5-4 Architectural Design

5-4-1 Basic Policy for Architectural Design

(1) Floor Plan

1) Designing clear routes for movement and management, to deal with the movement of a large number of trainees in accordance with training schedules

2) Designing large rooms avoiding partitioning where possible for adequate ventilation

3) Obtaining open areas as much as possible to provide natural light and ventilation for all rooms

(2) Section Plans

1) Designing ceilings as high as possible and maximizing loft space to deal with heat from direct sunshine

2) Designing sloped roofs with long eaves, to deal with heavy rain and prevent sunlight from affecting the inside.

5-4-2 Planning of Buildings

The area of main rooms was calculated in accordance with the number of occupants, using the following data from in Thailand. For other facilities, proposed uses, equipment to be installed, etc. were considered to decide the area. Enough space was provided for each room to meet further changes in occupancy.

Table 5-2 Standard of Net Floor Area

Room Name	General Standard (sqm/person)	Applie Figure (sqm/person)
Office	4.5 - 7.0	5.4
Conference room	1.5 - 5.0	2.0
Classroom	1.0 - 1.3	1.28
Auditorium	1.0 - 2.0	1.7
Canteen	0.9 - 1.5	1.16
Dormitory	3.2 - 8.3	4.5

Note: 1) canteen floor area is as per seat and calculated for self-service type.
2) figures shown are net floor area.

(1) Administration Office and Class Room Building

This is to be a 2 story building having space for administration and operation on the 1st floor and for classrooms for training on the 2nd floor. The details of the main rooms for the building are as follows:

Room Name	Description
Office for Administration	General administration office
Room for Task Force Unit	Specialist and counterpart
Office for Engineering	Engineering training office
Printing Room	Printing of teaching material
Conference Room	For 36 persons
Class Room No.1	45 Trainees
Class Room No.2	75 Trainees
Preparation Room	Storage for teaching equipment
Trainers' Room	Visiting trainers room
Library	Open stack reading
Storage toilet and corridor	

(2) Auditorium

The auditorium is designed as a multi-purpose building for the use of training for a large number of trainees, lectures and meetings for lodging trainees, night time recreation, meetings of agricultural cooperatives and other events.
Also, considering that a large number of trainees will gather, it is to be built near the entrance and allow easy management, as well as have ample space and waiting room. The auditorium consists of the followings:

Room Name	Description
Auditorium	130 persons for lecture
Projector room	16 mm, slide projector
Stage	
Storage and other	

(3) Dormitory

A dormitory is designed as 1 building consisting of 4 rooms for lecturers which provide a capacity of 8 persons and 17 rooms for trainees which provide a maximum capacity of 136 persons. Each room is provided with 8 beds. Also provided are a housekeeper's office for dormitory management including a room for night duty, a laundry room for cleaning and storing sheets and other bedclothes and a storage for linens.

The dormitory consists of the followings;

Room Name	Description
Trainers' Room	4 rooms with shower room
Trainees' Room	17 rooms,8 person each
Study Room	1 room for 24 person
Housekeeper Room	Reception, night duty, storage
Shower, Washing Room, Toilet	
Stair, Hall, Corridor	

(4) Canteen

The canteen is designed to serve as a facility to cater meals for guests, to sell daily necessities, to serve drinks, to cater light meals for events in the auditorium, and for use as a recreational facility for trainees during the evenings. The area is built in order that 130 trainees may take a meal at the same time; a double shift is possible when the number of trainees reaches the maximum. Kitchen management will be assigned to outsiders to bring prepared meals for cooking.

The canteen consists of the followings:

Room Name	Description
Canteen	130 seats
Kitchen	Kitchen equipment
Shop, Storage	Grocerries, soft drink
Service Yard	LPG tank storage

(5) Workshop

The workshop will mainly provide training on the repair of small agricultural machines. Also, It is designed to serve as a facility to be lent to agricultural cooperatives and members, and to repair equipment with major problems brought back by the mobile units.
(The workshop of the REC is used as a heavy machinery repair shop.)

Main facilities in the workshop are as follows:

Room Name	Description
Office	Trainer, engineer room
Workshop	Equipment for repair
Storage	Tools, guages, spare
Experiment Room	Engine and soil test
Toilet	

5-4-3 Differences From Requested Plan

The differences from the plans of facilities requested by the government of Thailand are given below:

Table 5-3 Floor Area Comparison

Facilities	Requested	Planned	Adjustment
Classroom	2 rooms for 50 persons each	2 rooms for 75 and 45 persons	according to trainnig schedule
Office	3 rooms for 19 persons	3 rooms for 43 persons	to cope with new organization
Auditorium	Multi-purpose for 100 persons	Multi-purpose for 130 persons	according to training schedule
Dormitory	2 trainees per room w/shw max.100 persons	8 trainees per room. com.shw max.136 persons	result of analysis of training program
Canteen	For 100 persons	For 130 persons	according to the capacity of dormitory
Library	Library and study room for 40 persons	Library and study room for 20 persons	extra study room is provided at the dormitory
Workshop	Repair of Agr. machinery garage	Same as left. Garage is not provided.	according to the training programme
Staff House	2 units for staff housing	Staff housing is not provided. Trainers' room for 8 persons included in the dormitory	housing will be built by Thai side
Others	Coffee break and game room	Not provided	auditorium and canteen to be used
Total Floor Area	about 3,330 sqm	about 4,260 sqm	

5-5 Structural Design

5-5-1 Design Principles for Structure

The design principles for the structure are as follows:

(1) Secure support of various loads and external forces
(2) Structure not interfering with building use and functions
(3) Economical structure
(4) Use of local construction methods and materials

5-5-2 Design Load

Design load is set in accordance with the laws and regulations in Thailand.

(1) Dead Load (t/cum)

Reinforced Concrete	2.4
Structural Steel	7.85
Concrete, Block, Brick	1.9

(2) Live Load (kg/sqm)

Roof	50
Canopy	100
Toilet, Shower room	150
Room of dormitory	200
Office, Conference room	250
Class room, Hall, Stairs	300
Canteen, Auditorium	400
Library, Workshop	500

(3) Wind Load (kg/sqm)

Lower than 10 meters	50
Between 10 to 20 meters	80

(4) Earthquake Load

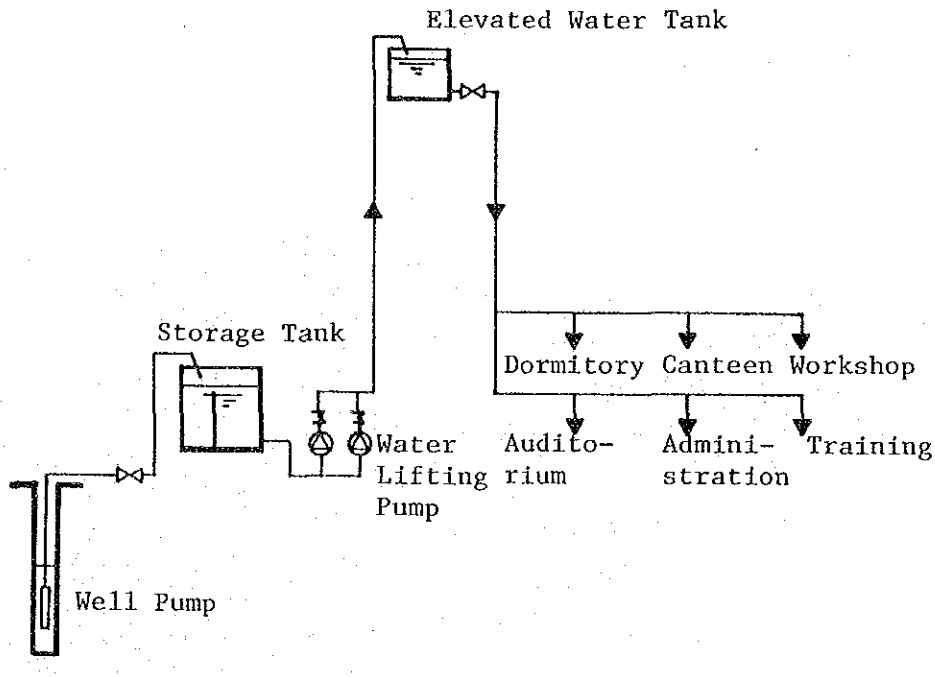
Since no major earthquake has occurred in Thailand, and there has not been any record of earthquakes in Northeast Thailand since 1900, seismic force was not considered in designing the buildings.

5-5-3 Major Structural Materials

Major structural materials are as follows;

Reinforcing steel	:	Deformed bar SD30(JIS standard) or its equivalent
Concrete	:	Fc=210 kg/sq cm (4 weks strength)
Cement	:	Ordinary Portland cement (ASTM standard)
Steel materials	:	SS41 (JIS standard) or its equivalent

Figure 5-4 Water Supply Plan



5-6 Mechanical and Plumbing Design

5-6-1 Water Supply System

The water supply system of the REC site does not have a sufficient capacity for the facilities. To cope with the situation, a deep well will be installed in the site and water will be channelled from this to water storage tanks, from which it will be pumped up to an elevated tank, and then supplied to various places by gravity.

Since the facilities need a water supply of about 40 cubic meters per day, the capacity of the water storage tank is designed to be 40 cubic meters. The elevated tank is installed 20 meter above ground, with a capacity of 4 cubic meters, which corresponds to 1 hour of the target supply. Two pumps will be able to supply 200 l/m for instant maximum, with automatic alternating operation and at the same time, provide for breakdown.

Polyvinyl chloride pipes are used in the interior piping, rust proof taped galvanized steel pipes in underground piping between the well and the water storage tank, and galvanized steel pipes lead up to the elevated tank.

5-6-2 Drainage System

As a whole, the drainage system is divided into three systems, sewage, general waste water and rain water.

(1) Sewage

Sewage from lavatories is led to FRP septic tanks installed outside each building for treatment, and then joined to the general waste water for discharge.
Cast iron pipes are used in the interior piping, and concrete fume pipes in the exterior portions.

(2) General Waste Water

General waste water is led to a dilution tank via a storage tank installed around each building for treatment, and then discharged into a control pond existing in the REC site.
Polyvinyl chloride pipes are used for the interior piping, and concrete fume pipes for the exterior portions.

(3) Rain Water

Rain water from buildings is discharged into an open ditch installed around each building. Rain water in the site is lead to an open ditch which is connected to the existing control pond in the REC site.

(4) Waste Water from the Workshop

Waste water containing oil from the workshop is led to an oil separation tank, and only water is discharged into the general waste water drainage system. The piping is the same as that for general waste water.

5-6-3 Sanitary Ware

Sanitary fixtures are installed in the lavatories and shower rooms in each building. Toilet stools are mainly Thai style, but Western style stools are in some quarters for some users.

5-6-4 Kitchen Equipment

The kitchin will be equipped with gas range, refrigerator, sink and kitchen counter.

5-6-5 Gas Supply

LPG gas is supplied to the kitchen from two of 50 kg cylinders installed outside.

5-6-6 Fire Fighting Equipment

Fire extinguishers are installed. Their capacity and location are in accordance with Thailand standards.

5-6-7 Ventilation System

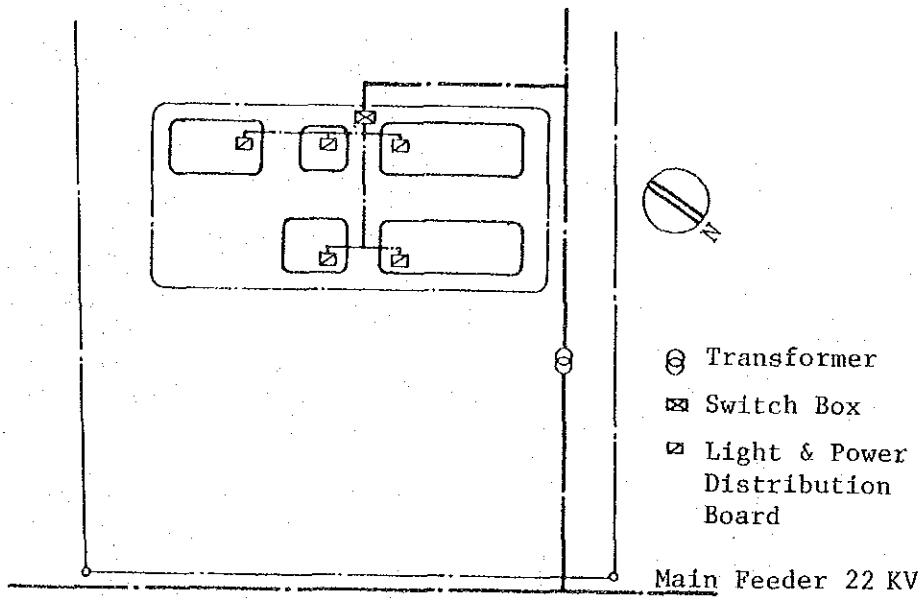
The facilities are designed to use natural ventilation in principle, with mechanical ventilation by ceiling and wall fans to be used in periods of no wind and in the summer season.

5-7 Electrical Design

5-7-1 Power Receiving System

315 KVA pole mounted transformers are installed in parallel with existing exterior pole mounted transformers on the REC site to drop 22 KV, supplied by the Provincial Electrical Authority (PEA), to 3 phase 4 lines 380 V/220 V, which is then supplied to each load.

Figure 5-5 Power Recieving Plan



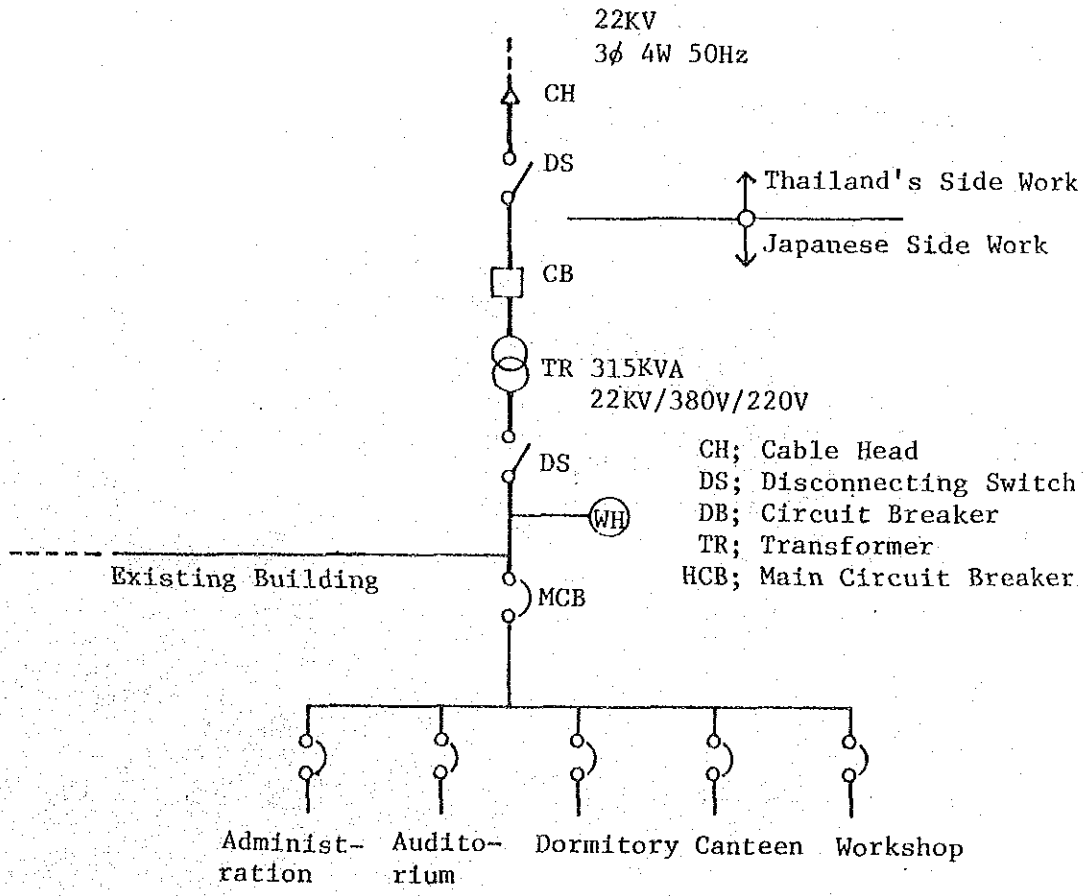
Design loads in all facilities are generally as follows:

Item	Load (KVA)
Lighting, Receptacle Load	90
Ventilation Load	60
Water Supply, Plumbing Load	20
Workshop Load	30
Engineering Load	115
Total	315

5-7-2 Trunk Line System

Low tension trunk lines, consisting of both steel conduit and vinyl cables, are installed from the main distribution panels to power panels, lighting panels and training equipment panel in the buildings.

Figure 5-6 Power Distribution Diagram



5-7-3 Power Supply System

Piping and wiring are provided to supply power to the water supply equipment and the workshop training equipment.

5-7-4 Lighting and Receptacles

Main lighting is provided by fluorescent lamps, with incandescent lamps where required. Luminous intensity in rooms is generally as follows:

Offices, Conference Rooms, classrooms and library	300 Lux
Hall and Corridor	100 Lux
Dormitories and canteen	200 Lux

Receptacles are of the ordinary type for office fixtures, and of grounded pole type for training equipment where required. Voltage is primarily single phase 220 V.

5-7-5 Ceiling Fans

Ceiling fans are installed in class rooms, offices, the auditorium, dormitory and canteen.

5-7-6 Telephone System

Two incoming lines (an existing line and a new line) are drawn into a main telephone switchboard in the administrative building. The switching system is the push-button type, with a capacity of 10 lines. Piping is provided in the canteen for public pay telephones.

5-7-7 Announcement System

An amplifier and microphone are installed in the administrative office, with speakers in corridors and common spaces in each building for public announcements. The system can be separated for public announcements over each line. Automatic chime and time signals are incorporated to signal the start and the end of classes.

5-7-8 TV Receiving System

Equipment including a TV antenna are installed to allow TV viewing in the classrooms, auditorium, canteen, etc.

5-7-9 Fire Alarm System

Manually actuated alarms are installed in the corridors and halls of each building, and alarms are indicated on a receiver in the administration office.

5-7-10 Lightning Conductor

A lightning conductor is installed in the upper part of the elevated tank.

5-8 Main Building Materials Plan

5-8-1 Exterior Finishing Materials

The following have been decided due to their durability, weather proof quality, appearance and economic efficiency.

(1) Roof

Taking into account the heavy rain during the rainy season and the fact that radiation from the roof due to the fierce sunlight seriously affects rooms right under the roof, a sloped roof has been designed instead of a concrete flat roof, in order to cope with the rainfall and provide heat insulation by having a loft space.

Cement tiles will be used due to the advantages of durability water resistance, heat insulation, fire proof quality, sound insulation from rainfall, fine appearance and ready procurement.

(2) Exterior Wall

Cement mortar with paint finishing which is popular in Thailand will be applied to the concrete block walls of all buildings except for the workshop, which will have with paint finishing on the concrete block wall.

(3) Floor

The floors in the workshop and storage area will be concrete with a hardener for finishing, and other floors will be terrazzo finishing. Terrazzo finishing is popular in Thailand for its general durability, shock durability, abrasion resistance and facility in maintenance, while parquet (wooden)tile is easily in damaged and has inferior in water resistance and must be replaced ofen. Therefore, parquet is unsuitable for a facility accommodating a large number of people.

(4) Interior Wall

Cement mortar with paint finishing is to be applied to block wall in principle. Shock durability has priority in the design, as the main users will consist of trainees and visitors from outside.

(5) Ceiling

Mineral acoustic board is to be used for the ceilings of the classrooms and offices in the administraive building, to provide more effective sound insulation and also to provide heat insulation under the loft space. In Thailand, mineral acoustic board is generally used for the ceilings of offices and classrooms, by simply putting it on T-shaped aluminium bars. This method enables it to provide cable wiring for lightings, etc., and facilitates easy installation and maintenance after completion.

Mineral acoustic board is also to be used for the dormitories where many people are accommodated to provide sound insulation by securing sleepers against noise from the corridor and to separate the rooms and loft space.

For the auditorium, too, the mineral acoustic board will be used for heat insulation under the loft space and sound insulation (which is needed for meetings).
Other facilities such as the canteen, workshop, hall and corridors, have exposed roof boards but no ceiling.

(6) Fittings

Since fittings are to be locally procured in principle, mainly economical wooden fittings are to be adopted, and steel-sash is to be used for places of frequent in use such as the main entrance, etc. The windows in the dormitories are swing-out style with swing-in window screens.

5-9 Equipment

Major equipment required for the Project is as follows:

(1) Equipment for preparing training materials and audio-visual equipment necessary for lectures
(2) Audio visual equipment used in the auditorium
(3) Workshop equipment required for repairing agricultural tools and equipment and field training
(4) Equipment used in mobile units to conduct field training

Equipment and materials are to be selected in order of priority and with reference those items furnished under the technical assistance. Equipment which can be easily inspected and maintained and for which spare parts and accessories are easily obtainable is preferred.

5-9-1 Equipment List

Lists of main equipment for each section is as follows:

(1) Administrative Section

Electric Typewriter
Copy Machine
Stencil Duplicator

(2) Training Section

Slide-tape Synchronized Projector
16mm and Overhead Projectors
Amplifier
Video recorder and monitor

(3) Auditorium

Mixing Amplifier
Slide-tape Synchronized Projector
Movie Projector/Zenon Lamp
Overhead Screen with Stand
Video Recorder and Monitor
Screen

(4) Workshop

Nozzle Tester
Valve Seat Grinder
Cylinder Gauge
Steam Cleaner
Hydraulic Press
Air-compressor
Drilling Machine
Bench Grinder
Lathe/Swing
Hack Sawing Machine

Welding Set
Gauges
Engine Cut Model
Water Pump for Training
Work Bench
Tools

(5) Mobile Unit

16 mm Projector
Slide Projector
Screen
Generator
Amplifier
Micro Bus

5-10 Furniture

Major furniture necessary for the Project is as follows;

(1) Desks, chairs, and materials storage shelves in classrooms
(2) Desks and chairs used in the auditorium
(3) Beds and chairs in the dormitory and canteen
(4) Desks, chairs, cabinets and meeting tables for the Administrative Section

5-11 Basic Design Drawing

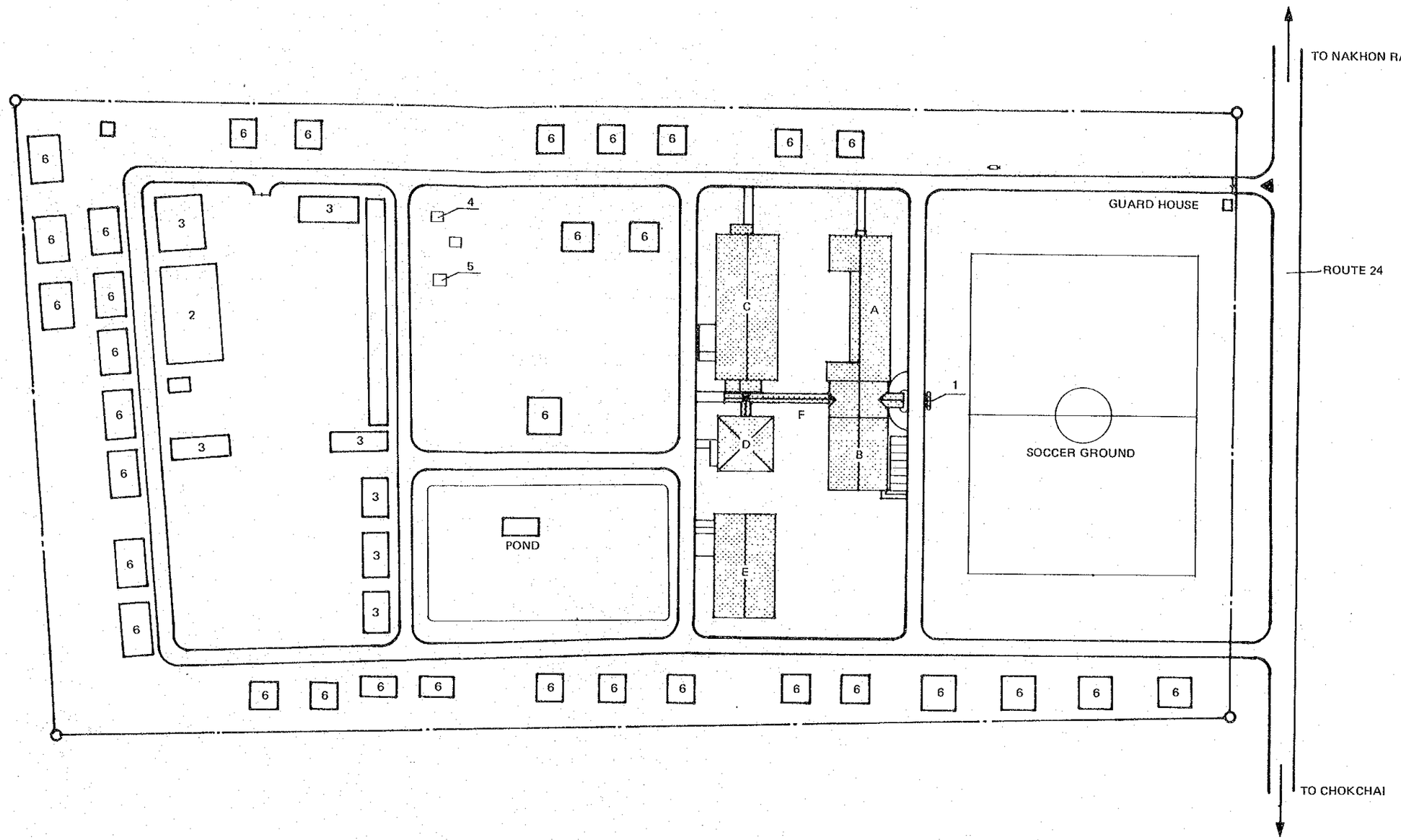
Floor area of the facilities is as follows;

Table 5-4 Floor Area

Area Building	Area Covered in the Floor Area (sqm)	Area Not Covered in the Floor Area (sqm)
Administration and Classroom Building	1,230.0	90.0
Auditorium	668.0	24.0
Dormitory	1,468.0	165.0
Canteen	196.0	-
Workshop	480.0	-
Walkway	120.0	-
TOTAL	4,162.0	401.0

List of Drawings

1. Site Plan
2. Ground Floor Plan
3. First Floor Plan
4. Elevations
5. Elevations Sections
6. Elevations Sections



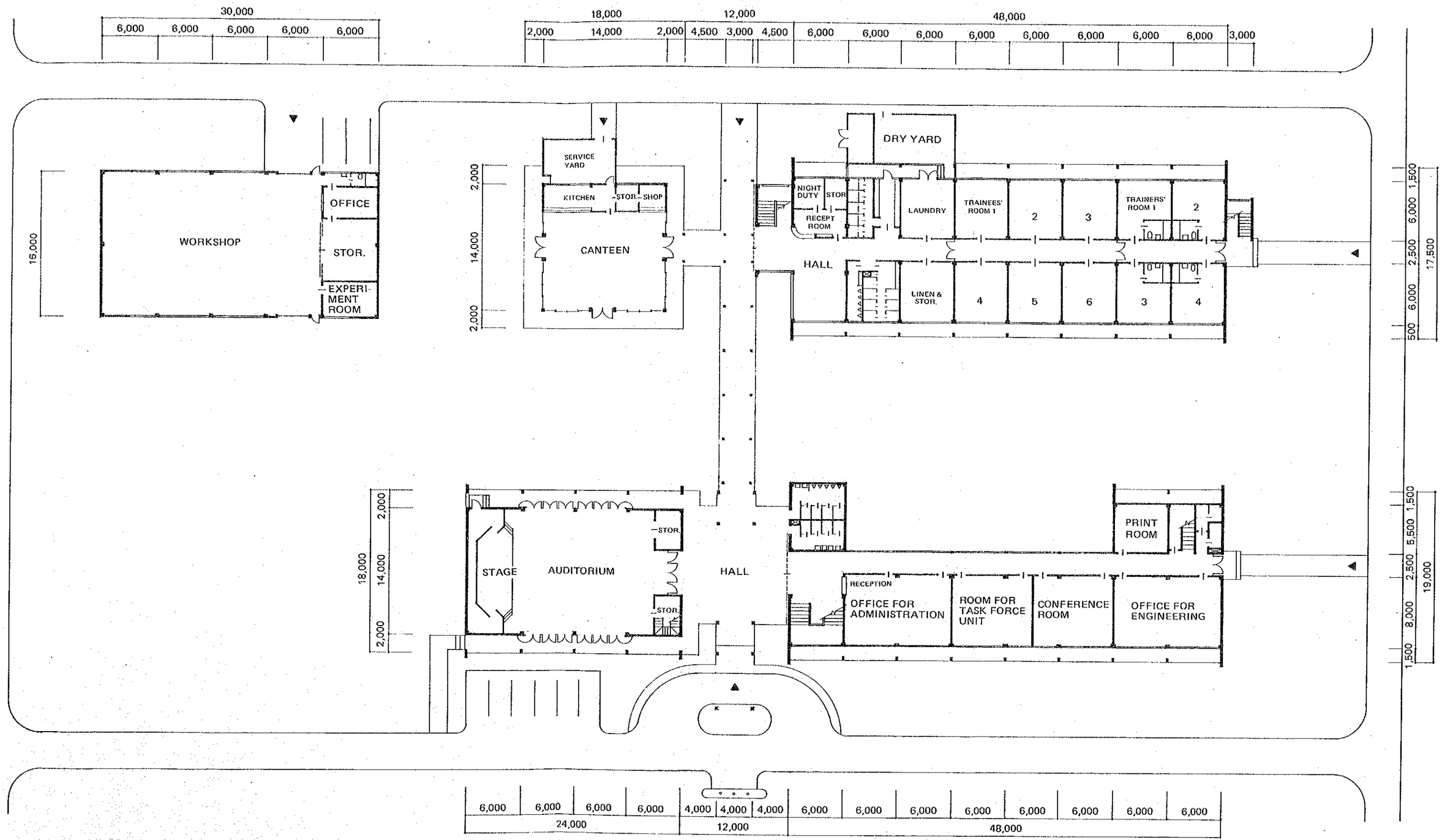
1. FLAG POLE
2. REC WORKSHOP
3. STORAGE
4. ELEVATED WATER TANK
5. WATER LIFTING POMP
6. RESIDENCE

A	OFFICE & CLASS ROOM BUILDING	1,230 m²
B	AUDITORIUM	668 m²
C	DORMITORY	1,468 m²
D	CANTEEN	196 m²
E	WORKSHOP	480 m²
F	CORRIDOR	120 m²
TOTAL		4,162 m²

N

0 10 20 50M

SITE PLAN S1:1500 01



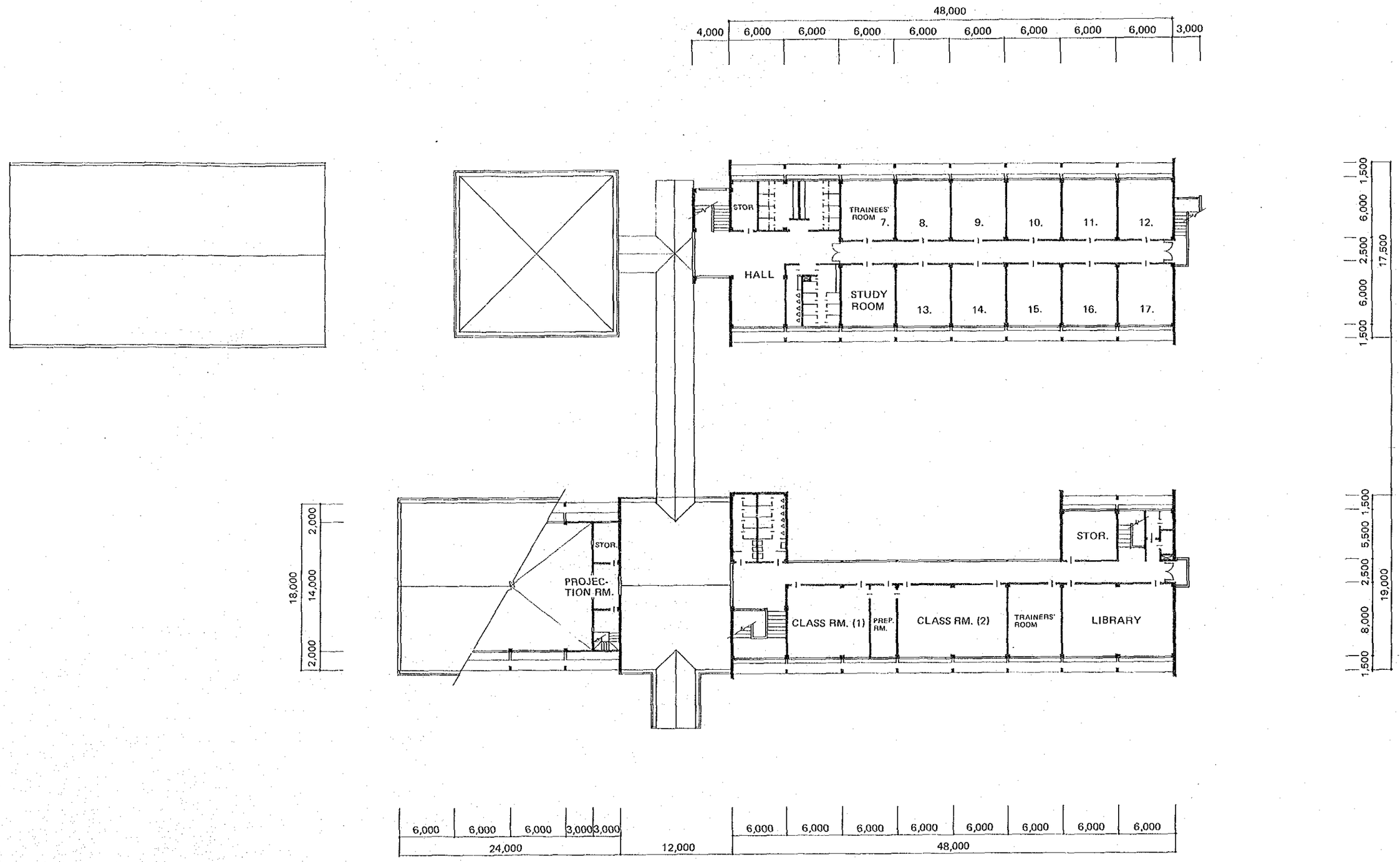
N

0 1 5 10 20M

GROUND FLOOR PLAN

S1:400

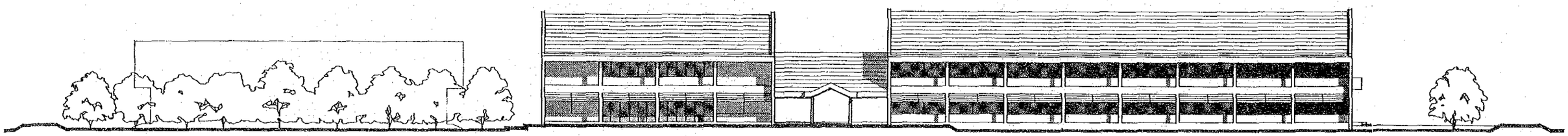
02



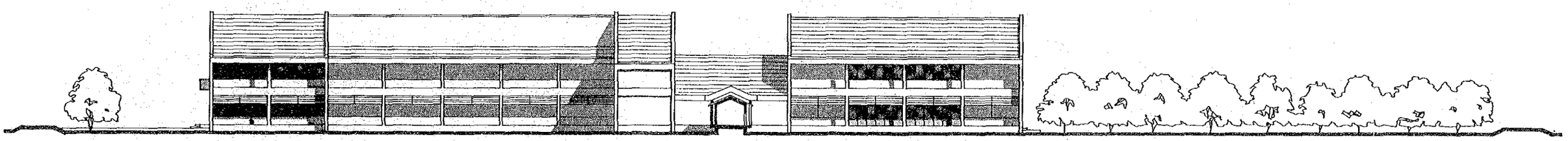
FIRST FLOOR PLAN

S1:400

03



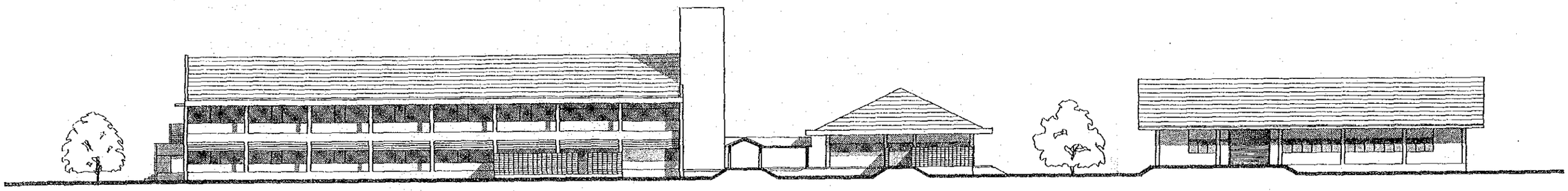
EAST ELEVATION



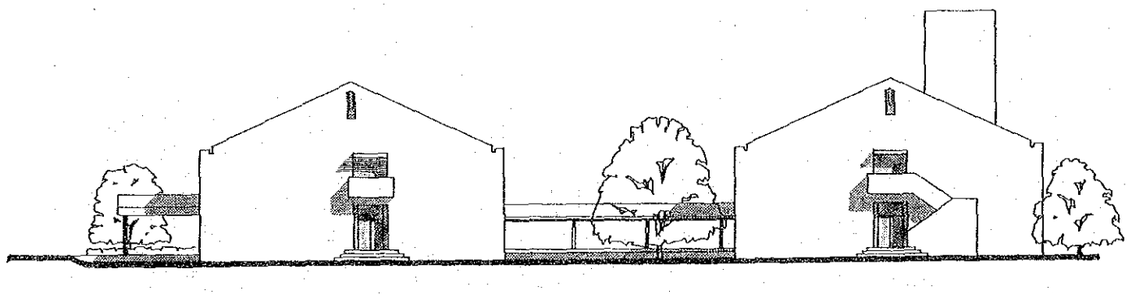
WEST ELEVATION

0 1 5 10 20M

ELEVATIONS S1:400 **04**

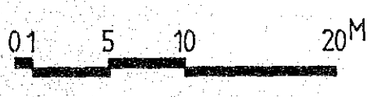


WEST ELEVATION



NORTH ELEVATION

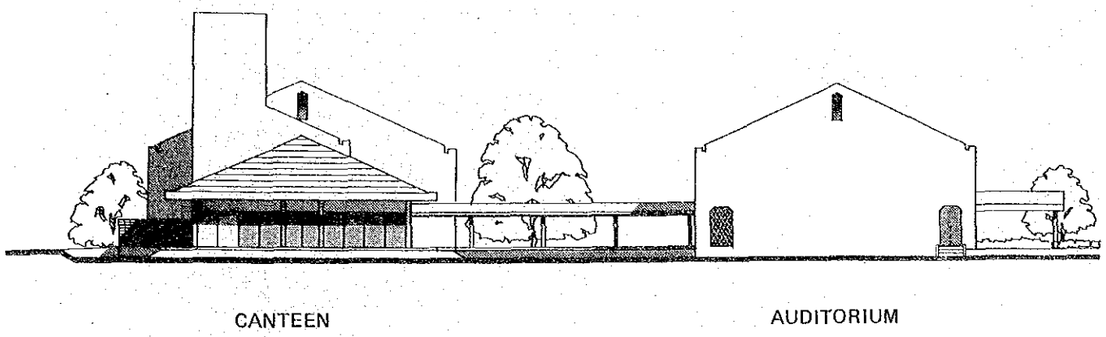
SECTION



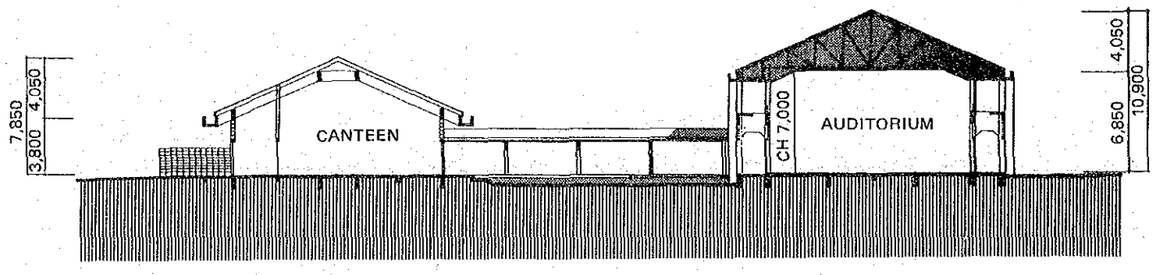
ELEVATIONS & SECTIONS

S1:400

05



SOUTH ELEVATION



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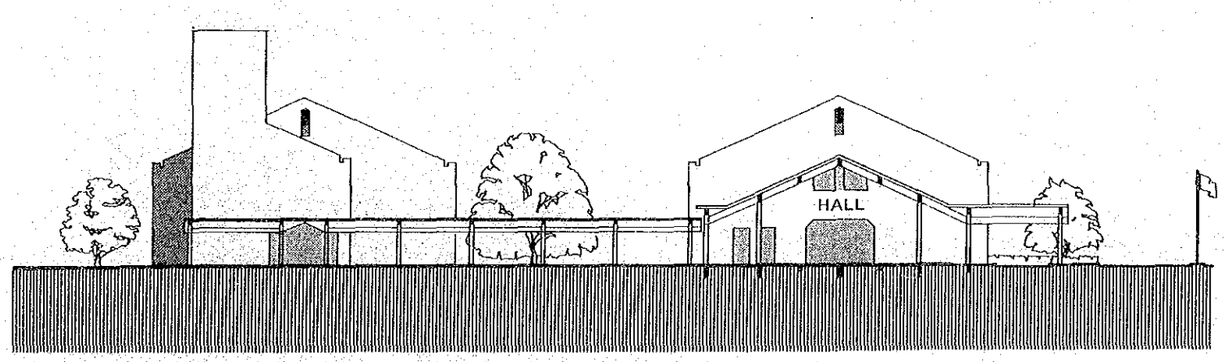

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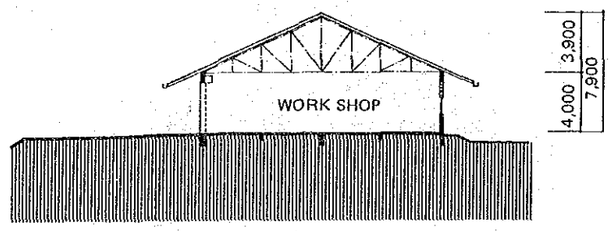

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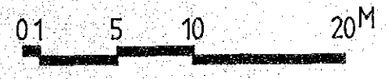


SECTIONS S1:400 06

CHAPTER 6

ORGANIZATION FOR PROJECT IMPLEMENTATION

CHAPTER 6 ORGANIZATION FOR PROJECT IMPLEMENTATION

6-1 Executive Body

The executive body of the Project on the Thai side is the Cooperatives Promotion Department (CPD) of the Ministry of Agriculture and Cooperatives. The basic outline of the Project is determined by CPD and is carried out under the authority of the Director General of CPD. The operation and maintenance of the Center, after completion, will be the responsibility of the chief of the Regional Training Center No.3 under the Training Division of CPD. However, since the Center will serve as the main regional training center, all important decisions related to the Project will be made by a steering committee consisting of the planning section and others concerned in CPD.

6-2 Construction Plan

A. Contracting System

The construction of the Project will be carried out under a general contract system. The contractor is selected through a competitive tender by Japanese contractors prequalified by the government. The tenderer offering the lowest price has his tender examined and evaluated, and following acceptance, enters into contract with the government. The construction commences after the verification of the contract by the government of Japan. That will be approximately 6 months after the Exchange Note concluded by both governments for the Grant Aid extended by the Government of Japan.

B. Construction Plan

In Thailand, the rainy season lasts from May to October, during which more than 70 % of the annual precipitation falls. In planning construction work, it must be noted that at the beginning of the rainy season the excavation work etc. will be somewhat slower than normal.

Japanese portion

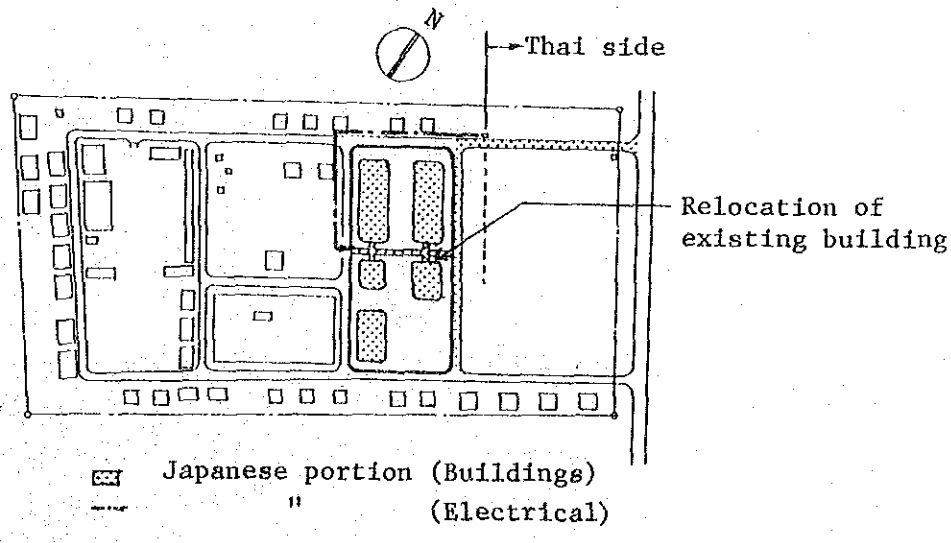
I. Construction Work
   1. Administration and classroom building
   2. Auditorium
   3. Dormitory
   4. Canteen
   5. Workshop
   6. Borehole and well pump
   7. Storage and elevated water tank and pumps
   8. Septic tank
   9. Water supply and drainage in the site
   10. Pavement from main gate to main entrance
   11. Training equipment
   12. Furniture

II. Design
   1. Working drawings
   2. Supervision

Thailand portion

I. Construction Work
   1. Removal of existing building within the site
   2. Clearing of the site
   3. Supply and connection of power and telephone line
   4. Furniture and fixtures other than provided by Japanese side
   5. Gardening
   6. Staff housing
   7. Recreation facilities

Figure 6-1 Work Demarcation



The construction period is estimated to be 9 months, taking into account the overall building scale, structure and facilities of the Center and local construction standards.

C. Supervision

Supervision for the construction of the Center will be carried out by periodical inspection. After signing the contract, the consultant responsible for field supervision will issue instructions to the contractor for the work.

At the same time, the contractor will be consulted and examined regarding the construction schedule. After commencement of the work, the consultant will check the working drawings and supervise fabrication of equipment, tools and materials for training as well as be engaged in color coordination and issue work instructions.

He will also visit the site, when necessary, for spot supervision. Before completion, he will conduct a final inspection and test operations at the site, issue instructions to repair defects or deficiencies, if any, and prepare documents to certify the substantial completion and thus act as a witness to the delivery of the Center from the Contractor to the government.

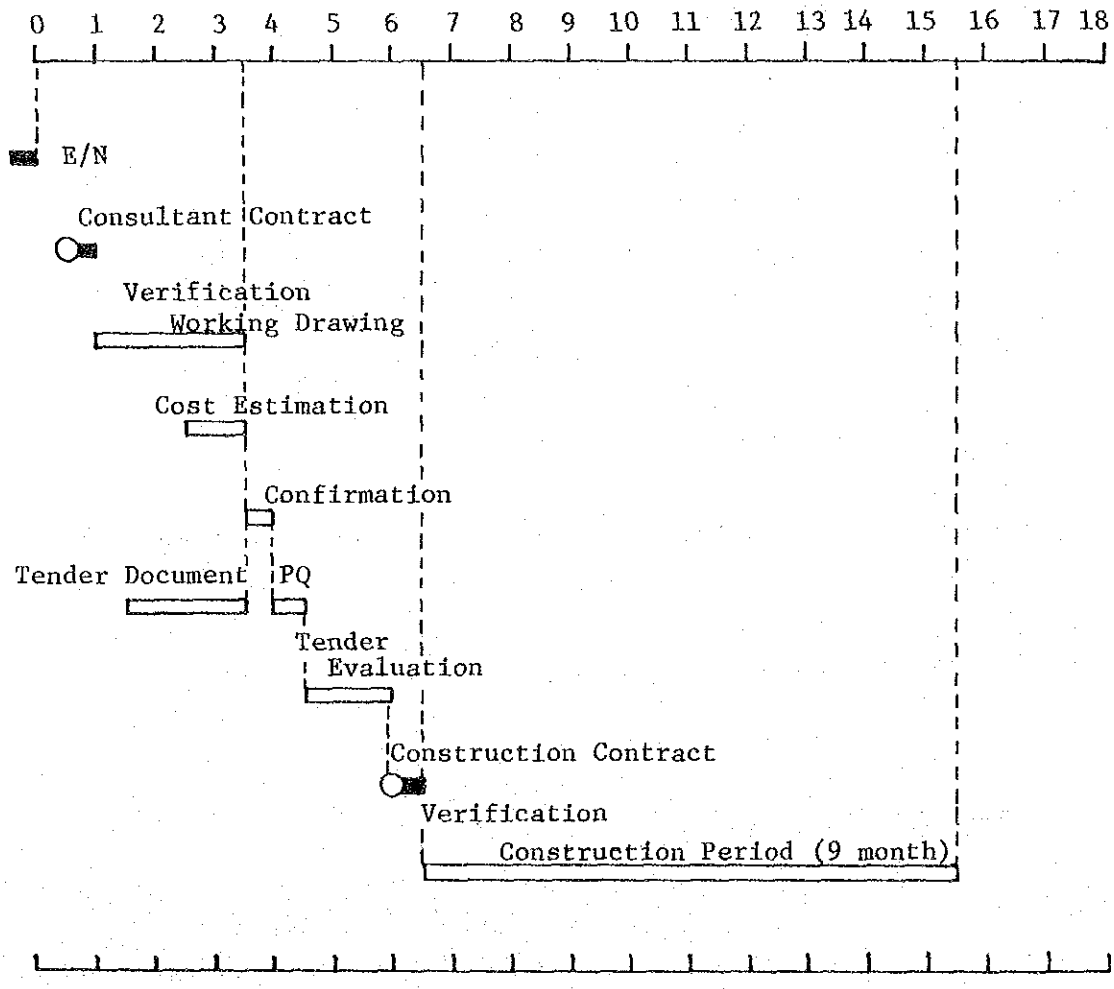
6-3 Scope of Work

The scope of work to be performed under the Grant Aid from the government of Japan and under the responsibility of Thailand is shown at left page:

6-4 Implementation Schedule

When the Project is realized in accordance with the procedure set for the Grant Aid of the government of Japan, the schedule for implementation is planned as follows:

Figure 6-2 Implementation Schedule



6-5 Operation and Maintenance Plan

After the completion of the Agricultural Cooperative Training Center, the Cooperatives Promotion Department of the Ministry of Agriculture and Cooperatives will be responsible for operation and maintenance of all facilities of the Center. The current outline of the plan will be as follows:

6-5-1 Personnel

The number of staff for the Center will be as follows:

Title	Number of persons
Chief	1
Deputy chief	1
Specialist	6
Assistant specialist	6
Trainer	11
Engineer	5
Clerical staff	4
Typist	3
Housekeeper	1
Audio-Visual technician	2
Electrical Engineer	2
Technician	2
Driver	2
Worker	4
total	50

6-5-2 Maintenance

In order for the Center to function properly, the facilities require proper handling and maintenance. Thus, the maintenance and operating system must be established to include engineering staff capable of proper judgement and instructions on various kinds of maintenance problems. In addition, periodical inspections will also be required to enable the maintenance crew to take prompt action against any possible malfunction or deterioration due to aging.

(1) Building

Building maintenance generally includes cleaning and repairing the interior and exterior. Since the fittings and fixtures in the building are frequently used, a sufficient number of maintenance workers are required to flexibly and quickly respond when any trouble occurs.

(2) Mechanical and Electrical Equipment

In order to make effective use of the equipment installed in the buildings, adequate maintenance is important. Details of the equipment should be made familiar to the electrical engineer and the training for the handling of such equipment shall be done.

Each piece of equipment has a certain service life and, therefore, must be replaced or repaired on a regular basis, if it is still in service beyond the specified limit. Thus, the budget must include funds to cover future depreciation.

(3) Training Equipment

Training equipment consists mainly of the audio-visual equipment and the equipment to repair the agricultural machinery which is installed in theworkshop.

As in the case of maintenance of equipment installed in the buildings, technical specialists will be assigned for maintenance and control of such equipment. It is, therefore, important for them to learn how to handle and operate the equipment.
In addition, both routine checks and periodic inspections will be required.

6-5-3 Estimation of Running Costs

The following is an estimate of annual maintenance cost for the Center after its completion:

	baht
Wages and salaries	2,200,000
Running cost	485,000
Maintenance cost	160,000
Total	2,845,000 baht/year

(1) Wage and Salaries

Salary paid by the REC to 33 persons is alloted.
(cf.Appendix III-2-6)

(2) Operation Cost

The operation cost mainly consists of electricity charges, detergent and maintenance expense for the equipment.

(3) Maintenance and Repair Cost

Annual repair cost varies widely according to the frequency of use of the buildings. The estimate was made assuming 50 baht/sqm for buildings and 1% of the purchase price for equipment annually.

6-6 Procurement

Main construction equipment and materials will be selected from those locally available, which leads to easier maintenance after completion. Some construction equipment and materials will have to be procured in Japan because they are not produced and manufactured in Thailand.

The following items are those which are not manufactured in Thailand and are to be brought in from Japan.

Audio visual equipment and materials
Equipement for repair of agricultural machines
Public announcement equipment

CHAPTER 7

PROJECT EVALUATION

CHAPTER 7 PROJECT EVALUATION

Notwithstanding the fact that agriculture is the key industry in Thailand, ranking at top of the total exports and supporting the national economy, the area where the most agricultural production takes place has lagged behind the urban area in terms of its economy and public services.

In an effort to improve this situation, the government of Thailand make it the top priority in the Fifth National Economic and Social Development Plan, giving great consideration to the problem of reducing the gap between the urban and rural areas, improving the living conditions and increasing the income in the Northeast.

In 1979, the Cooperatives Promotion Department of the Ministry of Agriculture and Cooperatives worked out the "Cooperatives Development Plan", aimed at suppling of the necessary materials for agriculture and improving the bargaining power of the farmers through fostering of cooperatives.

To facilitate this, the government realized that training of personnel who will be the leaders and managers of the cooperatives was needed urgently for vitalizing the cooperatives' activities. From this followed the needed to establish a training center to educate and improve the quality of personnel engaged in CPD and cooperatives.

This project is to construct the agricultural regional training center which covers the eight provinces in the Northeast where there participation in cooperatives is lowest and where it is urgent to foster cooperatives to meet the government policy.

The operation of the training facilities will enable an improved quality of training, an expanded scale of training and a resolution to the present problem and inconvenience of renting training facilities from others.

At the center, training activities will be based on live-in dormitory system and instruction using a mobile unit. This training method will encourage exchange of information among the trainees and give them a better understanding of cooperative activities.

Information drawn from the trainees and from the on-site training will be used to produce teaching materials as necessary. Through these methods, the rural conditions known to all the trainees will be reflected in their courses,. Therefore, they can relate to the lectures and easily apply new knowledge on the site.

The expansion of training activities will allow for repeated training of CPD personnel and cooperative officials, thereby incresing their ability. This will revise the cooperative movement and allow for great dissemination of cooperative activities among the farmers.

This should enable them to improve their bargaing power and increse their income level. Therefore, establishing this center for cooperatives in northeast Thailand can be seen as both appropriate and useful.

CHAPTER 8

CONCLUSION AND RECOMMENDATIONS

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

Prior to planning the basic design, the request from the government of Thailand was examined and confirmed, and the background and problems of the training center studied; then the most appropriate basic design which conforms to the local conditions was expected.

The Project envisages the establishment of the Agricultural Regional Cooperatives Training Center in Northeast Thailand, the region to be a focal point in the country because of its poverty and low development, which the government of Thailand has tried to resolve. The Project is expected to provide sufficient results as a Grant Aid Project extended by the government of Japan. It is therefore expected that necessary measures be taken promptly towards the earliest implementation of the Project by both governments.

The objective of the Project, which will be realized with the Grant Aid of Japan, can only be achieved through efficient operation and maintenance on the Thai side. In the budget for 1985, CPD plans to allot 1,843,000 baht (wage and salaries of 355,000 baht, and operation costs of 1,488,000), which responds to 12% of the budget for Regional Training Centers. The costs for maintenance of the Center based upon the estimated budget exceed the budget of 1985, preparation of the new budget, starting when the Project is completed, is necessary.

The following items are recommended for the operation and maintenance of the facilities:

1. Preparation of Annual Training Schedules

The factors to be considered in preparing the schedules are the number of classrooms and facilities available to accommodate the trainees. In determining the training courses and the number of trainees, the facilities should be utilized efficiently throughout the year. Furthermore, the budget should include definite figures for facilities, audio visual equipment, training materials and expendable supplies to be used for each program.

2. Training for Full Time Trainers

It is anticipated that in the early period after opening the Center, there may be a need for temporary outside trainers. However, without the help of the full time trainers as employed by the Center, it will be difficult to establish the training technique, develop the training materials and plan the training programs.
Therefore, the proportion of full time trainers must be increased in due course for effective training. At the same time, an adequate research staff must be employed in addition to the teaching staff.

3. Effective Utilization of Workshop

Workshop training will last for about 6 weeks per year, with each program unit being limited to 1 week. Therefore, the curriculum should aim at knowledge about the operation, repair and overhaul of agricultural equipment. In this connection, it is planned that the workshop facilities will be made available to the cooperatives and, furthermore, should provide facilities to repair equipment if requested to do so by the cooperatives, so that maximum benefit from the workshop can be obtained.

The auditorium will be effectively utilized by being available to other governmental organizations and the neighboring community when not used for training.

APPENDIX I.

I. Basic Design Survey

I-1 Members of the Study Team

Mr. Yoshiyuki INOUE	Leader Deputy Director Department of Agricultural Cooperatives, Bureau of Agricultural Economics, MAFF
Mr. Takuji KAMEYAMA	Project Coordinator, Technical Cooperation Division, Agricultural Development Cooperation Dep., Japan International Cooperation Agency (JICA)
Mr. Seiichi MATSUDA	Architectural Planner Matsuda Consultants International Co.,Ltd
Mr. Hidefumi INOUE	Architectural Designer Matsuda Consultants International Co.,Ltd.
Mr. Yasuo OODERA	Equipment Planner Matsuda Consultants International Co.,Ltd.

I-2 Study Schedule

	DATE	SCHEDULE	
1.	SEP. 2 (SUN)	LV. TOKYO(NRT) AR. BANGKOK	
2.	SEP. 3 (MON)	A.M EMBASSY OF JAPAN & JICA BANGKOK OFFICE	1. Confirmation of study schedule 2. Confirmation of study policy
		P.M DTEC CPD STAFF OF CPD (AS COUNTERPART)	1. Submission of inception report 2. Submission of questionaire

	DATE	SCHEDULE	
3.	SEP. 4 (TUE)	A.M & P.M CPD	1. Discussion on questionaire 2. Study tour to CPD central training center
4.	SEP. 5 (WED)	A.M & P.M CPD	1. Discussion on questionair 2. Study on construction condition in Bangkok
5.	SEP. 6 (THU)	A.M & P.M Study tour	1. Kasesert University Kamphangsaen Campus Central Laboratory 2. National Agricultural Extension and Training Center
6.	SEP. 7 (FRI)	LV. BANGKOK AR. NAKORN RATCHASIMA	1. Study tour at maize center at POPBURI 2. Discussion at CPD Nakorn Rachasima 3. Visit DAE training center
7.	SEP. 8 (SAT)	A.M P.M	1. Study at REC office 2. Site study and Survey
8.	SEP. 9 (SUN)	LV. NAKORN RATCHASIM AR. BANGKOK	1. Site visit at CPD central training center 2. Visit at AIT
9.	SEP.10 (MON)	A.M & P.M CPD	1. Discussion and confirmation on site 2. Study on training course and calicuram
10.	SEP.11 (TUE)	A.M & P.M	1. Discussion for MINUTES 2. Study on Trainers and Trainees
11.	SEP.12 (WED)	A.M P.M CPD	1. Discussion within study team 2. Discussion on facilities
12.	SEP.13 (THU)	A.M CPD	1. Signing of MINUTES 2. Team leader to Embassy of Japan and JICA
13.	SEP.14 (FRI)	A.M & P.M CPD (Mr. Y. INOUE MR. T. KAMEYAMA LV. BANGKOK)	1. Study & collection of relevant information
14.	SEP.15 (SAT)	A.M & P.M	1. Collect information 2. Study tour to Thai Japan youth center
15.	SEP.16 (SUN)	A.M & P.M	1. Collect information on construction
16.	SEP.17 (MON)	A.M CPD P.M	1. Final meeting with CPD 2. Reporting the result to the Embassy and JICA
17.	SEP.18 (TUE)	LV. BANGKOK AR. TOKYO(NARITA) (MRS. S. MATSUD H. INOUE Y. ODERA)	

MINUTES OF DISCUSSIONS
ON
THE CONSTRUCTION PROJECT
OF
THE REGIONAL COOPERATIVE TRAINING CENTER
IN
THE KINGDOM OF THAILAND

In response to the request made by the Government, of the Kingdom of Thailand for the construction project of the Regional Cooperative Training Center, located in Nakorn Ratchasima Province (hereinafter referred to as "the Project"), the Government of Japan, through Japan International Cooperation Agency (JICA) has dispatched a Basic Design Study Team headed by Mr. Yoshiyuki INOUE (hereinafter referred to as "the Team") to conduct the Basic Design Study on the Project from September 2nd to September 18th, 1984.

The Team has carried out a field survey, had series of discussions and exchanged views with Thai Government Authorities concerned with the Project.

As a result of the study and discussions both parties have agreed to recommend to their respective Governments to examine the result of study attached herewith towards the realization of the Project.

Bangkok, September 13th, 1984

Mr. Yoshiyuki INOUE
Leader
Japanese Study Team
Japan International
Cooperation Agency

Mr. Chern Bamrungwong
Director-General
Cooperatives Promotion Department
Ministry of Agriculture and
Cooperatives

ATTACHMENTS

1. The objective of the Project is to provide necessary building facilities and equipment for the Regional Cooperative Training Center, located in Nakorn Ratchasima Province, the Kingdom of Thailand.

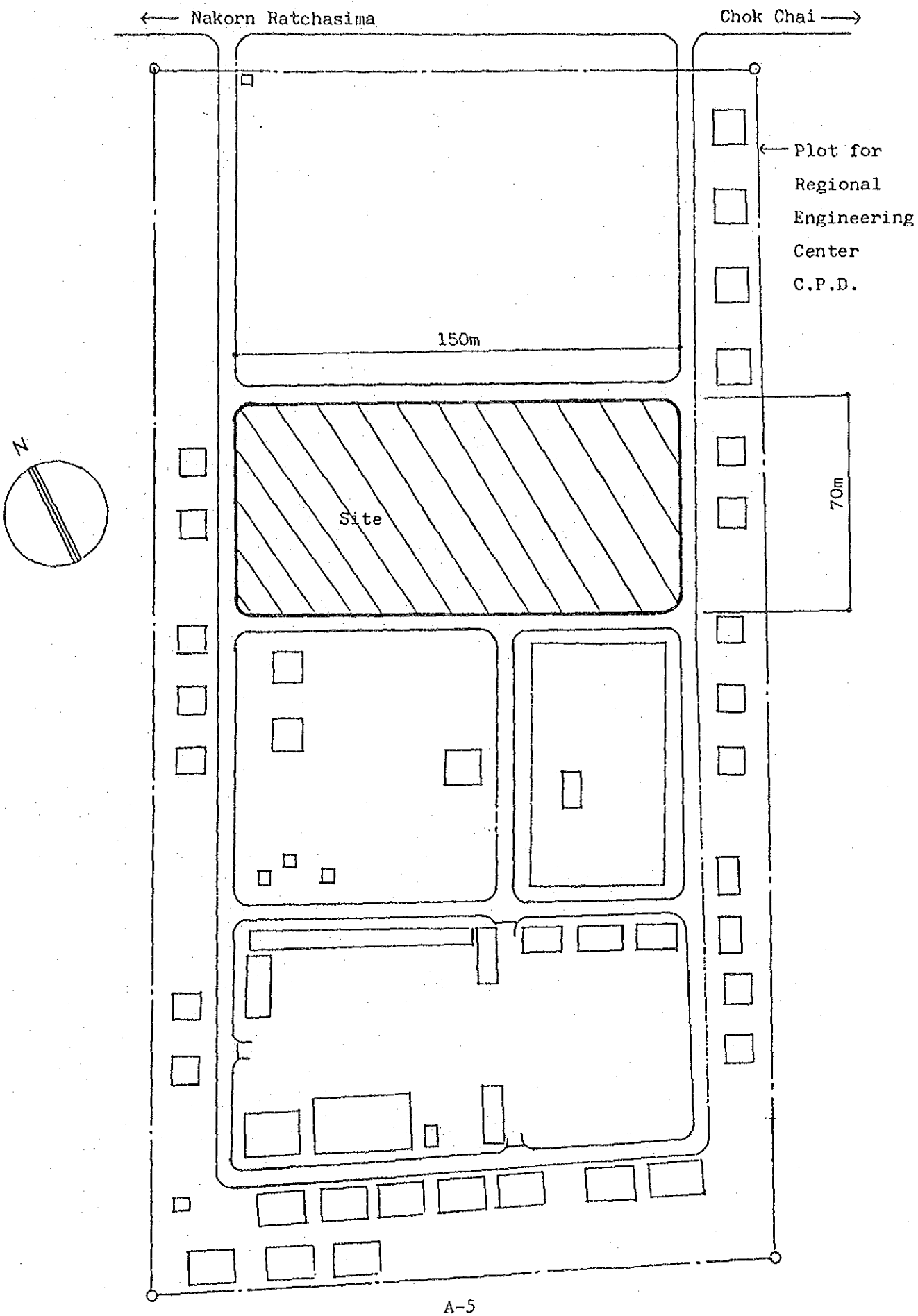
2. The site of the Project has been acquired by the Government of the Kingdom of Thailand (hereinafter referred to as " the Project Site ") as attached in Annex 1.

3. The Japanese Study Team will convey to the Government of Japan the desire of the Government of the Kingdom of Thailand that the former takes necessary measures to co-operate in implementing the Project and provides necessary facilities and other items as listed in Annex 2 within the scope of Japanese economic cooperation in Grant form.

4. The Government of the Kingdom of Thailand has understood Japan's Grant Aid system explained by the Team which includes a principle of use of a Japanese consultant and Japanese general contractor for implementation of the Project.

5. The Government of the Kingdom of Thailand will take necessary measures as listed in Annex 3 on condition that Grant Aid by the Government of Japan is extended to the Project.

Annex 1. Site for Regional Cooperative Training Center in Nakorn Ratchasima



Annex 2. The items of facilities and related equipment required by the Government of the Kingdom of Thailand are as follows:

1) Classrooms

2) Offices

3) Auditorium

4) Dormitory

5) Kitchen and Canteen

6) Workshop and Garage

7) Mobile Unit

8) Others

Annex 3. Following arrangements will be required to be taken by the Government of the Kingdom of Thailand.

1) To provide respective data and information to Japanese Consultant and Contractor necessary for detailed engineering services and construction.

2) To carry out site preparation such as clearing, filling, leveling and access road before commencement of construction works.

3) To provide space necessary for such construction on temporary offices, working area, stock yard and others.

4) To provide facilities for distribution of electricity, water supply, drainage, telephone lines and other incidental facilities to the Project Site.

5) To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Thailand and prompt internal transportation therein of the products purchased under the grant.

6) 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.

7) 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.

8) To undertake incidental civil works such as gardening, fencing, gates, garage, and exterior lighting.

9) To furnish general furniture for the Center.

10) To maintain and use properly and effectively the facilities constructed and equipment purchased under the grant.

APPENDIX II.

II. Confirmation of Basic Design

II-1 Members of the Study Team

Mr. Yoshiyuki INOUE	Leader Deputy Director Department of Agricultural Cooperatives, Bureau of Agricultural Economics, MAFF
Mr. Yoshifusa SHIKAMA	Project Coordinator, Basic Design Division Grant Aid Department, Japan International Cooperation Agency (JICA)
Mr. Seiichi MATSUDA	Architectural Planner Matsuda Consultant International Co.,Ltd.
Mr. Hidefumi INOUE	Architectural Designer Matsuda Consultant International Co.,Ltd.

II-2 Study Schedule

	DATE	SCHEDULE	
1.	DEC. 11 (TUE)	LV. TOKYO(NRT) AR. BANGKOK	TG 741
2.	DEC. 12 (WED)	A.M JICA BANGKOK OFFICE & JAPANESE EMBASSY	1. Explanation of the draft report of the Basic Design 2. Confirmation of study schedule
		P.M CPD STAFF OF CPD	1. Submission of draft report of the Basic Designt 2. Confirmation of study schedule
3.	DEC. 13 (THU)	A.M CPD	1. Meeting with Director-General 2. Explanation of the draft report
		P.M DETC CPD	1. Explanation of the Report 2. Detail Discussion
4.	DEC. 14 (FRI)	A.M & P.M CPD	1. Discussion on draft report 2. Discussion on Minutes 3. Signing of the Minutes
5.	DEC.15 (SAT)	A.M & P.M	1. Site Study
6.	DEC. 16 (SUN)	A.M & P.M	1. Visit Related Facilities 2. Study Team Meeting
7.	DEC.17 (MON)	A.M CPD P.M JICA & EMBASSY	1. Reporting the result to the Embassy and JICA
8.	DEC.18 (TUE)	LV. BANGKOK AR. TOKYO(NARITA)	TG740

II-3 Minutes

MINUTES OF DISCUSSIONS
ON
THE DRAFT FINAL REPORT OF THE BASIC DESIGN STUDY
ON
THE REGIONAL COOPERATIVE TRAINING CENTER
IN
THE KINGDOM OF THAILAND

The Government of Japan has sent, through Japan International Cooperation Agency (JICA), a Mission to the Kingdom of Thailand from December 11th to December 18th, 1984 for the purpose of presenting and explaining the Draft Final Report of the Basic Design Study (The Report) on the Project.

The team held meetings with the authorities concerned of Thai side headed by Mr.Chern Bamrungwong, Director-General, Cooperatives Promotion Department, Ministry of Agriculture and Cooperatives, to explain and to discuss on the Report.

The main items which were discussed and understood by both parties at the meetings are as follows:

1. The Thai side principally agreed upon the Report and appropriate alterations in design during the discussions which will be incorporated in the Final Report.
2. The Final Report (10 copies in English) on the Project will be submitted to the Government of Thailand by the end of February, 1985.
3. Both sides confirmed that the Thai side understood the system of Grant Aid Programme to be extended by the Government of Japan, especially the arrangements to be taken by the Government of Thailand as agreed in the Minutes for the Project dated September 13th, 1984.

Bangkok, December 14th, 1984

Mr. Yoshiyuki INOUE
Leader,
Japanese Study Team

Mr. Chern Bamrungwong
Director-General
Cooperatives Promotion Department
Ministry of Agriculture and Cooperatives

APPENDIX III.

III. Other Information

III-1 List of Officials Concerned

Department of Technical and Economic Cooperation (DTEC)

Mr. Kasem Unahasuvan	Deputy Director General
Mr. Tnawal Polpuech	Director, Colombo Plan Sub-Division
Mr. Sutin Susila	Staff-Member, Colombo Plan Sub-Division
Mr. Tirath Viputtikullavat	- ditto -

Ministry of Agriculture and Cooperatives

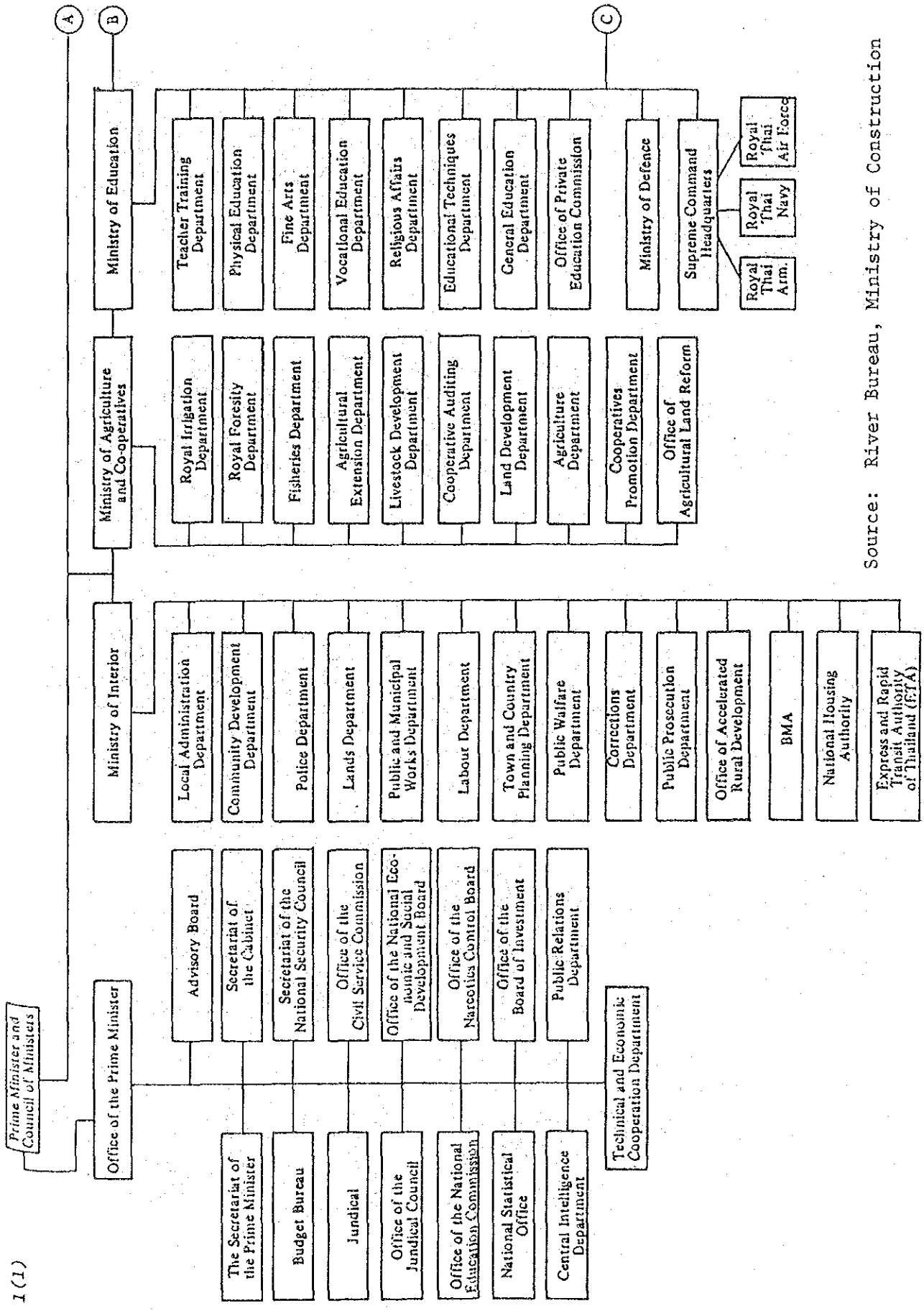
Mr. Yukio Ohata	JICA Expert Foreign Agricultural Relations Division
Mr. Chern Bamrungwong	Director-General, Cooperatives Promotion Department
Mr. Wangchai Khao Saard	Deputy Director-General, CPD
Mr. Chaiya Jarit-Nagram	Director, Engineering Division, CPD
Mr. Suprab Sewatasai	Director, Training Division, CPD
Mr. Boonnuk Pichkorn	Director, Planing Division, CPD
Mr. Chote Suvipakit	Director, Foreign Agricultural Relations Division
Mrs. Thada Kiriratnikon	Director, Technical Division, CPD
Miss Peerarat Aungurarat	Chief, Office of Project Management, CPD
Miss Rachaneewan Prathonthong	Project Management Office, CPD Senior Policy and Plan Analyst
Mr. Ruangchai Boonyanani	Staff, Training Division, CPD Senior Training Officer
Mr. Vichai Sasirachsiri	Staff, Engineering Division, CPD Civil Engineer

Mr. Manocho Sukulsing	
Mr. Witaya Chinchantawong	Policy and Plan Analyst Official
Mr. Chaovarat Ngamchorvithayanon	Director of Provincial Cooperative Office
Mr. Somponk Bouranasopone	Deputy Director of PCO
Mrs. Sumoi Phakakarn	Cooperative Technician
Miss Ratchaneewan Pratumtong	Policy and Plan Analyst Official

Japanese Side

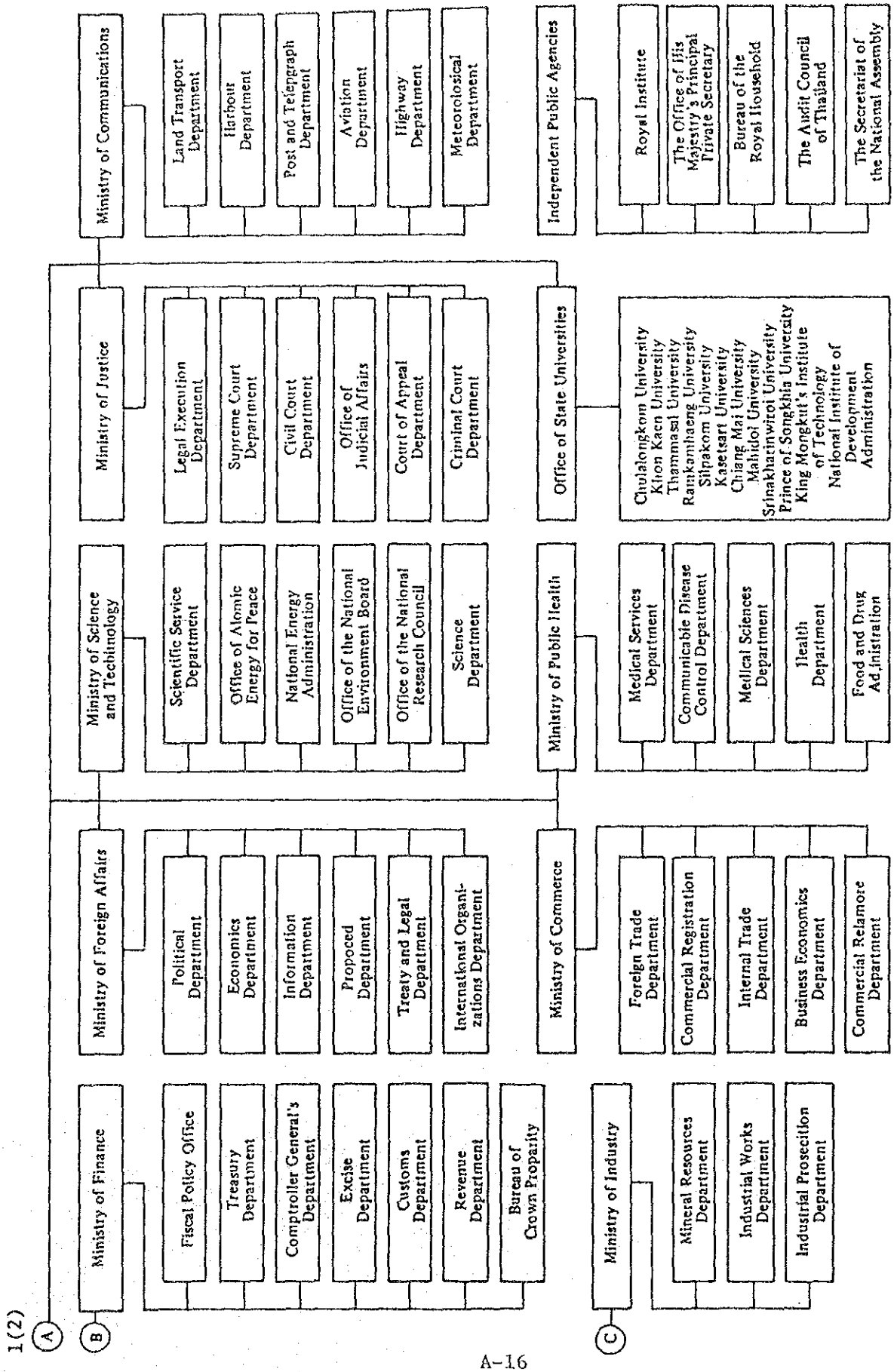
Mr. Kazuyoshi Urabe	Counsellor, Embassy of Japan
Mr. Hitoshi Miyake	First Secretary, Embassy of Japan
Mr. Hiroyuki Hashizume	Assistant to Economic Counsellor, Embassy of Japan
Mr. Akira Kasai	Director Resident Representative, JICA
Mr. Ikufumi Tomimot	Assistant Resident Representative, JICA
Mr. Keizaburo Kawaguchi	Kasetsart University Team Leader, KU-JAPAN Project
Mr. Kiyohisa Ogawa	Kasetsart University, Expert in Agri. Mechanization
Mr. Tsugio Nagai	Kasetsart University Expert in Agri. Extension
Mr. Toshio Oshiro	Kasetsart University Liaison Officer, KU-JAPAN Project
Mr. Tatsuji Murai	Expert, Maize Development Project

III-2-1 Structure of the Thai Government 1



Source: River Bureau, Ministry of Construction

III-2-1 Structure of the Thai Government 2



Source: River Bureau, Ministry of Construction

III-2-2 Training Program

Course	Course length (week)	1983		1984		1985		1986		1987		Trainers	
		Trainees	Week duration	Trainees	Week duration	Trainees	Week duration	Trainees	Week duration	Trainees	Week duration	No. of Trainers per course	Invited trainers
1. Training of CPD district officials	1	114	2	56	1	120	2	180	3	180	3	10	5
2. Training of CPD officials on coop. promotion	1	–	–	30	1	100	2	150	3	200	4	10	5
3. Training of cooperative technicians	1	–	–	–	–	70	2	120	3	120	4	10	7
4. Training for trainers on skilled development	1	–	–	30	1	30	1	30	1	30	1	10	7
5. Seminar of agricultural cooperatives' chairmen	1	60	2	100	3	100	3	150	4	200	6	10	–
6. Training of CPD officers on promotion of thrifts and credit cooperatives	1	–	–	–	–	100	2	200	4	300	6	10	2
7. Training of group leaders of agricultural cooperatives	0,5	540	5	1400	10	1500	10	1600	10.5	1800	12	5	1
8. Training on role and responsibilities of committeemen of agricultural cooperative	1	75	1	800	16	2100	30	2300	33	2500	36	10	3
9. Training of committeemen and managers of provincial agricultural cooperative federation	0.5	–	–	75	1	120	1.5	120	2	120	2	5	–
10. Training of cooperative staff on repairing of farm machinery	4	–	–	–	–	–	–	30	4	30	4	5	2
11. Basic training for agricultural credit staff	3	37	3	105	9	105	9	150	12	150	12	15	10
12. Basic training for accounting staff	3	31	3	105	9	105	9	150	12	150	12	15	10
13. Development of agricultural cooperative credit staff efficiency	1	60	2	105	3	105	3	150	4	150	4	10	7
14. Development of agricultural cooperative accounting staff efficiency	1	52	2	105	3	105	3	150	4	150	4	10	7
15. Training for committeemen and staff of non-agricultural cooperatives	1	100	3	120	3	120	3	200	5	300	7	10	–
16. Training for officials of other agencies in the region	1	–	–	–	–	350	7	350	7	350	7	10	–
Sub-total (courses utilizes training facilities)	–	1069	23	3031	60	5,130	87.5	6,030	111.5	6,730	124	$\bar{x}$=9.69	$\bar{x}$=4.12
Mobile training													
17. Training of cooperative members on operation, maintenance and repairing of farm machinery	1	60	1	240	4	270	4	360	6	420	7	5	–
18. Training for agricultural cooperatives members	0.2 (1-day)	–	–	180	1.2	600	4	1000	6	1200	7	3	–
19. Training for agricultural cooperative members under restructuring program	0.5	6400	40	6400	40	6400	40	6400	40	6400	40	3	–
20. Training for newly recruited cooperative members	0.2	2860	10.4	600	4	900	6	1200	8	1200	8	3	–
21. Training for agricultural coop. members in land consolidation areas	1	–	–	–	–	200	10	250	12	300	15	3	1
22. Cooperative promotion to general public	0.2	2000	4	3000	4	3000	4	3500	5	4000	6	3	1
Sub-total (Mobile training)	–	11,320	56,4	10,420	53.2	11,340	68	12,710	77	13,520	83	$\bar{x}$=3.3	$\bar{x}$=0.31
Total	–	12,389	78,4	13,451	113.2	16,470	155.5	18,740	188.5	20,250	207		

III-2-3 1987 Training Schedule

Course	1986			1987								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
1. Training of CPD district officials		60										
2. Training of CPD officials on coop. promotion			50									
3. Training of cooperative technicians			30									
4. Training for trainers on skilled development	30											
5. Seminar of agricultural cooperatives' chairmen				33								
6. Training of CPD officers on promotion of thrifts and credit cooperatives										50		
7. Training of group leaders of agricultural cooperatives	75											
8. Training on role and responsibilities of committeemen of agricultural cooperative	70											
9. Training of committeemen and managers of provincial agricultural cooperative federation				30								
10. Training of cooperative staff on repairing of farm machinery						30						
11. Basic training for agricultural credit staff		38										
12. Basic training for accounting staff			38									
13. Development of agricultural cooperative credit staff efficiency						38						
14. Development of agricultural cooperative accounting staff efficiency							38					
15. Training for committeemen and staff of non-agricultural cooperatives									43			
16. Training for officials of other agencies in the region					50							
TOTAL NO. OF TRAINERS	15 25 15 5	10 20 20 25	35 35 25 30	35 45 35 40	35 25 30 35	30 25 25 35	20 20 25 25	20 25 20 25	20 35 25 15	35 25 25 30	20 25 25 50	30 25 20 25
TOTAL NO. OF TRAINEES	145 175 145 75	70 130 130 98	158 158 175 143	158 191 141 131	158 133 153 188	213 138 138 188	108 108 183 163	120 108 113 113	113 151 108 38	151 108 158 143	113 108 108 169	163 108 120 88
17. Training of cooperative members on operation, maintenance and repairing of farm machinery												
18. Training for agricultural cooperatives members												
19. Training for agricultural cooperative members under restructuring program												
20. Training for newly recruited cooperative members												
21. Training for agricultural coop. members in land consolidation areas												
22. Cooperative promotion to general public												
TOTAL NO. OF TRAINERS	– – – –	6 6 6 6	3 3 6 6	3 6 6 6	9 6 6 3	3 3 3 3	3 3 3 3	9 9 9 6	3 3 3 3	3 3 3 3	6 6 6 6	– – – –
TOTAL NO. OF TRAINEES	– – – –	100 100 100 100	80 80 100 100	80 110 110 110	140 110 110 150	80 150 80 150	80 150 80 150	260 150 260 230	80 80 80 80	80 80 80 80	100 100 100 100	– – – –

III-2-4 Number of Cooperatives in Target Provinces

Number of Cooperative Societies, member, and staff

In 8 provinces of Northeastern region at May 31, 1984

Province	No. of Dis tric ts	Type of Cooperative															
		Agriculture			Consumer			Thrifts & Credit			Service			Land Settlement			
		Socie-ties	member	Staff	Societies	member	Staff	Societies	member	Staff	Societies	member	Staff	Societies	member	Staff	
Nakhon Ratchasima	21	32	35,028	171	7	8,424	38	6	21,088	35	1	21	-	2	1,702	2	
Buriram	14	21	12,234	45	4	1,047	8	4	12,351	30	2	532	7	1	1,117	2	
Roi Et	15	23	16,641	56	-	-	3	3	9,809	22	2	104	1	-	-	-	
Si Sa Ket	14	18	18,626	64	3	2,675	8	4	10,960	25	5	426	3	-	-	-	
Ubon Ratchathani	21	28	26,028	96	6	6,839	18	10	10,935	52	4	570	7	1	706	2	
Yasothon	8	10	6,797	27	3	1,802	8	3	5,143	13	1	89	1	-	-	-	
Chaiyaphum	13	19	13,337	55	3	1,907	4	3	8,682	22	2	75	1	1	1,508	2	
Surin	13	24	23,934	97	3	262	4	5	12,052	39	1	31	1	-	-	-	
Total	119	175	152,625	611	29	22,956	91	38	101,020	238	18	1,848	21	5	5,033	8	

Data of Provincial and District CPD officers

Province	Provincial CPD office			District CPD office		
	1 Senior Staff	2 Others officers	3 Employees	4 Officers	5 Employees	1-5 Total
Nakhon Ratchasima	3	8	7	56	21	95
Buriram	3	3	6	27	12	51
Roi-Et	3	2	5	33	15	58
Si Sa Ket	3	3	6	28	13	53
Ubon Ratchathane	3	5	6	45	16	75
Yasothon	1	3	3	16	8	31
Chaiyaphum	3	3	4	26	12	48
Surin	3	4	7	25	12	51
TOTAL	22	31	44	256	109	462

III-2-6 CPD Approved Budget (F.Y. 1984 and 1985)

Cooperatives Promotion Department

Approved budget of F.Y. 1984 and 1985

1,000 Baht.

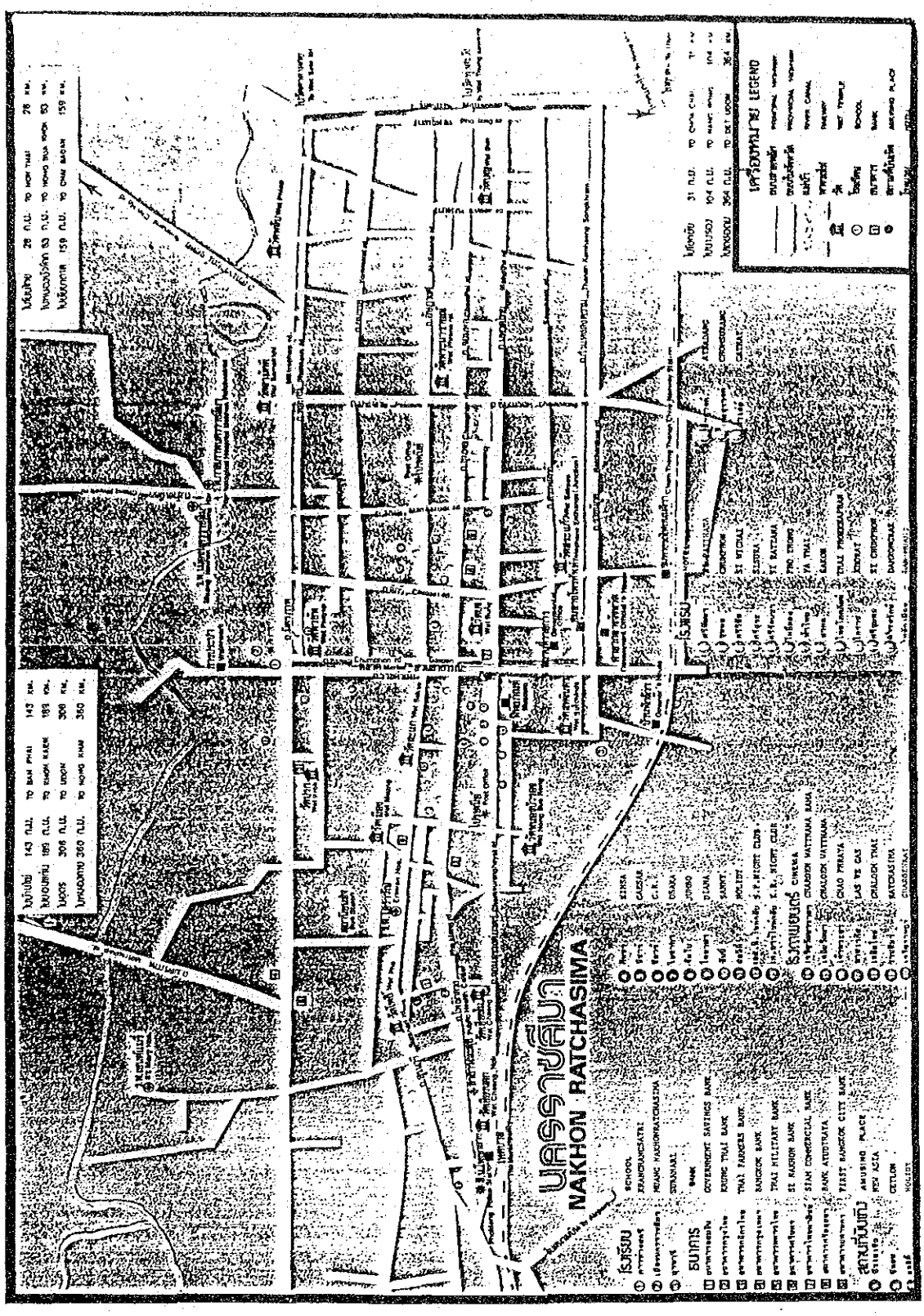
	details of budget	fiscal year 1984	fiscal year 1985
1	Total Budget of CPD	535,724	562,688
	1.1 Salary and wages	270,337	276,925
	1.2 Operational expenses	125,948	153,613
	1.3 Equipment and Construction expenses	96,263	94,278
	1.4 Subsidy	43,176	37,872
2	Budget for Cooperative training	20,125	21,879
	2.1 Salary and wages	5,586	6,524
	2.2 Operational expenses	12,100	12,128
	2.3 Equipment and Construction expenses	2,438.7	3,227
3	CPD budget for regional cooperative training	12,405.4	15,306.5
	- Salary and wages	2,932	3,414.1
	- Operational expenses	7,094.7	8,781.9
	- Equipment and construction	2,378.7	3,110.5
4	CPD budget for regional Training center No. 3 (Nakhon Ratchasima Province)	1,328.4	1,843
	- Salary and wages	300	355
	- Operational expenses	1,028.4	1,488
5	Cooperative promotion fund	530	600

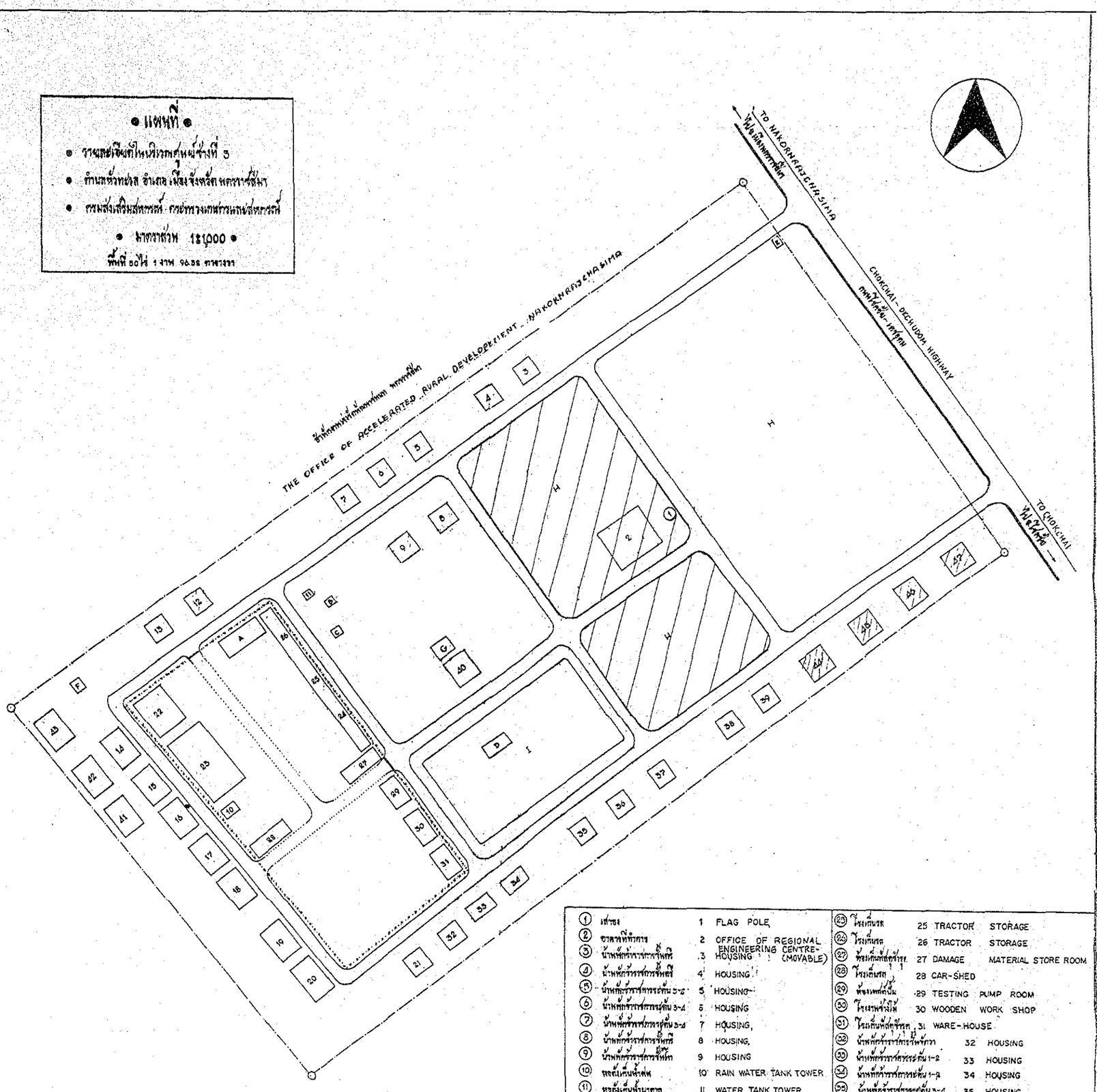
III-2-7 Wages and Salaries

Title	Number of Persons	PC Level	Wages and Salaries per Month	Number of Month	Total
			฿		฿
Chief	1	7	14,000	12	168,000
Deputy Chief	1	7	13,000	12	156,000
Trainer	11	6	12,000	10	1,320,000
Engineer	-	-			
Clerical Staff	4	2	3,900	12	187,000
Typist	3	1	2,000	12	48,000
Housekeeper	1	2	3,800	12	45,600
A.V. Technician	2	2	3,800	10	72,000
Electrical Engineer	2	2	3,800	10	72,000
Technician	2	2	2,500	10	50,000
Driver	2	-	1,500	10	36,000
Worker	4	-	1,300	10	52,000
				Total	2,206,800
					2,200,000

III-3 General Description of Proposed Site

III-3-1 Map of Nakhon Ratchasima





• แผนที่ •

• ราชบัณฑิตยสถานวิศวกรศาสตร์แห่งที่ 3

• กำแพงชั้นที่ ตำบล เมือง จังหวัด นครราชสีมา

• กรมส่งเสริมสหกรณ์ กระทรวงเกษตรและสหกรณ์

• มาตราส่วน 1:1,000 •

พื้นที่ 50 ไร่ 1 งาน 90.56 ตารางวา

LAYOUT OF REGIONAL ENGINEERING CENTRE No.3

COOPORATIVES PROMOTION DEPARTMENT

TAMBOL HUATALAY AMPHURE MUANG

NAKHORN RAJCHASIMA PROVINCE

SCALE 1:1,000

AREA = 50 RAI (19.76 ACER)

①	เสาธง	1 FLAG POLE
②	อาคารที่ทำการ	2 OFFICE OF REGIONAL ENGINEERING CENTRE-(MOVABLE)
③	บ้านพักข้าราชการชั้นเดี่ยว	3 HOUSING
④	บ้านพักข้าราชการชั้นเดี่ยว	4 HOUSING
⑤	บ้านพักข้าราชการชั้นประทวน 5-6	5 HOUSING
⑥	บ้านพักข้าราชการชั้นประทวน 3-4	6 HOUSING
⑦	บ้านพักข้าราชการชั้นประทวน 3-4	7 HOUSING
⑧	บ้านพักข้าราชการชั้นเดี่ยว	8 HOUSING
⑨	บ้านพักข้าราชการชั้นโท	9 HOUSING
⑩	หอถังเก็บน้ำประปา	10 RAIN WATER TANK TOWER
⑪	หอถังเก็บน้ำบาดาล	11 WATER TANK TOWER
⑫	บ้านพักข้าราชการชั้นประทวน	12 HOUSING
⑬	บ้านพักข้าราชการชั้นประทวน	13 HOUSING
⑭	บ้านพักลูกจ้าง 4 ครอบครัว	14 WORKER LODGING
⑮	บ้านพักลูกจ้าง 4 ครอบครัว	15 WORKER LODGING
⑯	บ้านพักลูกจ้าง 4 ครอบครัว	16 WORKER LODGING
⑰	บ้านพักลูกจ้าง 4 ครอบครัว	17 WORKER LODGING
⑱	บ้านพักลูกจ้าง 4 ครอบครัว	18 WORKER LODGING
⑲	บ้านพักลูกจ้าง 4 ครอบครัว	19 WORKER LODGING
⑳	บ้านพักลูกจ้าง 4 ครอบครัว	20 WORKER LODGING
㉑	บ้านพักข้าราชการชั้นประทวน	21 HOUSING
㉒	ที่เก็บพัสดุ	22 WARE HOUSE
㉓	โรงซ่อมเครื่องจักรกล	23 MACHINE WORK SHOP
㉔	โรงเก็บรถ	24 TRACTOR STORAGE
㉕	โรงเก็บรถ	25 TRACTOR STORAGE
㉖	โรงเก็บรถ	26 TRACTOR STORAGE
㉗	ห้องเก็บพัสดุชำรุด	27 DAMAGE MATERIAL STORE ROOM
㉘	โรงเก็บรถ	28 CAR-SHED
㉙	ห้องเครื่องสูบน้ำ	29 TESTING PUMP ROOM
㉚	โรงงานช่างไม้	30 WOODEN WORK SHOP
㉛	โรงเก็บพัสดุชำรุด	31 WARE-HOUSE
㉜	บ้านพักข้าราชการชั้นสัญญา	32 HOUSING
㉝	บ้านพักข้าราชการชั้นประทวน 1-2	33 HOUSING
㉞	บ้านพักข้าราชการชั้นประทวน 1-2	34 HOUSING
㉟	บ้านพักข้าราชการชั้นประทวน 3-4	35 HOUSING
㊱	บ้านพักข้าราชการชั้นประทวน 3-4	36 HOUSING
㊲	บ้านพักข้าราชการชั้นประทวน 3-4	37 HOUSING
㊳	บ้านพักข้าราชการชั้นเดี่ยว	38 HOUSING
㊴	บ้านพักข้าราชการชั้นโท	39 HOUSING
㊵	บ้านพักข้าราชการชั้นประทวน 5-6	40 HOUSING
㊶	บ้านพักลูกจ้าง 4 ครอบครัว	41 WORKER LODGING
㊷	บ้านพักลูกจ้าง 4 ครอบครัว	42 WORKER LODGING
㊸	บ้านพักลูกจ้าง 4 ครอบครัว	43 WORKER LODGING
㊹	บ้านพักข้าราชการฝึกอบรม	44 TRAINING CENTER HOUSE
㊺	บ้านพักข้าราชการฝึกอบรม	45 DITTO
㊻	บ้านพักข้าราชการฝึกอบรม	46 DITTO
㊼	บ้านพักข้าราชการฝึกอบรม	47 DITTO
	AREA TO BE ESTABLISHED THE REGIONAL TRAINING CENTRE	

Ⓐ	โรงเก็บรถ	A TRACTOR STORAGE
Ⓑ	บ่อน้ำบาดาล	B ARTESIAN WELL
Ⓒ	โรงสูบน้ำบาดาล	C PUMPING HOUSE
Ⓓ	ศาลาพักร้อน	D THAI NATIVE HOUSE
Ⓔ	ป้อมยาม	E GUARD HOUSE
Ⓕ	ห้องเก็บพัสดุย่อย	F STORE ROOM
Ⓖ	ครัว-ห้องเก็บของ	G KITCHEN-STORE
Ⓗ	สนามหญ้า	H LAWN
Ⓘ	สระน้ำ	I POND

พ.ศ. ๒๕๒๕
(A.D. 1982)

ค่าเฉลี่ยผลการตรวจอุณหภูมิอากาศเฉพาะเวลาเป็นองศาเซลเซียส
Mean Air Temperature in Degrees Celsius observed at **fixed hours**

สถานีตรวจอากาศ นครราชสีมา
Nakhon Ratchasima Meteorological Station

เดือน Month	เวลาทำการตรวจ Hours of Observation								ค่าปานกลาง สูงสุด Mean Max.	ค่าปานกลาง ต่ำสุด Mean Min.	ค่าปานกลาง Mean $\frac{\text{Max.} + \text{Min.}}{2}$	สูงสุด Extreme Max.	วันที่/เดือน Date/Month	ต่ำสุด Extreme Min.	วันที่/เดือน Date/Month	ค่าปานกลาง ระยะเปลี่ยนประจำวัน Mean Diurnal Range
	0100	0400	0700	1000	1300	1600	1900	2200								
ม.ค. Jan	19.4	17.8	16.5	23.2	28.0	29.6	25.7	21.3	30.0	16.0	23.0	32.4	25	12.5	10	13.8
ก.พ. Feb	24.3	23.0	21.9	26.6	31.4	33.1	29.2	26.5	33.4	21.4	27.4	37.8	25	17.8	2	12.0
มี.ค. Mar	26.9	25.5	24.5	30.1	34.4	35.2	31.3	28.6	36.0	24.2	30.1	39.5	24	21.9	26	11.8
เม.ย. Apr	25.6	24.6	24.5	29.5	32.7	33.1	29.2	27.1	34.3	23.9	29.1	38.8	28	20.3	6	10.4
พ.ค. May	27.1	26.2	26.3	31.5	34.6	33.8	30.5	28.4	36.0	25.4	30.7	39.5	13	23.1	14, 18	10.6
มิ.ย. Jun	26.1	25.4	25.8	29.8	32.6	32.4	28.6	26.8	33.5	24.7	29.1	36.4	3	23.2	8	8.8
ก.ค. Jul	25.9	25.2	25.3	30.1	32.4	32.7	29.1	26.9	33.7	24.6	29.2	36.0	7	22.1	22	9.2
ส.ค. Aug	25.4	24.9	24.8	28.6	30.5	31.0	28.6	26.3	32.1	24.2	28.2	35.8	3	22.2	25	7.8
ก.ย. Sep	24.6	24.1	24.1	27.4	29.7	28.7	26.3	25.3	30.7	23.4	27.1	33.7	22	20.4	10	7.3
ต.ค. Oct	24.6	23.9	24.0	28.3	30.5	29.8	27.2	25.5	31.4	23.3	27.4	33.2	9	21.8	16, 20	8.1
พ.ย. Nov	24.0	23.2	22.9	27.7	30.3	30.4	27.6	25.6	31.2	22.4	26.8	32.8	15	19.1	11	8.8
ธ.ค. Dec	18.4	17.1	16.1	22.0	26.0	27.1	23.4	20.3	27.5	15.7	21.6	32.7	4, 5	8.6	29	11.8
ค่าปานกลาง Mean	24.4	23.4	23.1	27.9	31.1	31.4	28.1	25.7	32.5	22.4	27.5	—	—	—	—	10.0
สูงสุดและต่ำสุด Extremes	—	—	—	—	—	—	—	—	—	—	—	39.5	24/3, 13/5	8.6	29/12	—

พ.ศ. ๒๕๒๕ (A.D. 1982)

ค่าเฉลี่ยผลการตรวจความชื้นสัมพัทธ์เฉพาะเวลาเป็นเรือนร้อย

Mean Relative Humidity in percent observed at fixed hours

สถานีตรวจอากาศ นครราชสีมา

Nakhon Ratchasima Meteorological Station

เดือน Month	เวลาทำการตรวจ Hours of Observation								ค่าปานกลาง Mean	ค่าปานกลางสูงสุด Mean Max.	ค่าปานกลางต่ำสุด Mean Min.	สูงสุด Extreme Max.	วันที่/เดือน Date/Month	ต่ำสุด Extreme Min.	วันที่/เดือน Date/Month
	0100	0400	0700	1000	1300	1600	1900	2200							
ม.ค. Jan	75.4	80.7	85.4	58.5	42.1	36.5	52.4	68.6	62.4	86.0	36.4	93.0	6	27.0	25
ก.พ. Feb	74.0	79.2	82.7	63.0	45.0	39.7	55.1	65.4	63.0	83.5	39.7	92.0	7	31.0	24
มี.ค. Mar	72.3	79.3	83.3	59.8	43.0	40.3	53.2	64.2	61.9	84.0	37.9	95.0	26,27,28	24.0	14,24
เม.ย. Apr	78.9	82.5	83.4	60.6	48.1	47.0	63.2	73.5	67.2	84.8	45.2	95.0	17,19	28.0	27
พ.ค. May	78.1	81.9	81.8	58.2	47.1	50.1	62.1	72.0	66.4	83.7	44.6	92.0	16,20,25	31.0	1
มิ.ย. Jun	81.9	84.9	83.8	65.7	54.4	55.3	70.6	80.3	72.1	87.5	52.4	97.0	9	43.0	2
ก.ค. Jul	80.2	82.2	82.0	61.9	53.3	52.1	67.0	75.9	69.3	84.6	50.2	96.0	21	39.0	7
ส.ค. Aug	83.9	85.5	86.0	68.9	62.3	60.2	70.4	79.6	74.6	88.6	57.7	98.0	24	44.0	3
ก.ย. Sep	91.0	92.5	92.8	76.9	67.5	71.5	83.6	88.1	83.0	94.1	64.9	98.0	10,12	53.0	28
ต.ค. Oct	90.8	93.2	93.3	71.2	60.7	63.2	78.4	87.7	79.8	94.5	59.1	97.0	6 days	43.0	18
พ.ย. Nov	87.2	88.8	89.7	67.6	56.3	55.3	69.3	81.0	74.4	91.0	53.8	96.0	7,16,29	40.0	28
ธ.ค. Dec	80.8	82.7	86.1	59.9	45.9	42.2	59.4	73.8	66.3	86.5	42.0	96.0	3,4,10	23.0	28
ค่าปานกลาง Mean	81.2	84.5	85.9	64.4	52.1	51.1	65.4	75.8	70.0	87.4	48.7	—	—	—	—
สูงสุดและต่ำสุด Extremes	—	—	—	—	—	—	—	—	—	—	—	98.0	24/8,10,12/9	23.0	28/12

พ.ศ. ๒๕๒๕
(A.D. 1982)

ค่าเฉลี่ยสาระประกอบอุตุนิยมเป็นรายเดือนสำหรับ พ.ศ. ๒๕๒๕
Monthly Values of Meteorological Elements for A.D. 1982

สถานีตรวจอากาศ นครราชสีมา
Nakhon Ratchasima Meteorological Station

เดือน Month		ความถี่ของทิศลมเป็นเปอร์เซ็นต์ Mean Frequency of Wind Direction in Percent									กำลังลมเป็นนอต Wind Force in Knots			จำนวนฝนตก (มม.) Rainfall (mm.)				จำนวนน้ำระเหยแบบถาด (มม.) Evaporation American class A pan (mm.)		
		สงบ Calm	น N	นอ NE	อ E	ซอ SE	ซ S	ซว SW	ว W	นว NW	ค่าปานกลาง Mean	สูงที่สุด Max.	วันที่/เดือน Date/Month	วันมีฝน Rainy Day	จำนวนฝนตก Total Amount	ตกมากที่สุดในวันหนึ่ง Heaviest fall in 24 hours		รวมทั้งเดือน Total	อย่างมากที่สุดในวันหนึ่ง Greatest in one day	วันที่/เดือน Date/Month
																จำนวน Amount	วันที่/เดือน Date/Month			
ม.ค.	Jan	69.0	4.4	16.5	8.9	0.4	0.4	0.4	—	—	1.2	10	12	0	0	0	0	129.0	5.5	4
ก.พ.	Feb	67.4	6.3	9.4	5.8	1.8	4.0	2.7	0.8	1.8	1.1	50	10	4	38.2	31.8	10	141.7	10.8	10
มี.ค.	Mar	65.3	1.2	0.4	2.8	5.3	12.9	8.9	2.4	0.8	1.2	18	2	7	27.3	12.9	27	168.7	7.3	18
เม.ย.	Apr	50.0	5.4	8.3	6.3	4.6	12.1	8.3	2.9	2.1	1.9	22	29	6	39.6	16.9	24	169.3	9.3	23
พ.ค.	May	50.4	1.6	1.6	4.0	3.7	14.5	14.5	7.7	2.0	1.8	18	2,14	10	48.6	32.9	18	195.0	10.9	6
มิ.ย.	Jun	41.3	—	—	—	2.5	12.5	22.9	20.4	0.4	2.3	18	12,29	13	172.4	52.9	8	187.8	9.7	25
ก.ค.	Jul	31.5	—	0.4	—	1.2	10.5	28.6	26.6	1.2	3.1	16	2	9	166.1	82.9	20	198.6	9.6	6
ส.ค.	Aug	44.0	—	—	—	—	7.2	24.6	23.0	1.2	2.0	15	27	21	161.8	38.3	31	159.7	9.0	31
ก.ย.	Sep	57.1	3.3	0.4	0.8	1.3	7.9	10.8	14.6	3.8	1.4	15	20	21	310.5	81.9	9	112.0	6.3	17
ต.ค.	Oct	64.5	10.9	10.5	4.9	1.2	2.4	1.6	1.2	2.8	1.2	12	20	9	53.5	13.8	20	126.0	8.1	18
พ.ย.	Nov	56.7	10.4	20.8	8.3	0.4	—	—	2.1	1.3	1.0	10	2	3	7.9	6.7	15	128.0	5.7	9
ธ.ค.	Dec	52.0	10.1	25.8	8.1	0.8	0.4	0.4	0.8	1.6	1.7	12	19	1	18.1	18.1	1	119.7	6.8	6
รวมยอด Total		—	—	—	—	—	—	—	—	—	—	—	—	104	1044.0	—	—	1835.5	—	—
ค่าปานกลาง Mean		54.1	4.5	7.8	4.2	1.9	7.1	10.3	8.5	1.6	1.7	—	—	—	—	—	—	—	—	—
มากที่สุด Extremes		—	—	—	—	—	—	—	—	—	—	50	10/2	—	—	82.9	20/7	—	10.9	6/5

MONTHLY AND ANNUAL RAINFALL FOR THE PERIOD 1951 - 1980

Station ..... Nakhon Ratchasima
Index Station 48 ..431.....
Latitude .....14° 58..... N.
Longitude.....102° 05..... E.

Elevation of station above MSL.....187.....Meters
Height of raingauge .....1.00..... "
(Above MSL .....188.00..... Meters)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1951	5.4	0.8	79.9	30.4	232.2	81.3	223.9	88.7	254.0	293.6	77.2	0.0	1367.4
1952	0.0	1.6	91.5	30.6	324.3	99.0	75.9	146.6	111.8	311.4	0.6	0.0	1193.3
1953	11.7	107.3	125.0	25.5	132.5	81.3	198.9	97.7	400.0	125.3	27.0	0.7	1332.9
1954	28.2	82.5	54.3	60.8	237.2	82.9	131.7	186.7	255.5	70.4	0.0	1.3	1191.5
1955	0.0	18.8	30.7	145.3	146.6	242.0	121.7	58.6	306.8	57.5	174.3	0.5	1302.8
1956	0.0	18.2	83.5	103.6	150.3	156.7	263.2	159.7	165.7	156.0	3.9	0.0	1260.8
1957	0.0	43.2	81.8	82.8	93.6	58.8	197.4	80.7	246.9	209.8	3.9	0.0	1098.9
1958	8.6	16.9	13.1	75.4	96.9	119.5	167.2	241.3	322.0	210.3	0.9	0.0	1272.1
1959	0.0	27.1	29.7	72.0	91.1	106.0	152.1	110.5	565.9	235.2	7.1	3.5	1400.2
1960	0.0	0.1	65.3	42.0	53.5	101.4	108.7	97.9	242.7	295.7	24.8	0.0	1032.1
1961	0.0	9.9	87.2	81.2	222.8	95.2	71.3	46.8	127.8	206.6	0.8	0.0	949.6
1962	2.5	0.0	23.3	100.2	143.2	107.5	154.4	173.7	333.4	265.8	37.0	12.9	1353.9
1963	0.0	0.0	123.3	159.0	105.7	96.3	118.1	181.0	263.8	219.6	91.6	0.0	1358.4
1964	0.0	3.7	26.2	34.3	319.0	69.2	163.1	161.0	257.5	227.3	30.0	0.1	1291.4
1965	0.0	94.7	26.3	93.7	197.7	45.2	67.1	192.3	251.9	72.3	16.8	0.0	1078.0
1966	0.1	56.5	65.9	61.7	313.4	50.5	191.2	155.7	286.0	123.5	11.9	1.4	1317.8
1967	0.0	0.3	2.7	95.6	180.9	135.5	86.4	110.6	162.2	61.2	65.0	0.0	920.4
1968	1.0	45.9	34.5	85.7	175.9	146.8	142.8	174.4	242.7	36.3	0.0	0.0	1086.0
1969	22.1	0.0	43.3	24.1	147.2	223.9	83.1	59.1	300.8	201.1	20.9	0.0	1125.6
1970	1.5	0.0	50.6	46.1	187.1	123.4	92.7	157.7	231.0	89.2	2.7	33.8	1015.8
1971	1.7	9.8	50.2	87.8	113.6	211.9	92.7	122.3	262.2	62.1	0.0	6.5	1020.8
1972	0.0	5.3	74.4	147.9	31.6	185.9	50.4	56.5	425.5	192.7	60.4	16.7	1247.3
1973	0.0	1.8	32.2	128.4	60.0	162.4	146.2	47.0	269.0	77.9	15.4	0.0	960.3
1974	6.6	54.2	139.1	50.7	182.5	74.3	110.9	102.8	251.9	227.0	111.9	0.1	1312.0
1975	16.1	0.3	24.6	17.2	161.4	121.5	199.4	62.4	228.1	129.7	51.0	9.7	1041.4
1976	0.0	30.6	62.3	21.2	102.5	43.4	126.7	141.0	217.2	236.2	7.1	0.0	988.2
1977	0.0	0.0	22.7	85.2	76.9	64.6	66.0	289.6	186.3	83.8	3.0	6.1	884.2
1978	0.0	45.6	28.9	29.6	111.6	62.0	86.6	76.1	199.3	89.1	30.5	0.0	759.3
1979	0.0	6.7	0.0	51.0	99.9	86.1	57.8	62.2	229.5	48.4	1.1	0.0	642.7
1980	0.0	6.0	82.6	29.8	196.6	251.4	161.1	166.4	282.9	115.1	23.6	0.0	1315.5
AVERAGE	3.5	22.9	55.2	70.0	157.6	116.2	131.0	126.9	263.3	157.7	30.0	3.1	1137.4
EXTREME	28.2	107.3	139.1	159.0	324.3	251.4	263.2	289.6	565.9	311.4	111.9	33.8	1400.2
YEAR	1954	1953	1974	1963	1952	1980	1956	1977	1959	1952	1974	1970	1959

Remark : - = No Report

X = Missing

III-3-7 Water Quality Analysis Report

GROUND WATER DIVISION
DEPARTMENT OF MINERAL RESOURCES
BANGKOK, THAILAND

WATER QUALITY ANALYSIS REPORT

Well No. ____________ Code ____________ Lab. No. 4147/2527

Owner ____________ Address ____________

Location บริเวณศูนย์ช่างที่ 3 กรมส่งเสริมสหกรณ์ ติดถนนสายโชคชัย-นครราชสีมา อ.เมือง (NAKORN RACHASIMA) (ENGINEERING CENTER) นครราชสีมา

Drilled by ____________

Depth of well ____________ Water level ____________

Water-bearing formation ____________

Method of sampling ____________ Use of water ____________

Collected by ____________ Date 25 กรกฎาคม 2527

Appearance of water at time of collection ____________

Remarks ____________

PHYSICAL CHARACTERISTIC

pH 6.8

Specific conductance 336 µmhos/cm. (micromhos per centimetre at 25°C)

Turbidity 0.62 NTU. (Nephelometric Turbidity Units)

True colour 0 Platinum-cobalt Scale.

CHEMICAL CONSTITUENT

CONSTITUENT		milligrams per litre (mg/l)	CONSTITUENT		milligrams per litre (mg/l)
Calcium	(Ca)	38	Sulfate	(SO_4)	28
Magnesium	(Mg)	11	Carbonate	(CO_3)	0
Sodium	(Na)	14	Bicarbonate	(HCO_3)	153
Potassium	(K)	0.8	Carbon dioxide	(CO_2)	39
Iron-dissolved	(Fe)	-	Nitrite	(NO_2)	0.00
Iron-total	(Fe)	0.59	Nitrate	(NO_3)	2.8
Manganese-dissolved	(Mn)	0.02	Fluoride	(F)	0.2
Copper	(Cu)	0.00	Total Solids		328
Zinc	(Zn)	0.43	Total hardness as $CaCO_3$		138
Chloride	(Cl)	18	Noncarbonate hardness		13

Appearance of water at time of analysis ใส (วิเคราะห์หลังวันรับตัวอย่างน้ำ 6 วัน)

Remarks คุณลักษณะทางกายภาพและทางเคมีของน้ำตัวอย่างนี้
อยู่ในเกณฑ์ใช้บริโภคได้ (THIS WATER IS DRINKABLE)

Date 1 สิงหาคม 2527

Analysed and checked by (นางสาววิไลวรรณ สุวรรณกิจ)

Chief chemist

นักวิทยาศาสตร์ 7
หัวหน้าฝ่ายวิเคราะห์น้ำ
กองน้ำบาดาล กรมทรัพยากรธรณี

III-3-8 Report on Bearing Capacity of Soil Investigation 1

Report on Bearing Capacity of Soil Investigation

Objective To find the bearing capacity of soil at Engineering Center 3

Testing Equipment Pocket Penetrometer Date 25th month April year 2526 (1983)

Type of Soil Silty - Sand

unit weight of soil (γ moist) 1.8 Ton/m^2

Pt.	observed value (Kg/cm^2)										Av. Kg/cm^2
	1	2	3	4	5	6	7	8	9	10	
1	3.04	3.04	3.04	3.04	-	-	-	-	-	-	3.04
2	3.04	3.04	3.04	3.04	-	-	-	-	-	-	3.04
3	3.04	3.04	3.04	3.04	-	-	-	-	-	-	3.04
										qu =	3.04

= 30.4 Ton/m^2

$C = \frac{qu}{2}$ = 15.2 Ton/m^2

For clay or silty sand

$\phi = 0$, $N_c = 5.7$, $N_q = 1.00$, $N_\gamma = 0$

	Square footing (B x B), Ton/m^2	
1	1.3 CNc	112.63
2	γd Nq	2.16
3	0.4 γBN$_\gamma$	0
	qf = 1+2+3	114.79
	F.S.=10= $\frac{qf}{10}$	11.479
	bearing capacity	11.479

Remarks tested at depth 1.20 m. below ground surface

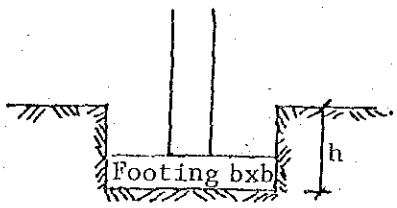
Tested by Anan Checked by Sutep Engineer Sutep

III-3-8 Report on Bearing Capacity of Soil Investigation 2

From - Terzaghi's Formular

- Continuous footing width = b $\quad \therefore$ Pman = cNe + γhHq + 0.5γbNγ
- Square footing width = b $\quad \therefore$ Pman = 1.3cNe + γhNq + 0.4γbNγ
- Cireular footing diameter = b $\quad \therefore$ Pman = 1.3cNe + γhNq + 0.3γbNγ

Critical Load Q_{Δ} = Pman x Area of footing



For square footing b x b

For clay or silty - sand $\phi = 0$

use Pocket Penetrometer

Test at depth h = 1.20 m

γmoist = 1.8 ton/m^2

unconfined compressive strength qu = 30.4 ton/m^2

$$\therefore c = \frac{qu}{2} = \frac{30.4}{2} = 15.2 \text{ ton/m}^2$$

For $\phi = 0 \quad \therefore$ Ne = 5.7, Nq = 1.0, Nγ = 0

Pman = 1.3cNe + γhNq + 0.4γbNγ

= (1.3 x 15.2 x 5.7) + (1.8 x 1.2 x 1) + (0.4 x 1.8 x b x 0)

= 112.63 + 2.16 + 0

= 114.79 ton/m^2

use Factor of Safety = 10

$$\therefore \text{Pallowable} = \frac{\text{Pman}}{10} = \frac{114.79}{10} = 11.479 \text{ ton/m}^2$$