-3-2 Architectural Design

### (1) Planning

In accordance with the planned arrangement of facilities described above, an organic layout design of the Research Laboratory Building has been prepared, centering around the five laboratories (virology, bacteriology, parasitology, pathology and biochemistry) in which the principal activities of the NAHPI will take place. As the diagram below (Fig. 4-3-5) shows, the layout of this building is shaped like a squared-off letter "U" composed of three wings, A, B and C. The research laboratories will be housed in Wings A and B, and Wing C will accommodate facilities utilized in common by all users of the building, such as stairways, toilets, elevators and corridors. The yard between Wings A and B will in general be used as a service yard for receipt and dispatch purposes in relation to utility services.

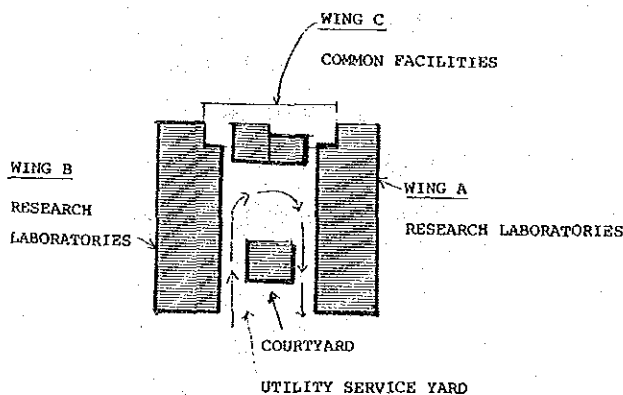


Fig. 4-3-5

On the basis of such considerations as the site area available, the Research Laboratory Building has been designed as a 4-story structure (See p.67). As a result of the examination (described above) of the proposed scale of the facilities, it has been possible to plan suitable areas both for the structure as a whole and for each of the research laboratories. The research laboratories will be arranged as indicated below (Fig. 4-3-6)

	<u>Wing B</u>	<u>Wing A</u>
4th Floor	Virology Laboratories	Bacteriology Laboratories
3rd Floor	Parasitology Laboratories	Biochemistry Laboratories II
2nd Floor	Pathology Laboratories	Biochemistry Laboratories I
1st Floor	Electrical Service Room, Central Supply and Distribution Room	Mechanical Service Unit, Wash-up and Sterilization Unit

General and common-use facilities have been located on the first floor.

RESEARCH LABORATORY UNIT

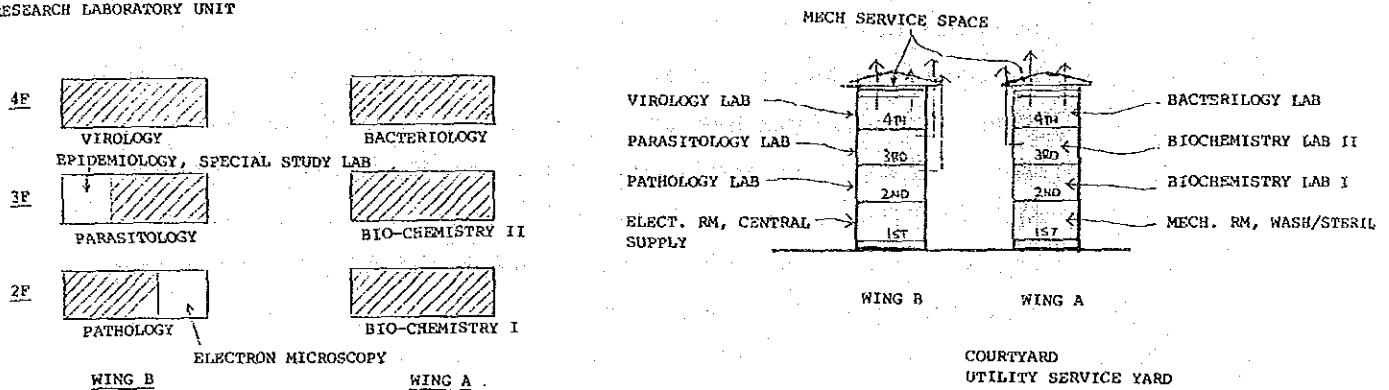


FIG. 4-3-6

Each room of the Bacteriology Laboratories, where bacteria and molds are cultured and pathogens will be studied, and the Virology Laboratories, where tissue culture and viral experimentation will be performed, will be independently fitted with HEP filters that will process both the air taken in and the expelled air in order to prevent cross-contamination by microorganisms. In order that exhaust fans and other equipment can be installed in the attic-type space immediately above, the Bacteriology and Virology Laboratories have been located on the top, or 4th, floor.

The various research activities planned in the Biochemistry Laboratories have been roughly divided into two sections: (1) toxicology, clinical biochemistry and immunology, and (2) feed quality and safety. In view of the large amount of equipment required and of the large number of staff (48), it was considered that the Biochemistry Laboratories would require space on two floors, and the above activities have accordingly been split between the 2nd and 3rd floors.

The Parasitology Laboratories, on the 3rd floor of Wing B, will be the site of research on endoparasites, ectoparasites, protozoa and zoonoses, and will also include an Epidemiology Room and a Special Study Laboratory.

In the Pathology Laboratories (2nd floor, Wing B), research in the fields of mistopathology, clinical pathology and immunopathology will be conducted; there will be an F.A. Room and a Specimen Room; and two common-use rooms, the Photography and Electron Microscopy Rooms, will also be included.

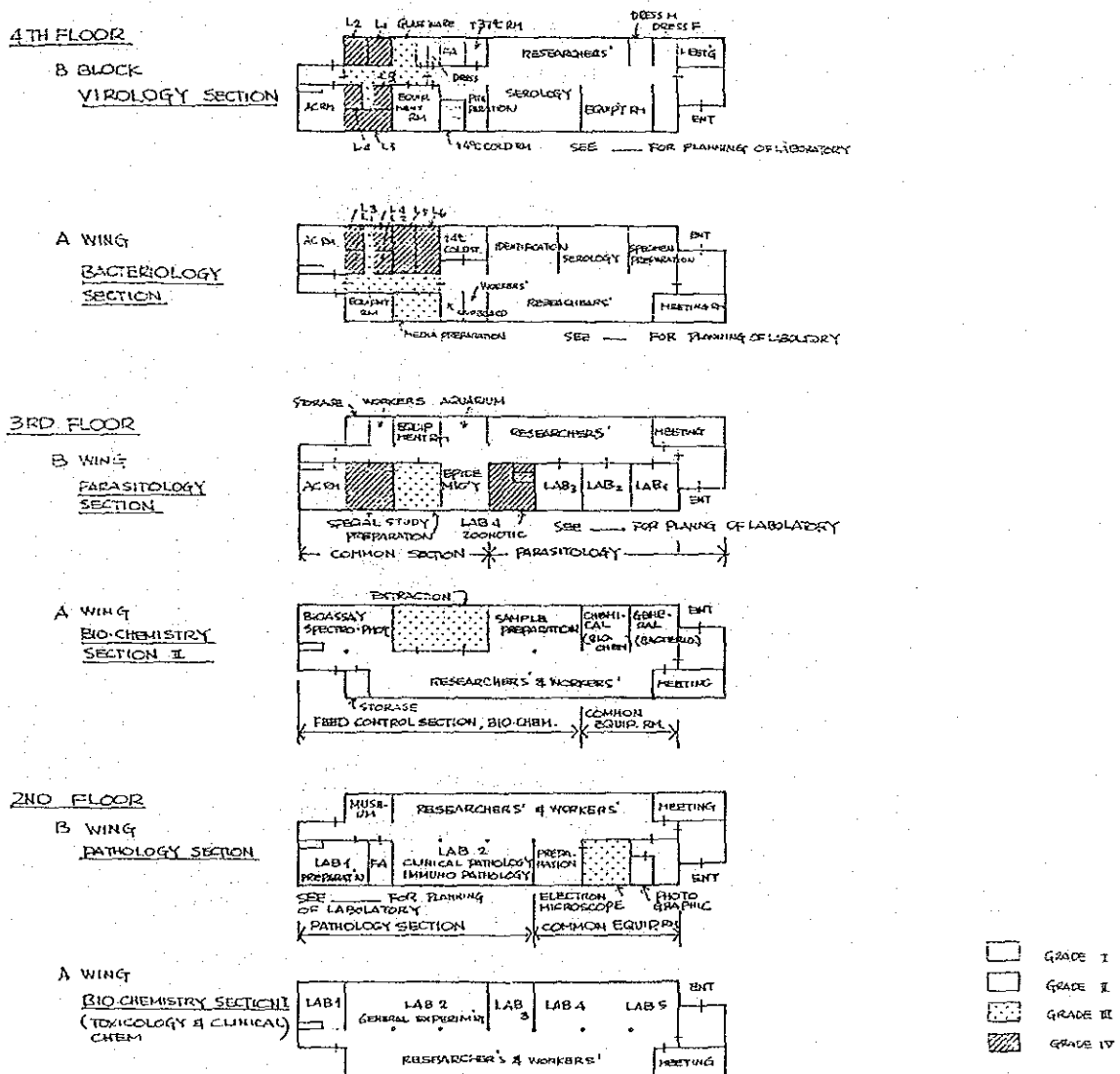


FIG. 4-3-9 GRADING OF RESEARCH LABORATORY AREA

The Units of the Animal Experiment Building, which are designed for experiments related to infectious disease organism, have been divided up according to the types of animals for which they are employed, as follows:

the Small-animal Unit, for rabbits, guinea-pigs, etc.; the Cattle and Pig Unit, for larger animals; and the Poultry Unit. In addition, there will be separate Isolation Units, one for cattle and pigs, and one for poultry and small animals. An autopsy Unit will be provided as a common-use area for both diagnostic services and autopsies on tested animals on special occasions. In addition, an Incinerator Unit will be built for the incineration of tested animal corpses, materials received from elsewhere for diagnostic services and contaminated feed and litter.

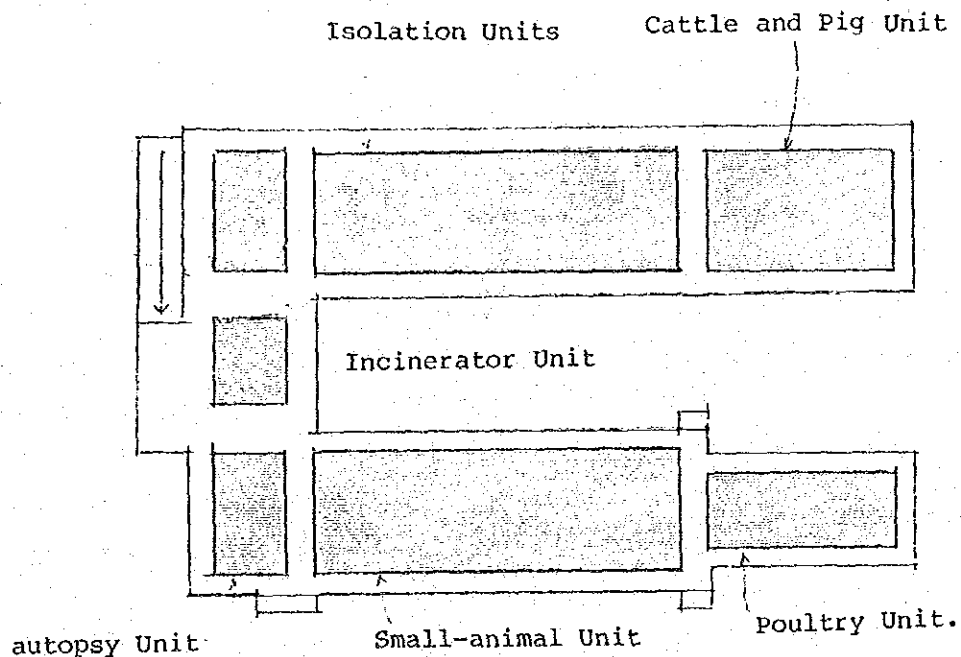


FIG. 4-3-10 ANIMAL EXPERIMENT FACILITIES



In the Training and Administration Building, the first floor has been reserved for administrative activities, and the second floor as a center for training and information work. The utilization of the two floors will be as follows:

First floor: General Affairs, Planning and Coordination Offices; 100-seat Lecture Room for group training, international technical cooperation and other meetings; etc.

Second floor: Training and Extension Office; 30-seat Seminar Room; Meeting Room; Information Room; Reading Room

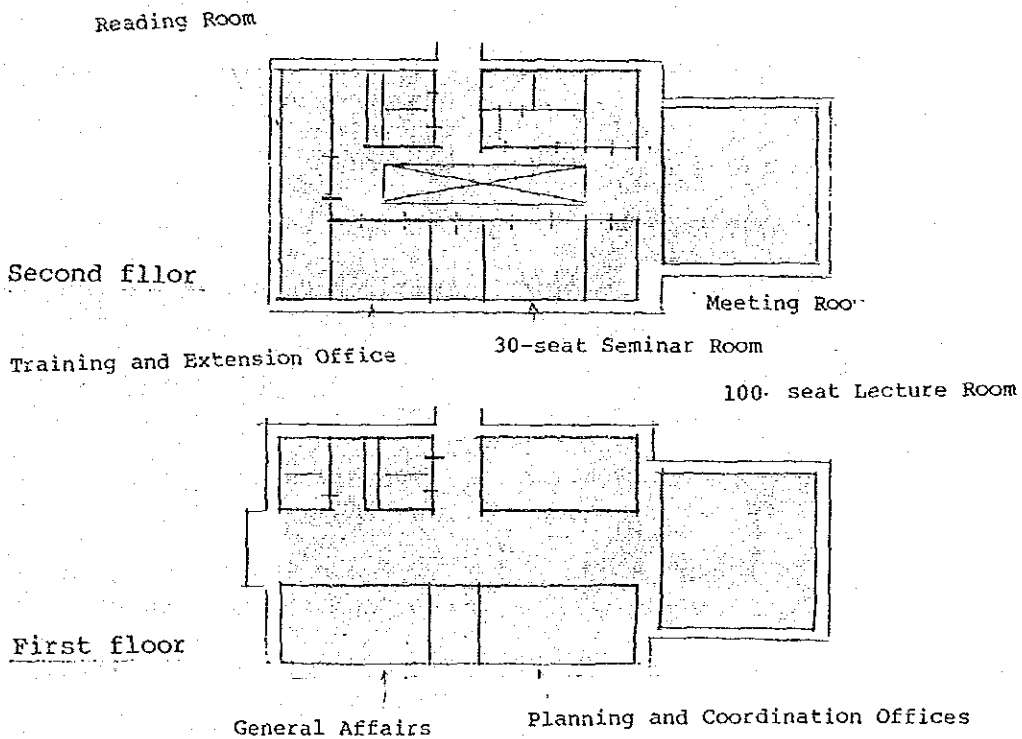


FIG. 4-3-11 TRAINING & ADMINISTRATION BUILDING

The following sections described the planning of all the rooms in each of the three building.

#### 4-3-2 Architectural Design

The design of, and the equipment to be supplied for, each of the rooms in each building are determined according to the activities and functional requirements of the respective rooms.

##### 1. Laboratory Building

###### 1) Bacteriology Section (4th Floor, Wing A)

The activities intended for each laboratory of this Section are as follows:

<u>Room</u>	<u>Activities</u>
1. Laboratories L1-L4	Bacterial culture in conditions designed to prevent contamination by extraneous bacteria
2. Laboratory L5	Cultivation of molds
3. Laboratory L6	Research on pathogenic bacteria of zoonoses
4. Identification Room	Isolation and identification of bacteria
5. Medium Preparation Room	Preparation of culture media
6. Equipment Room	Low-temperature storage of sera and bacteria in freezers
7. Cold storage (+4°C)	Storage for culture media and reagents
8. Serum Reaction Room	Diagnosis and immunological study of bacterial diseases
9. Preparation Room	Preparation of specimens

The detailed list of equipment necessary for the above rooms is given under 4-3-6, Equipment Planning. The projected staffing in the Bacteriology Section is as follows:

Researchers	20 (DVM 10, BS 10)
Assistants	6
Workers	7
<b>Total</b>	<b>33</b>

This section will take care of the Animal Experiment Building.

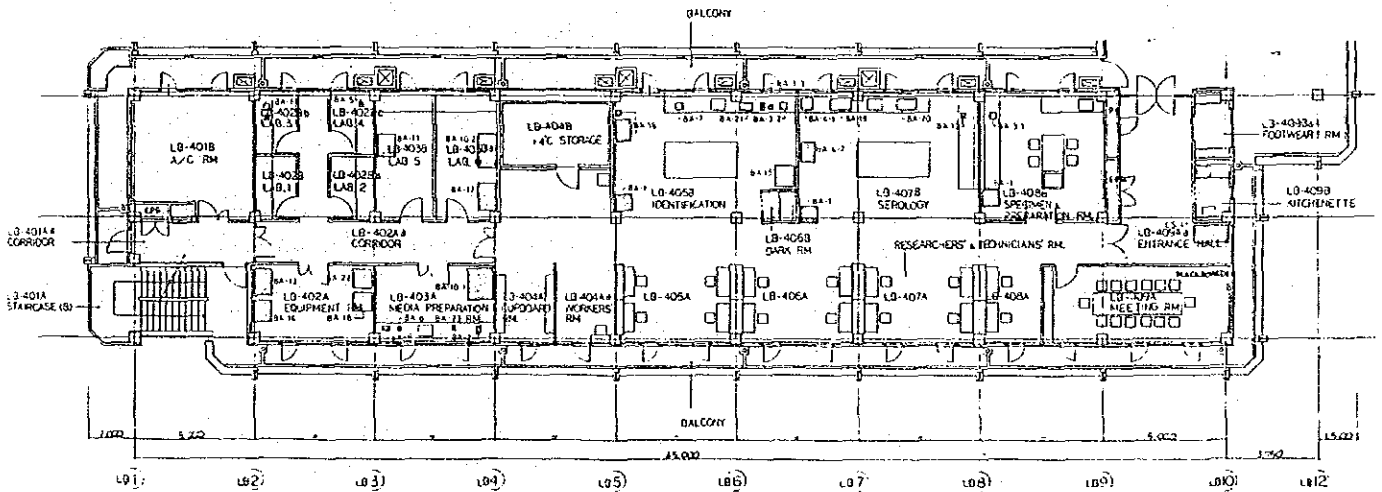


Fig 4-3-12 PLANNING OF BACTERIOLOGY SECTION  
4th FLOOR, WING A

2) Virology Section (4th Floor Wing B)

The activities in each room of this Section are as follows:

<u>Room</u>	<u>Activities</u>
1. Laboratories L1 - L6	Using tissue-cultured eggs, virological experimentation in sterile conditions, avoiding dispersion of viruses.
2. Glassware Room	Temporary storage of sterilized glassware for the use in various areas
3. Preparation Room	Preparation of tissue culture media.
4. Cold Storage (+4°C)	Storage of culture media and reagents.
5. Serum Reaction Room	Identification of and immunological research on various viruses and virus diseases.
6. Equipment Room - 1	Refrigerator storage of viruses and sera; virus cultivation using tissue cultures.
7. Equipment - 2	Purification and condensation of viruses; research on nature of viruses.
8. Incubation room (+37°C)	Tissue culture
9. Fluorescent Antibody Room	Observation with fluorescent antibody staining.
10. Dressing Room	Changing of clothing

A detailed list of the equipment for the above rooms is given in 4-3-6 Equipment Planning.

The projected staffing of the Virology Section is as follows:

Researchers	19 (DVM 10, BS 10)
Assistants	5
Workers	6
<hr/>	
Total	30

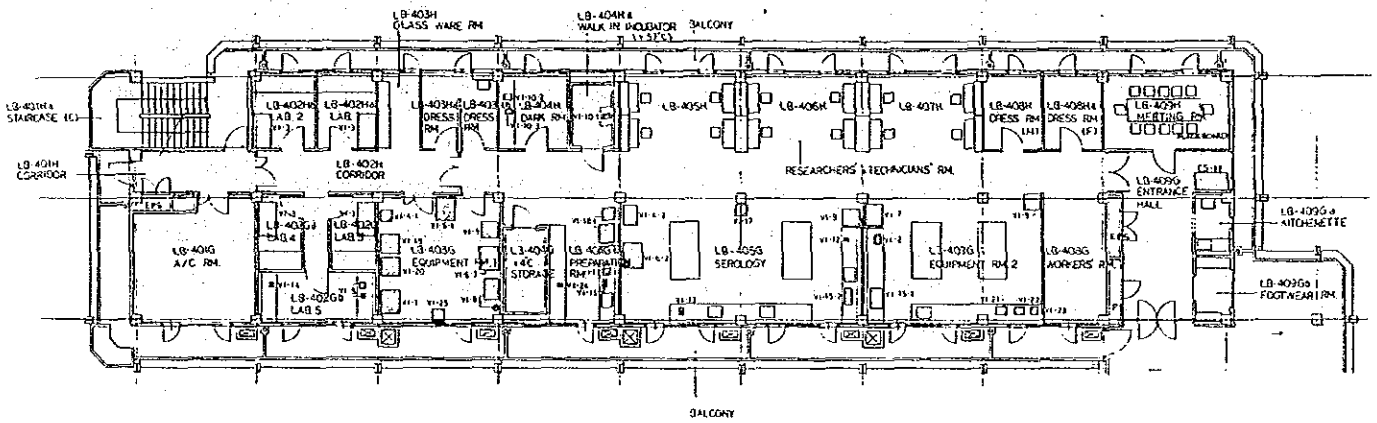


FIG. 4-3-13 PLANNING OF VIROLOGY SECTION  
4th FLOOR, WING B

3) Biochemistry Section - II. Feed Quality Control Group  
(3rd Floor Wing A)

The activities in each room of this Section are as follows:

<u>Room</u>	<u>Activities</u>
1. Laboratory 1	Antibiotic testing, spectrophotometry
2. Laboratory 2	Fat extraction
3. Laboratory 3	Preparation of specimens for measurement
4. Laboratory 4	Electrophoresis: Processing of research data.

The detailed list of the equipment necessary for the above rooms is given in 4-3-6, Equipment Planning.

The projected staffing of the Biochemistry Section is shown under Biochemistry Section I (Page 4-26). Of those personnel, the staff allotted to this section, Biochemistry Section II, are those concerned with feed quality and safety and with common-use equipment, (listed together under "II: Feed quality and safety"). Their numbers are as follows:

Researchers	8
Assistants	6
Workers	3
<hr/>	
Total	17

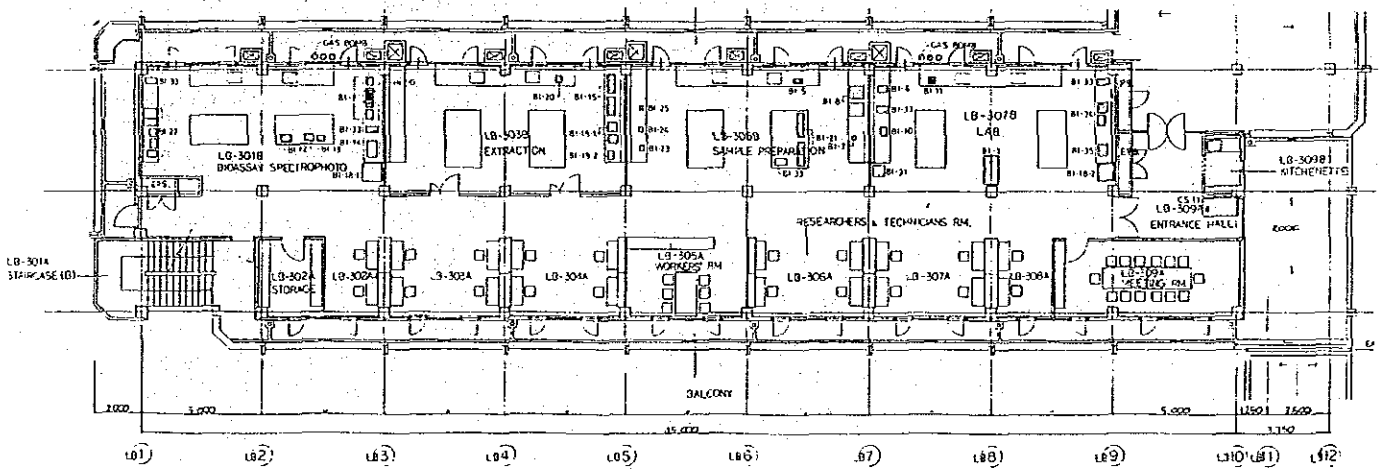


FIG. 4-3-14 PLANNING OF BIO-CHEMISTRY SECTION II  
3RD FLOOR, WING A

4) Parasitology Section (3rd Floor, Wing B)

The activities of this Section are as follows:

<u>Room</u>	<u>Activities</u>
1. Laboratory 1	Research on endoparasites
2. Laboratory 2	Research on ectoparasites
3. Laboratory 3	Research on protozoa
4. Laboratory 4	Research on parasites causing zoonoses
5. Aquatic Animal Room	Research on intermediate hosts
6. Epidemiology Room	Epidemiological research on various infectious diseases in animals
7. Special Study Laboratory	Special research related to parasitology, immunology, pathology, biochemistry, for example, cell culture work requiring sterile conditions.
8. Preparation Room	Preparation of specimens for special research.
9. Equipment room	Preparation of equipment for special research.

A detailed list of the equipment for the above rooms is given in 4-3-6, Equipment Planning.

The projected staffing of this Section is as follows:

Researchers	17 (DVM 8, BS 9)
Assistants	5
Workers	6
<hr/>	
Total	28



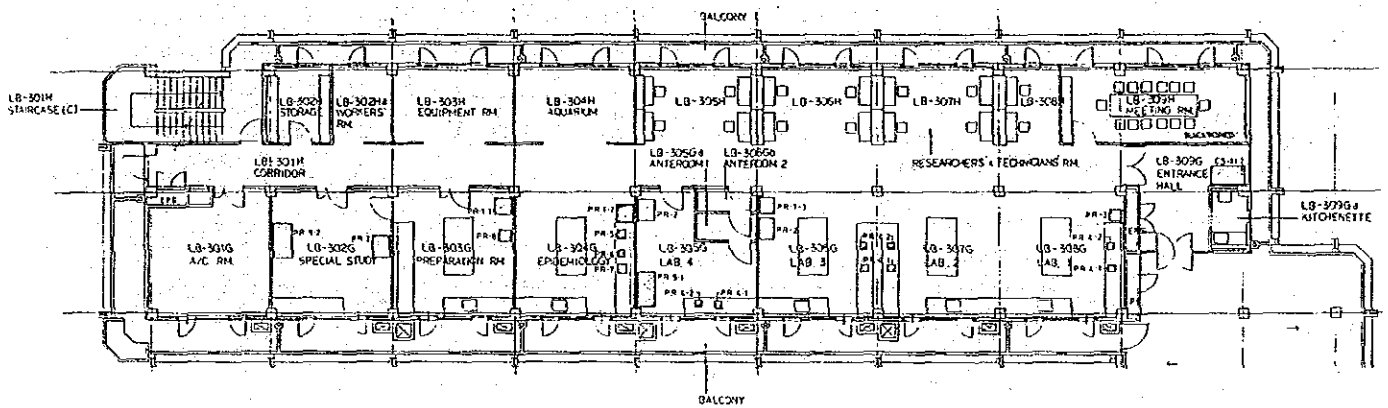


FIG. 4-3-15 PLANNING OF PARASITOLOGY SECTION  
3RD FLOOR, WING B

5) Biochemistry Section I (Toxicology, clinical biochemistry and immuno-chemistry) (2nd Floor, Wing A)

<u>Room</u>	<u>Activities</u>
1. Laboratory 1	Examinations producing corrosive gas
2. Laboratory 2	General biochemistry research
3. Laboratory 3	Analysis and weighing
4. Laboratory 4	Clinical biochemical research
5. Laboratory 5	Immuno-biochemical research

A detailed list of the equipment for the above rooms is given in 4-3-6, Equipment Planning.

The total projected staffing for Biochemistry Sections I and II is as follows:

Biochemistry Sections I and II		I: General			II: Feed quality and safety
Research (D.V.M. 15; B.S. 15)	30	8	7	7	8
Assistants	8	0	1	1	6
Workers	10	3	2	2	3
Total	48	11	10	10	17

(Please also refer to: 3) Biochemistry Section II, page 4-26)

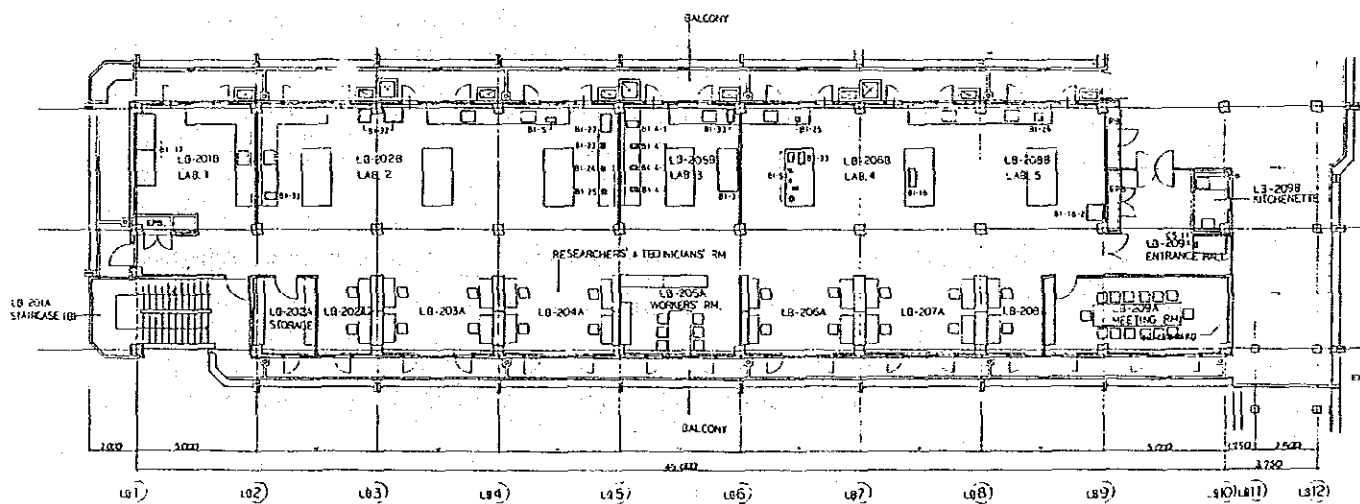


FIG. 4-3-16 PLANNING OF BIO-CHEMISTRY SECTION I  
2ND FLOOR WING A

6) Pathology Section (2nd Floor, Wing B)

The activities in this section are as follows:

<u>Room</u>	<u>Activities</u>
1. Laboratory 1	Preparation of pathology specimens
2. Laboratory 2	Histopathological, clinical pathological and immuno-pathological research
3. Photography Room (Common use)	Photography, developing, slide preparation.
4. Electron microscopy Room (Common use)	Operation of electron microscope
5. Specimen preparation (Common use)	Preparation of specimens for electron microscope
6. F.A. Room	Microscopy using fluorescent antibody method
7. Specimen Room	Storage of pathological specimens

A detailed list of the equipment for the above rooms is given in 4-3-6, Equipment Planning.

The projected staffing of this Section is as follows:

Researchers	14 (DVM 7, BS 7)
Assistants	4
Workers	4
<hr/>	
Total	22

The Photography Room and the Electron Microscopy Room, which house common-use equipment, are under the control of the researchers in this Section. In addition, the Autopsy Unit in the Animal Experiment Building is also managed by this Section.

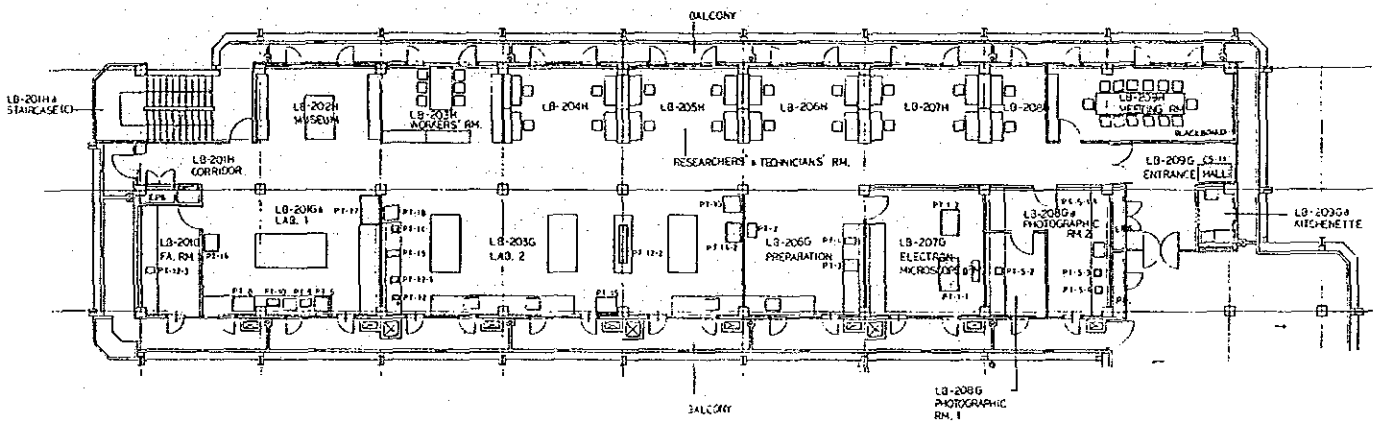


FIG. 4-3-17 PLANNING OF PATHOLOGY SECTION  
2ND FLOOR, WING B

7) Laboratory Building (First floor, Wing A)

The activities carried out in the rooms of Wing A of this building are as follows:

<u>Room</u>	<u>Activities</u>
1. Mechanical Service Room	Storage of various machines for use in research and experimentation
2. Wash-up and Sterilization Room	For washing and sterilization of equipment used in research and in experiments

For details of the equipment required on the first floor, Wing A, of the Laboratory Building, see 4-3-6 Equipment Planning.

The planned staffing of the first floor, Wing A, of the Laboratory Building will be as follows:

Mechanical Service Room	4 persons (staff stationed in workshop on first floor, Wing B)
Wash-up and Sterilization Room	5 persons

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Total 9

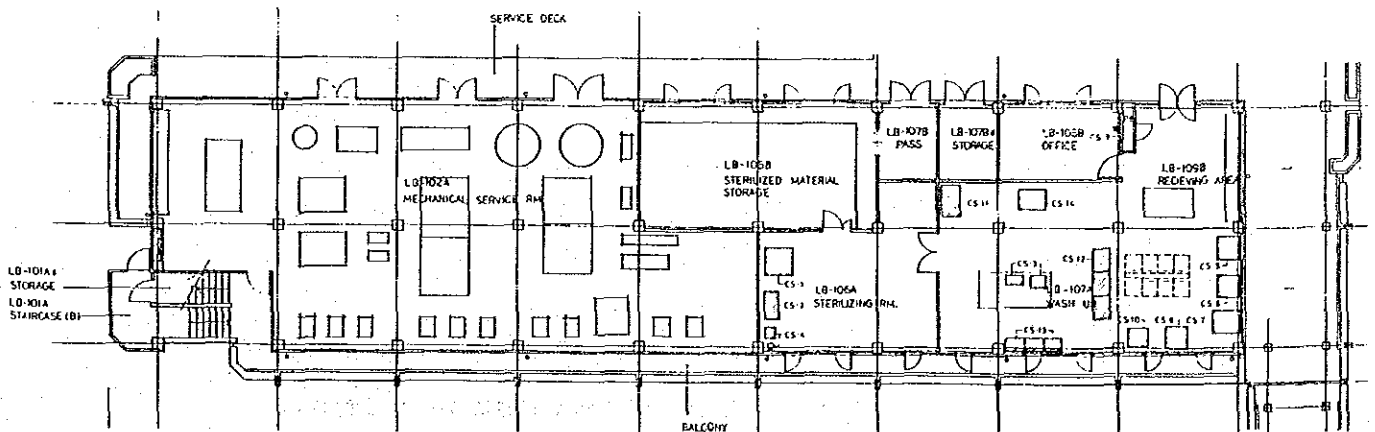


FIG. 4-3-19 PLANNING OF FIRST FLOOR, WING A

8) Laboratory Building (First floor, Wing B)

The activities to be carried out in the rooms of Wing B of this building are as follows:

<u>Room</u>	<u>Activities</u>
1. Electrical Service Room	High-voltage transformers and distribution boards supply electricity to all parts of the NAHPI.
2. Workshop, Storage Room	Maintenance, inspection and repair work for the entire Institute, and storage of related equipment
3. Central Cold Storage Room	Cold storage of testing materials for use in research and experimentation
4. Central Supply and Distribution Rooms	Supply of linen, chemicals and apparatus for use in research and experimentation

For details of the equipment required on the first floor, Wing B, of the Laboratory Building, see 4-3-6 Equipment Planning. The planned staffing of the first floor, Wing B, of the Laboratory Building will be as follows:

Electrical Service Room	2 persons (staff stationed in workshop of first floor, Wing B)
Central Supply and Distribution Room	3 persons
<hr/>	
Total	5

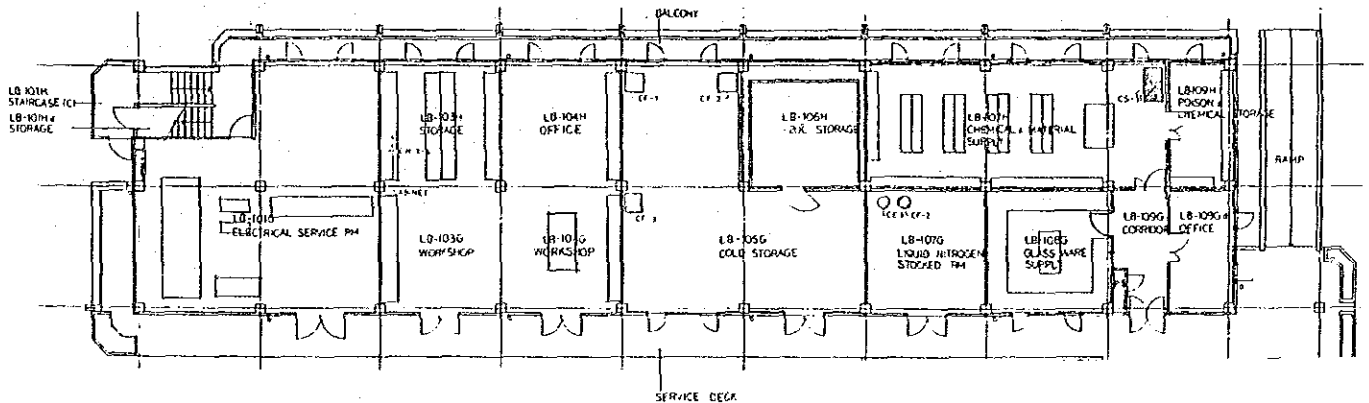


FIG. 4-3-19 PLANNING OF FIRST FLOOR, WING B

2. Animal Experiment Building

- 1) The activities carried out in the various units of this building are as follows:

<u>Room</u>	<u>Activities</u>
1. Small-animal Unit	Infection tests on rabbits, guinea pigs, mice and rats
2. Cattle and Pig Unit	Infection tests on cattle and pigs
3. Poultry Unit	Infection testing of poultry
4. Isolation Unit (cattle and pigs)	Highly dangerous infection tests on cattle and pigs
5. Isolation Unit (poultry and small animals)	Highly dangerous infection tests on poultry and small animals
6. Incinerator Unit	Incineration of tested-animal corpses, materials received for disease identification; contaminated feed, animal litter, etc.
7. Autopsy Unit	Clinical diagnosis and autopsy of animals brought from field. Occasional autopsy of tested animals.
8. Worker's unit	Preparation of specimens for animal experiments
9. Healthy Animal Shed	Housing of healthy animals for blood collection



The Animal Experiment Building is for the common use of the staff members from each laboratory under the control of the Bacteriology Section. Personnel are allocated to this building as follows:

Bacteriology reseachers (Units 1 - 5 above) 9 persons  
 Pathology reseachers (Autopsy unit) 6 - 7 persons  
 Parasitology reseachers 8 persons  
 General affairs workers 4 persons

27 - 28 persons

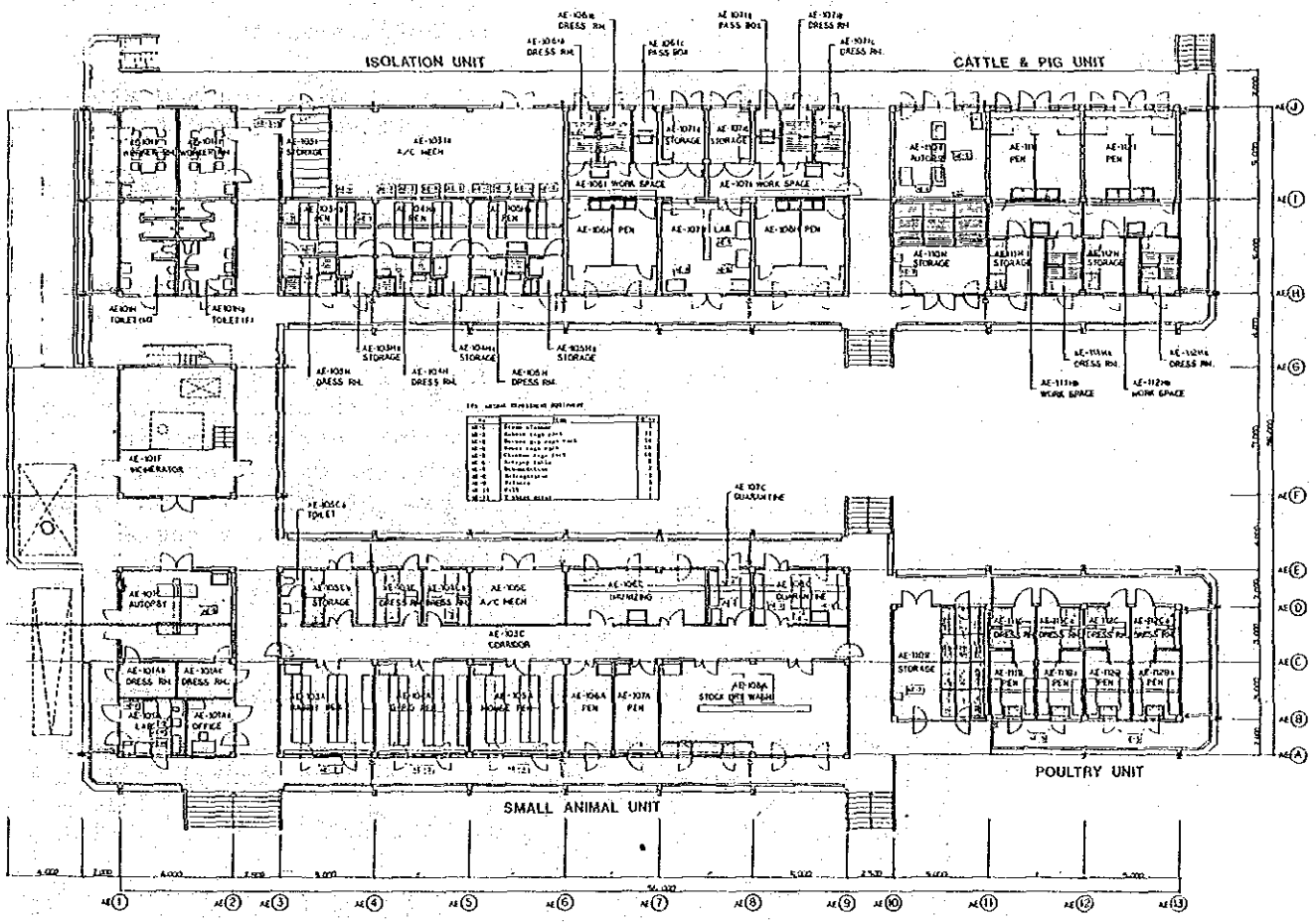


FIG. 4-3-20 ANIMAL EXPERIMENT BUILDING

2) Activities by room in the four units

1. Small-animal Unit

(Infection tests on rabbits, guinea - pigs, mice and rats)

<u>Room</u>	<u>Activities</u>
a. Rabbit Laboratory	Infection tests on rabbits
b. Guinea-pig Laboratory	Infection tests on guinea-pigs
c. Mouse Laboratory	Infection tests on mice
d. Pens	Spare room for infection tests on small animals
e. Wash-up and Drying Room	Room for cleaning and stocking of small-animal cages
f. Quarantine Room	Quarantine of small experimental animals
g. Immunology Room	Immunology experiments on small animals
h. Dressing Rooms	Rooms for researchers and workers to change clothes to prevent introduction of bacterial contamination and escape of bacteria and viruses used in infection tests
i. Feed and Storage Rooms	Storage of feed and hay

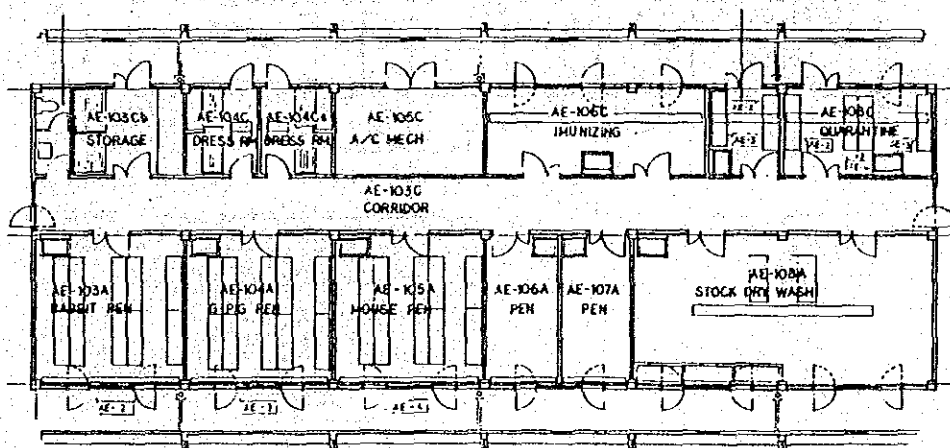


FIG. 4-3-21 SMALL ANIMAL UNIT

2. Cattle and Pig Unit  
 (Infection tests on cattle and pigs)

<u>Room</u>	<u>Activities</u>
a. Pens	Rooms for infection tests on cattle and pigs
b. Dressing Rooms	Rooms for researchers and workers to change clothes to prevent bacterial contamination and escape of bacteria and viruses used in infection tests
c. Feed and Storage Rooms	Storage of feed and hay
d. Autopsy Room	Autopsies on animals used in infection tests
e. Storeroom	Storage of feed and equipment used for experimental animals

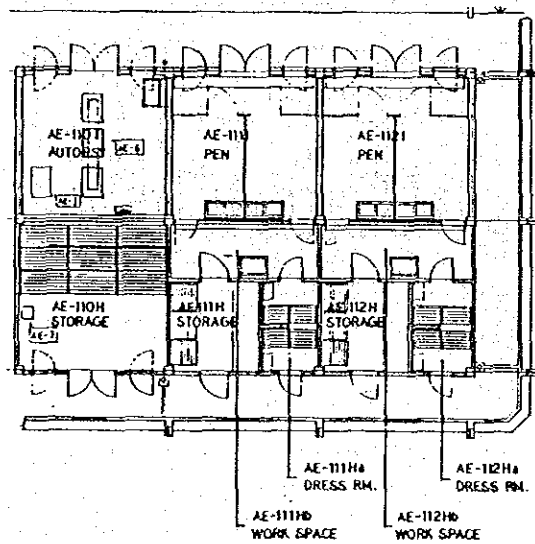


FIG. 4-3-22 CATTLE AND PIG UNIT

3. Poultry Unit (Infection tests on poultry)

<u>Room</u>	<u>Activities</u>
a. Pens	Rooms for infection tests on poultry
b. Dressing Rooms	Rooms for researchers and workers to change clothes to prevent introduction of bacteria contamination and escape of bacteria and viruses used in infection tests
c. Feed and Storage Rooms	Storage of feed and equipment used for experimental animals

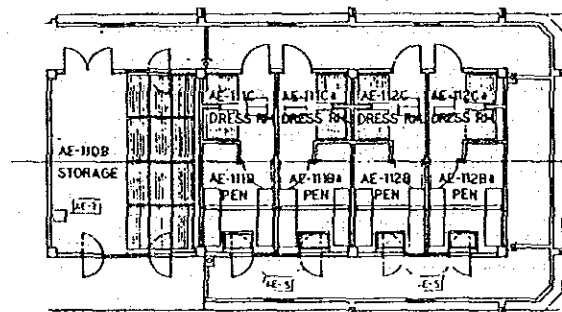


FIG. 4-3-23 POULTRY UNIT

4, 5. Isolation Unit

(Testing of cattle, pigs, poultry and small animals for highly dangerous infections)

<u>Room</u>	<u>Activities</u>
a. Cattle and pig pens	Rooms for infection tests on cattle and pigs
b. Dressing Rooms	Rooms for researchers and workers to change clothes to prevent introduction of bacterial contamination and escape of bacteria and viruses used in infection tests
c. Feed and Storage Rooms	Storage of feed and hay
d. Post-mortem Research Room	Autopsies and study of animals used in infection tests
e. Poultry and Small-animal Pens	Pens for poultry and small animals being used in infection tests
f. Storeroom	Storage of spare cages, etc.
g. Laboratory	Autopsies on an animals used in infection tests

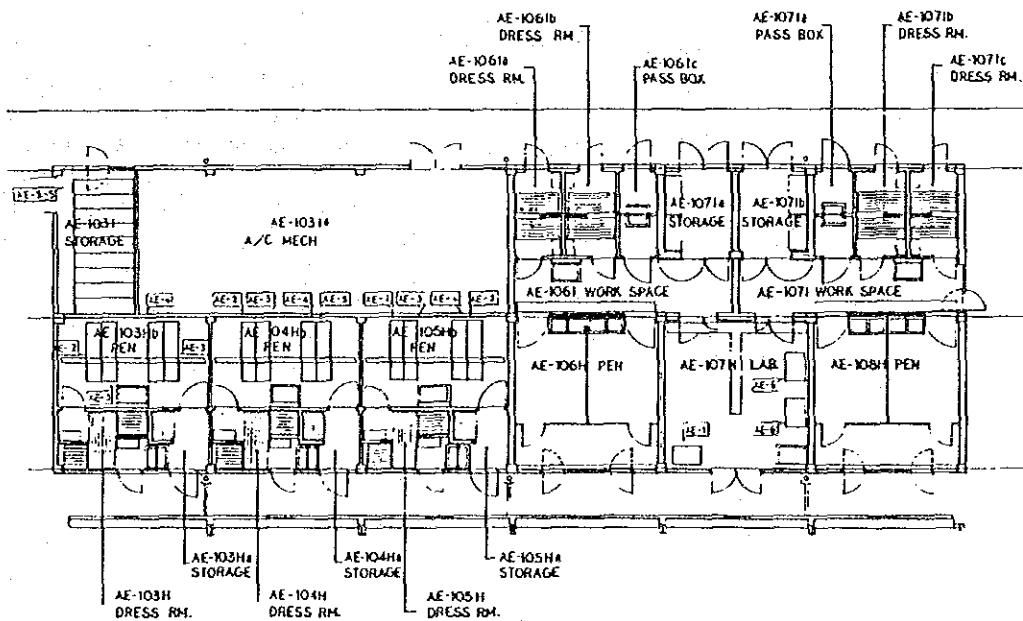


FIG. 4-3-24 ISOLATION UNIT

(3) Training and Administration Building

The following list shows the activities for which each room is to be used.

1) First Floor

<u>Room</u>	<u>Activities</u>
1. General Affairs Office	General affairs, personnel affairs, accounting routine administration
2. Exhibition Area	Mounting of exhibitions of specimens and display of notices for animal health promotion
3. Planning Office	Planning of research projects, budgets and activities
4. Coordination Office	Reception of specimens for diagnosis, institution of field tests, technical communication and coordination with other government offices
5. Reception	Reception, telephone exchange, paging, central security
6. Night Duty Room	Rest area for day and night staff (operators, etc.)
7. Lecture Room	Lectures and study activities for all research sections, and for Thai veterinary researchers and other groups, meetings on technical cooperation with other countries. (Approx. 100 seats)

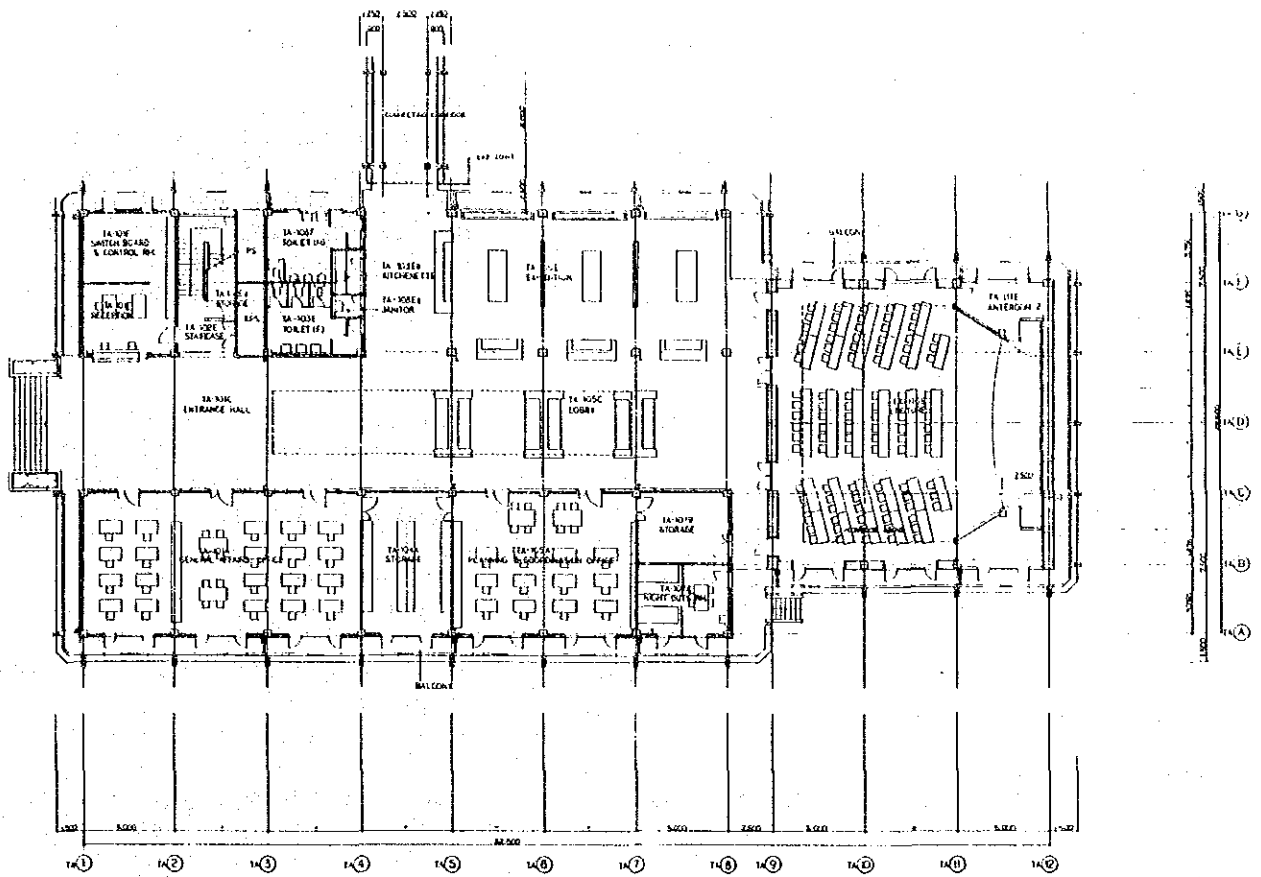


FIG. 4-3-25 TRAINING AND ADMINISTRATION BUILDING  
1ST FLOOR PLAN

2) Second Floor

<u>Room</u>	<u>Activities</u>
1. Training and Extension Office	Planning and implementation of training duties related to training for individual research sections and group education; duties training of veterinary researchers; technical cooperation and communication with other countries; handling of visitors.
2. Seminar Room	Training for individual research Sections and for Thai veterinary researchers; internal meetings (Approx. 30 seats)
3. Meeting Room	Internal meetings and discussions
4. Director's and Deputy Directors Rooms	Offices for Director (1), Deputy Directors (2)
5. Information Room	Data collection, analysis and distribution of general animal hygiene statistics and of information on outbreaks of veterinary emergencies; preparation and publication of research texts and guidance, and of audio-visual materials; etc., housing of microcomputer
6. Reading Room	Collection and arrangement of printed materials and ensuring their availability



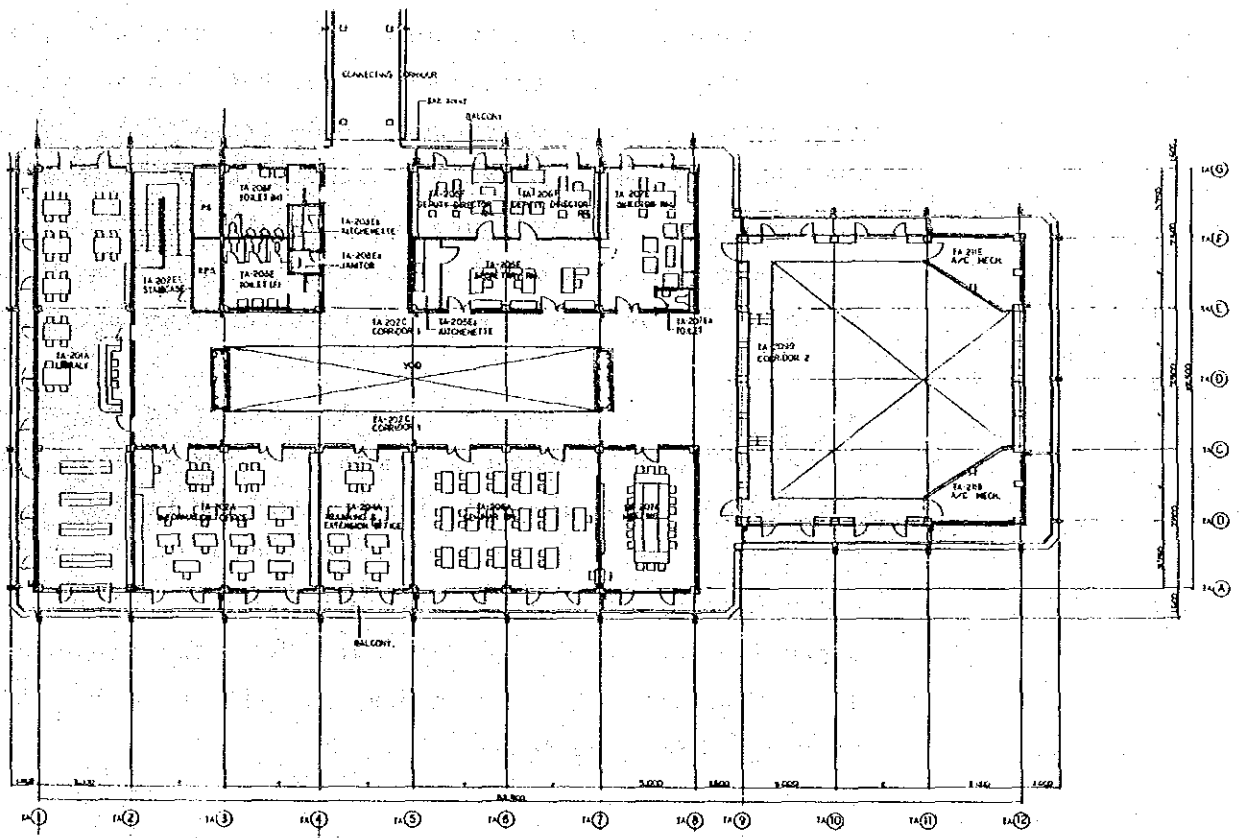


FIG. 4-3-26 TRAINING AND ADMINISTRATION BUILDING  
2ND FLOOR PLAN

(4) Sectional Planning

1) Research Laboratory Building

The Research Laboratory Building has four stories, each story having a height of 3.7 meters and a ceiling height of 2.6m. The above-ceiling space, which accounts for most of the difference between these two figures, will contain conduit piping and ducting.

The floor surface of the first floor of the building will be suspended 1.3m from the ground, and utility piping will pass through the resulting space. This design will prevent piping damage due to subsidence of earthfilled areas, that might occur if pipes were buried underground. The attic-type space between the ceiling slab of the 4th floor and the sloped roof has two purposes: (1) to provide temperature insulation and ventilation, and (2) to house the exhaust fans required for certain research equipment.

Each floor projects beyond the walls to provide balconies on the inside and outside surfaces of A and B wings. The inner balconies will act as maintenance and utility service corridors, provide emergency access and escape routes, accommodate external air-conditioning units, and provide suspension for piping and ducting. The outer balconies will not be generally accessible, but will provide shade and protection from rain.

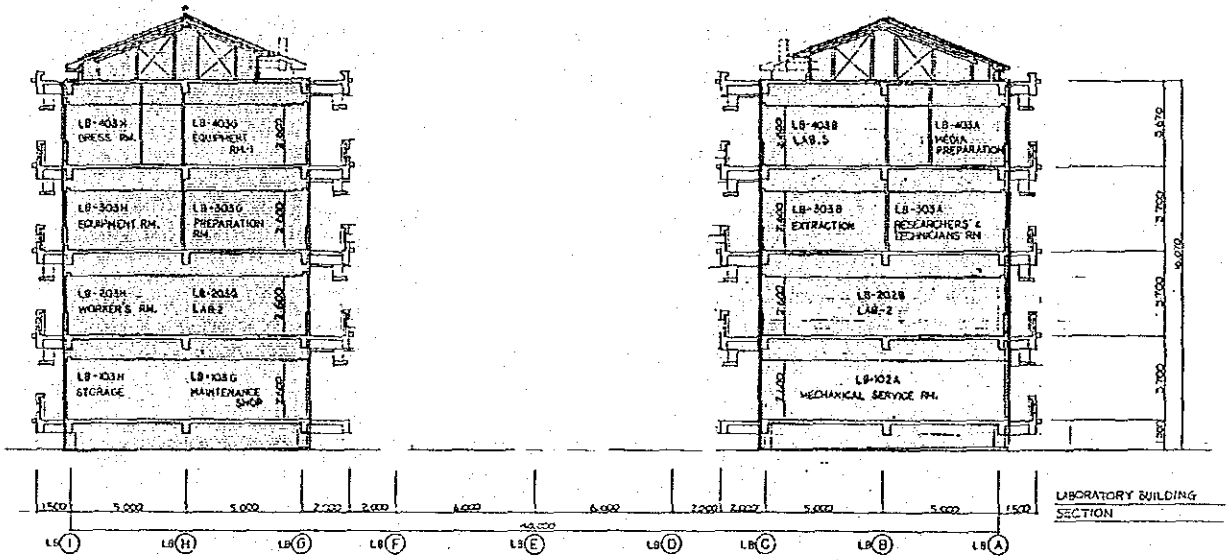


FIG. 4-3-27 SECTION OF LABORATORY BUILDING

2) Animal Experiment Building

The Animal Experiment Building is a single-story building with a story height of 3.7 meters and a ceiling height of 3.0m in most rooms, but 2.6m in some. In other respects, the sectional planning is very similar to that of the Research Laboratory Building, with conduit piping and ducting similarly located, with a similarly suspended floor, an attic-type space under the roof, and balconies on both sides of the building. This type of design has been selected for the same reasons and for the same purposes as in the Research Laboratory Building.

Because of the function of the Animal Experiment Building, many doors provide direct access from the exterior to most of the rooms.

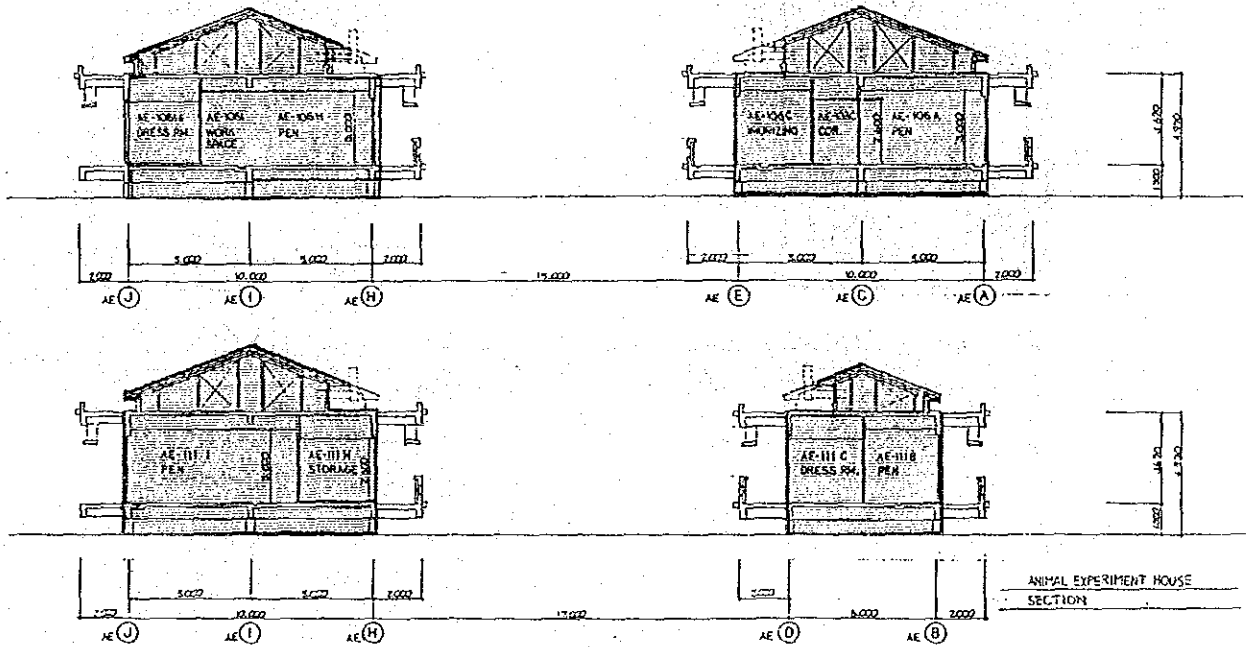


FIG. 4-3-28 SECTION OF ANIMAL EXPERIMENT BUILDING

3) Training and Administration Building

The Training and Administration Building is a two-story building with a story height of 3.7 meters and a ceiling height of 2.6m. As in the other two buildings, there are above-ceiling spaces for piping and ducting, a suspended floor on the first floor, an attic-type space for insulation and ventilation, and floors projecting into balconies for access and protection purposes. However, a major difference in the design permits a very free flow of air through the building. This is achieved by providing the exhibition area on the first floor with pillars instead of external walls, leaving a large central void between the first and second floors, and placing a large open skylight above the void. The fact that many of the rooms in this building have no air-conditioning makes such a design essential, so that air may flow in through any of the openings in the first and second floors, up through the void and out through the skylight.

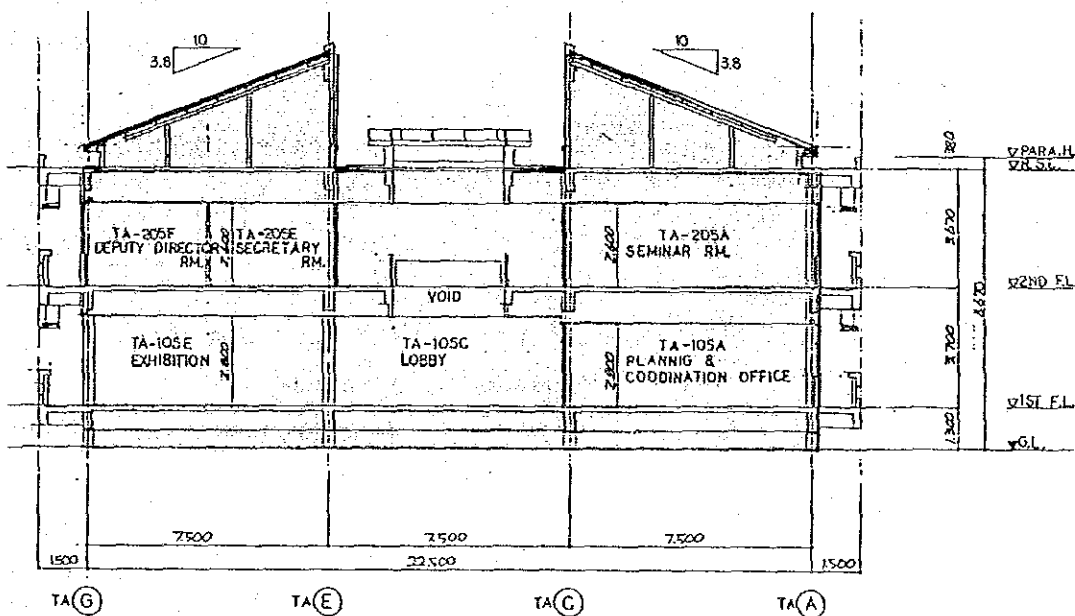


FIG. 4-3-29 SECTION OF TRAINING & ADMINISTRATION BUILDING

(5) Finishing

Materials that are both easy to maintain and high in cost performance will be selected for interior and exterior finishes, but all due account will be taken of local construction conditions, site conditions, site environment, and the usage and function of each facility and room. In the design of the NAHPI, the following areas need particular consideration:

- a. Satisfaction of the needs and functions required of a research institute.
- b. Durability: weather resistance, chemical resistance, waterproofing and shock resistance.
- c. Ease of daily maintenance: simplicity of maintenance of a sanitary environment.
- d. Simplicity of future alterations, replacements and remodelling of facilities.
- e. Possession of an atmosphere and character in keeping with its function as a public research facility.

1) Exterior Finish

Roofs:	Roof tiles, partially waterproof mortar
Exterior walls:	Ceramic tiles, partially ceramic blocks
Balcony floors:	Waterproof mortar
Doors and windows:	Aluminum sashes (electrolytically colored)

2) Interior Finish

a. Laboratory Building	Floors	Baseboards	Walls	Ceilings
Laboratories	PVC sheet	PVC	Mortar, painted; partially asbesto-calcium silicate board, painted	Asbesto-calcium silicate board, painted
Elevator, staircase and entrance hall	Terrazzo, polished on site	Terrazzo block	Ceramic tile, ceramic block	Decorated hardwood, oil-stained
Machine and Electrical Service Room	Dust proofed paint Mortar	Mortar	Glass wool board	Glass wool board
Wash-up and sterilization room	Epoxy resin	Epoxy resin	Ceramic Tile	Asbesto-calcium silicate board
Central Supply and Distribution, Cold Storage	Vinyl tile	Soft base-board	Mortar, painted	Asbesto-calcium silicate board, painted

b. Animal Experiment Building	Floors	Baseboards	Walls	Ceilings
Animal accommodation, storage rooms	Epoxy resin	Epoxy resin	Mortar, painted	Concrete, painted; partially asbestos-calcium silicate board, painted
Laboratories	PVC sheeting	PVC sheeting	Mortar, painted	Decorated plaster-board, painted
c. Training and Administration Building	Floors	Baseboards	Walls	Ceilings
Offices	PVC tile	Soft type baseboard	Mortar, painted; partially asbestos-calcium silicate board, painted	Asbestos-calcium silicate board, painted
Directors' Rooms	Carpet	Wooden	Mortar, painted; partially asbestos-calcium silicate board, painted	Rockwool acoustic board
Lecture Room	Needle-punched carpet	Wooden	Particle board, acoustic	Rockwool acoustic board



c. Training and Administration Building	Floors	Baseboards	Walls	Ceilings
Seminar Room	PVC tile	Soft type	Mortar, painted; partially asbesto-calcium silicate board, painted	Rockwool acoustic board
Reading Room	Needle-punched carpet	Wooden	Mortar, painted; partially asbesto-calcium silicate board, painted	Rockwool acoustic board
Corridors	Terrazzo, polished on site	Ceramic tile	Ceramic tile, block	Decorated hardwood, oil-stained
Exhibition corner and Entrance hall	Terrazzo, polished on site	Ceramic tile	Ceramic tile, ceramic block	Decorated hardwood, oil-stained
Toilet	Mosaic tile	Tile	Tile	Asbesto-Calcium silicate board, painted
Storage	PVC tile	Soft type	Mortar, painted	Asbesto-calcium silicate board
Interior of doors and windows	Plywood flush door	Wooden sash	Aluminum glass louver	



### 4-3-3 Structural Design

#### (1) Basic Policies

- 1) The structural system should suit the size, layout and mode of use of the facilities to be built, all in relation to the physical conditions in Thailand.
- 2) The structural system should be adaptable according to the materials available locally and their quality, and to local construction techniques; and preference be given to local products and methods unless special problems are involved.
- 3) The structural system should be economical and yet should result in a durable structure.

#### (2) Design of Structures

- 1) The structural design will as a rule make use of the rigid reinforced concrete frames commonly used in Thailand. The walls will be of bricks and concrete blocks laid in the frames.
- 2) Foundation  
In view of the unfavorable ground conditions around Bangkok, a pile foundation will be adopted. The length of the piles and the stress they can stand will be determined after boring tests on the Project Site and after the building weight have been established in the detailed design stage.
- 3) Structural calculation will be based on the working stress design method conforming to the various standards of the Architectural Institute of Japan. The standards in Thailand and Japan should be considered for determining

the allowable structural materials, and the local workmanship and irregularity in quality of materials should also be considered.

(3) Design Loads

The design loads will comply with Article 63 of the By-Laws of the Bangkok Metropolis, Re: Control of the Construction of Buildings, 1979.

1) Dead Loads

- a. Reinforced concrete 2.4 t/m<sup>3</sup>
- b. Structural steel 7.85 t/m<sup>3</sup>
- c. Brick and concrete block 1.9 t/m<sup>3</sup>
- d. Dead weight of other materials and finishing materials will be evaluated in the detail design stage.

2) Live Loads

- a. Roof (general) 50 kg/m<sup>2</sup>
- b. Roof (concrete overhang) 100 kg/m<sup>2</sup>
- c. Toilet 150 kg/m<sup>2</sup>
- d. Office, Conference Room  
Corridor, Staircase 300 kg/m<sup>2</sup>
- e. Auditorium, Research  
Experiment Room 400 kg/m<sup>2</sup>
- f. Library, Storage,  
Machine Room, Workshop 500 kg/m<sup>2</sup>
- g. Details will be determined in the detailed design stage for the live loads of water tanks, machines and research equipment on which heavy loads will be imposed, or which should be free from vibration.

### 3) Wind Loads

The standards provided by the By-Laws of Bangkok Metropolis will be adopted.

Height	Wind Pressure
Less than 10m	50 kg/m <sup>2</sup>
10m - 20m	80 kg/m <sup>2</sup>
20m - 40m	120 kg/m <sup>2</sup>

Wind loads in Thailand are about one third of those in Japan, small enough to be disregarded for this Project, which is at most 4 floors high.

### 4) Seismic Load

In view of the absence of any major earthquake in the past in Thailand, the effects of earthquakes can be disregarded for this Project.

## (4) Structural Materials

Major construction materials will be designated as follows:

- 1) Reinforcing Bars: Deformed Bar SD 30 (TIS)
- 2) Concrete:  $F_c = 210 \text{ kg/cm}^2$   
(Cylinder test for 4-week strength)
- 3) Cement: Normal Portland Cement (ASTM)
- 4) Structural Steel: SS41 (JIS) or equivalent
- 5) Piles: Precast concrete

#### 4-3-4 Utility Design

##### (1) Basic Policies

- 1) To provide an environment where research can be carried out in safety.
- 2) To provide an environment where research can be carried out accurately and effectively.
- 3) To provide functional utility services which meet the diversified needs of research ranging from general to advanced studies.
- 4) To provide utility services which will be maintained perfectly in both technical and economical terms.
- 5) To encourage utility design which allows for future development and extension of research activities.
- 6) To encourage utility design which will economize on construction, operation and maintenance costs.
- 7) To provide utility services which will be easy to operate and maintain.
- 8) To encourage utility design using standard equipment and materials as much as possible so that replacement of parts and repairs will be easy.
- 9) To use equipment and materials conforming to TIS and JIS in general, specifically for equipment and materials provided from Japan.

(2) Electrical System

1) Power Intake and Transformer System

Power will be supplied by the Thai Government from the 12,000-volt high-voltage line running along the trunk roads surrounding the Project Site to receiving transformers placed in the electrical service room. From there, electric cables will transmit power to the distribution panels also in the Electrical Service Room for distribution to each facility.

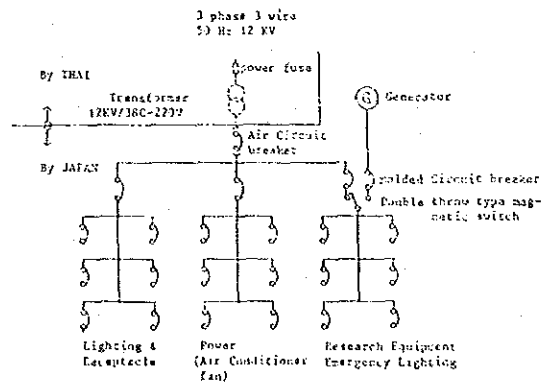


FIG. 4-3-30 POWER SUPPLY SINGLE LINE DIAGRAM

The total estimated electrical capacity of the Project facilities is about 900 KVA, and the capacities of the individual categories of facilities to be installed are as follows:

Lighting/receptacles	170KVA
Air conditioners/ventilators	180
Water supply/drainage pumps	100
Research equipment	420
Elevator	30
Total	900 KVA

The actual demand for electricity is expected to be about 500 KVA.

Receiving transformers with a capacity of around 900 KVA will be installed by the Thai Government inside the facilities. These transformers will provide a secondary voltage of 380-220V, 3-phase 4-line, and will supply 3-phase 380V current for package air-conditioners and single-phase 220V current to receptacles.

2) Generator

A diesel generator of about 200 KVA will be installed in the Generator Room as a stand-by in case of power failure. The generator will provide power for emergency lighting, research equipment such as refrigerators and cold storage, fire-fighting pumps, and some air conditioners that should not remain off for a long time.

3) Low-voltage main line and wiring

XLPE cable will be used for the main line extending from the transformer to the lighting panels, power control panel board and research equipment, carrying 3-phase 4-line 380-220V current. It will be installed on cable racks to facilitate easy maintenance and inspection. Incidentally, possible future needs have been taken into account in determining the main line power capacity of the power control panel board and lighting panels.

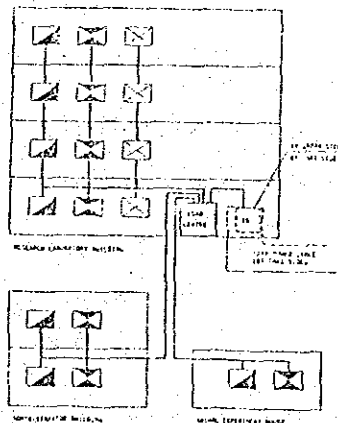


FIG. 4-3-31 DISTRIBUTION DIAGRAM FOR MAIN POWER LINE



#### 4) Lighting and Receptacles

##### 1. Lighting

As a rule, the lighting fixtures for the Laboratories and other major facilities will be fluorescent lamps with an average illuminance of 300 lux. The efficient 40W type will generally be used. The following are the average illuminances required for the major rooms:

Laboratories	300 Lux
Administration Office	300 Lux
Library	300 Lux
Conference Rooms	300 Lux
Animal Rooms	100 Lux
Toilets, Corridors	100 Lux

##### 2. Receptacles for general use

Receptacles will be installed where appropriate in rooms, corridors, halls, etc., for cleaning and other devices.

##### 3. Receptacles for research equipment

Receptacles for the research equipment will be located on the caseway attached to the surrounding walls of the laboratories. The receptacles will have earth electrodes and will carry a voltage of 220V, 1-phase. For research equipment that requires a stabilized electric current, individual AVR devices will be installed nearby. Three-phase 380V electric power will be supplied to the major devices.

##### 4. Power for Research Equipment

Electrical sockets for the use of experimental and research equipment will be distributed in the caseways of the surrounding walls. All sockets will be fitted

with an earth terminal and will generally carry single-phase 220-volt current. For research equipment which requires a stabilized power source, a stabilized power supply device will be provided near to each device that needs it. For large equipment, a 3-phase, 380V current will be supplied.

5) Power installations

Power control panel boards will be installed at suitable points for the air-conditioning/ventilating devices, and plumbing, fans, pumps and elevators. Power sources will be 3Ø 3W, 380V for most devices 1Ø 2W, 220V for smaller devices.

6) Telephone Installations

The Thai Government will execute the work of drawing in 20 trunk lines up to the terminal board inside the building. Electronic exchange equipment will be installed to enable connection within the facility and inside the city. A relaying device will be installed in the Reception Office on the first floor of the Training and Administration Building. The capacity of the exchange will be 60 extension lines and 10 station lines. Outlets for telephones will be fitted in the main rooms and halls.

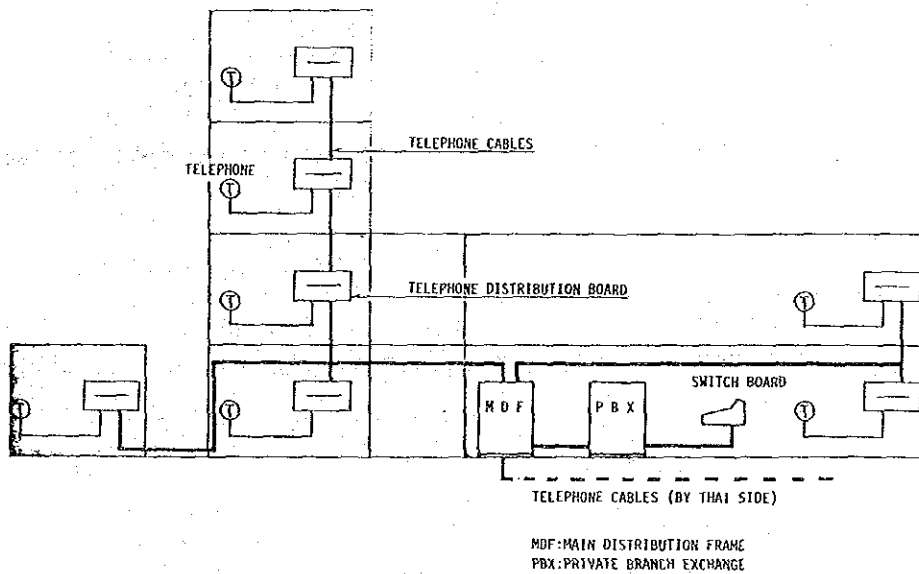


FIG. 4-3-32 DISTRIBUTION DIAGRAM FOR TELEPHONE SYSTEM

7) Public Address System

Loudspeakers will be placed in the major rooms of each facility to enable public announcements to be made. Microphones and amplifiers will be installed in the Training and Administration Building

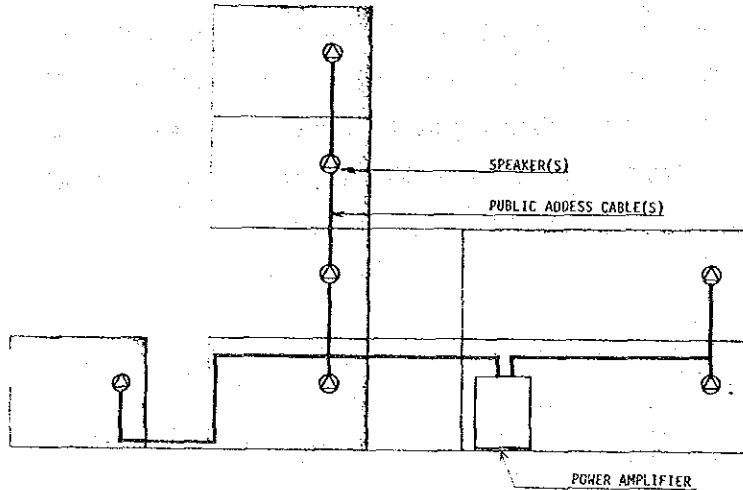


FIG. 4-3-33 DISTRIBUTION DIAGRAM FOR PUBLIC ADDRESS SYSTEM

8) Audio Devices

A loudspeaker, system will be installed in the Lecture Room.

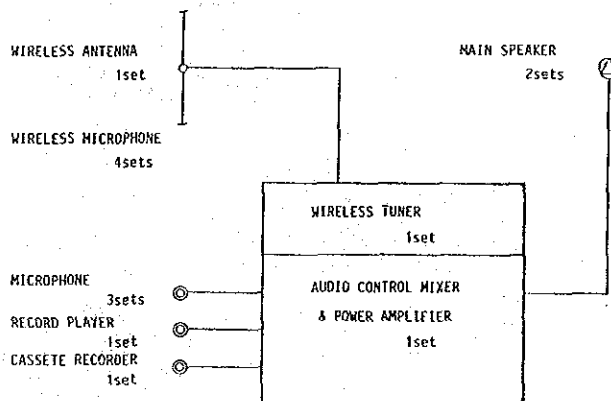


FIG. 4-3-34 AUDIO DEVICES DIAGRAM

9) Fire Alarms

Push-button-type fire alarm switches and alarm bells will be installed in the corridors of every building where necessary.

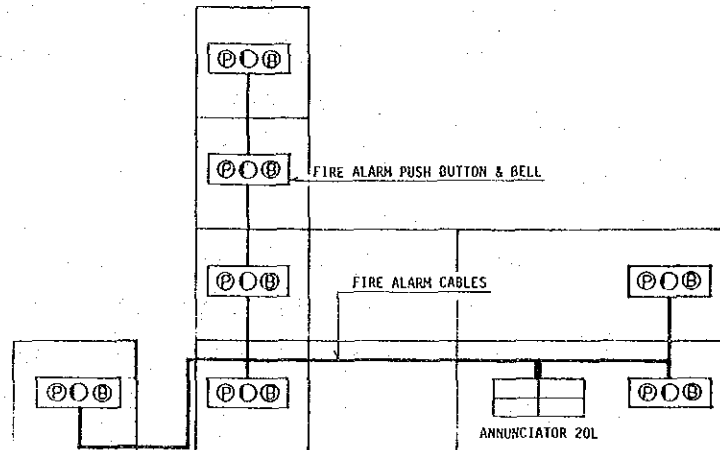


FIG. 4-3-35 FIRE ALARM SYSTEM DISTRIBUTION DIAGRAM

10) Lightning Devices

A system that consists of lightning rods mounted on the roofs, conductors and earth poles will be installed to prevent lightning damage.

11) Elevator

An elevator for cargo and passenger use will be provided.

Capacity: Load, 1,000kg; no. of passengers, 15 persons

Speed: 45m/min., 4 stops

(3) Plumbing System

1) Water Supply System

Filtered well water and city water will be stored in a water reservoir and supplied under gravity to the necessary places. This water will be used in three categories: treated water for experiments, ordinary treated water (potable) and general-purpose water.

a. Treated water for experiments

Treated water, which is filtered and chlorinated general-purpose water, will be used for making sterilized water, pure water and soft water, and will be supplied to the steam generators and the small experimental animal breeding laboratory sinks.

b. Ordinary treated water for drinking

Ordinary treated water, after being filtered, will be supplied to the hot water supply system, cooling system water, etc., as well as for drinking.

c. General-purpose water

General-purpose water, which is untreated city water or filtered well water, will be used for washing closets and urinals, cleaning, spraying, washing of wheels, etc.

d. The projected water supply capacities are as follows:

	Supply capacity	Reservoir tank	Elevated water tank
Treated water for experiments	20	30	15
Ordinary treated water	30	30	15
General-purpose water	30	60	15
Total	80	(m <sup>3</sup> /day)	

e) The water supply system is as shown in Fig. 4-3.

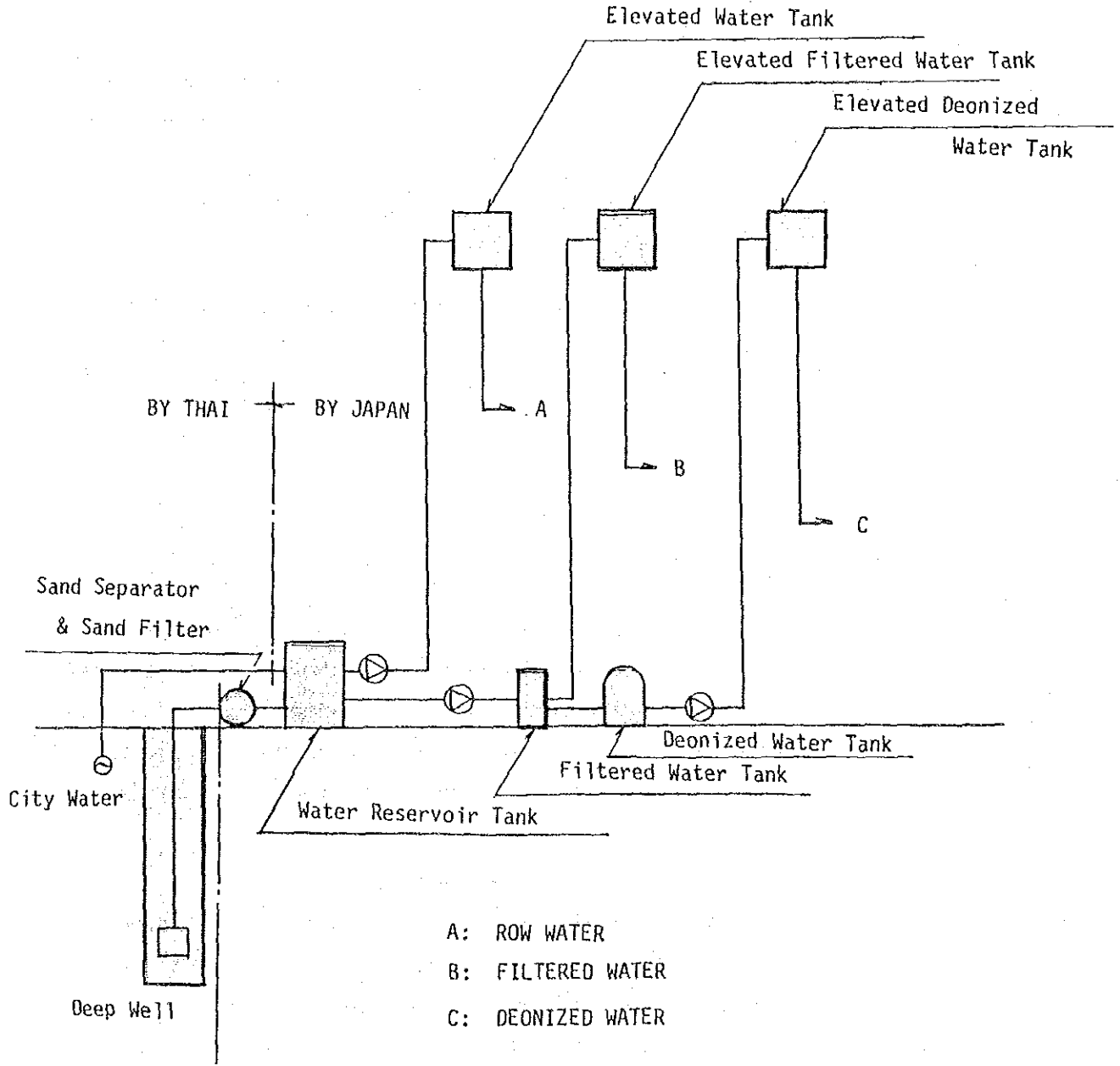


FIG. 4-3 WATER SUPPLY SYSTEM