3-4 Technical Cooperation

The requests by the Government of Thailand, concerning the solving of aflatoxin contamination of maize to the Government of Japan, are as follows:

(1) Dispatch of specialists

(2) Overseas training of Thai researchers

(3) Research facilities and equipment

Following specialists/engineers from Japan are expected to be dispatched in the near future.

. Specialists in long-term assignment
  - Leader (1)
  - Agronomist (1)
  - Engineer of maize dryer and sheller (1)
  - Expert of microbe and analysis (1)
  - Coordinator (1)
. Specialists in short-term assignment
  Short-term experts may be dispatched when necessity arise. The kind and number of experts, by specialty, shall be discussed later between the Government of Japan and the Government of Thailand.

These specialists' activities include:

(1) Study of the incidence of mycotoxins, especially aflatoxin contamination.

  1) The relation between variety and degree of aflatoxin contamination.

  2) The relation between climate, cultivation practices and the incidence of aflatoxin contamination.

3) The causes and affecting factors in post-harvest operations such as harvesting, shelling, drying and storage.

(2) Improvement of analytical and experimental techniques concerning aflatoxin in the Laboratory.

1) Incubation technique.

2) Introducing of a reliable and confirmatory test method of quantitative analysis of aflatoxin, as well as developing an accurate and handy method for testing the moisture content of maize.

3) Introduction of a handy tester for detecting and checking the aflatoxin content in the field as well as developing a tester to check the moisture content of the maize kernel.

(3) Study and develop Pre-harvest technique on preventive measures for the incidence of aflatoxin contamination. Experiment and application of late season crop of maize for:
- variety,
- cropping pattern,
- soil water, fertilizer, and pest control.

(4) Development of suitable post-harvest machines for farmers and operational system such as;
- harvesting,
- shelling,
- drying and
- storage.

(5) Support of activities for educational campaigns on preventive post-harvest practices for farmers by the Government of Thailand.

4. BASIC DESIGN

4.BASIC DESIGN

4-1 Basic Policies

In designing the facilities, it is important to completely understand the special functional features of a research building, to set up the standard suitable for the primary aim of this project and for local conditions and to utilize the results of various concrete programs as explained later.

4-1-1 Nature of a Research Building

(1) Component elements and form of facilities

In general, the internal structures of a research building have a more complicated form than other facilities. The present Research Center is also provided with various functional rooms. According to functional groupings, it is roughly divided into the sections of administration, research, experiment, storing and processing and other sections. Each of these sections is also provided with diversified functions.

The research activities to be executed in these rooms are also diverse and varied. They are: general clerical and other static work in research rooms and offices, the experimental and inspection jobs to be carried out in experimentation rooms under well-controlled conditions, the post-harvest processing work in the shelling and drying rooms, and the trial manufacturer of agricultural machineries and implements in the workshop section.

In making a plan for the research building, it is necessary, in addition to the above mentioned complicated factors, to properly coordinate the conditions for location, building site, climate, the contents of research, facility standard, management system, etc. In addition, it may be necessary to re-arrange these conditions in order to systematically apprehend the meanings and mutual influence among them.

(2) Adaptability and flexibility of the facilities

With the rapid progress of science and technology, social demand on the research activities is also increasing more than ever, and there are remarkable trends to shorten the time span for research equipment and facilities. It is an important element in making a plan for a research institute to provide the buildings with such adaptability and flexibility as to cope with the change in the contents and methods of research activities.

4-1-2 Selection of the Appropriate Standard

The appropriate standard for the facilities is an index to roughly represent the degree and level of the proposed facilities. It is determined according to the conditions such as the position, importance, role and functions of the planned facilities in the country and other factors such as environmental conditions or the conditions of the building site. The evaluation to set up the standard for the proposed facilities is determined by the degree and level of such factors as performance characteristics, functions, durability, maintenance economy,maintenance and inspection adaptability, construction feasibility, external appearance, etc.

The proposed facility is a national research Center, and is equivalent to the experimental station of the Ministry of Agriculture, Forestry and Fisheries in Japan. Accordingly, its position, importance, role and functions in Thailand are to be at a considerably high level.

According to the character of the Center and the research, the facilities, material and equipment must be of high quality.

The designing of the facilities and structure must be determined from the viewpoints of functions, safety and durability.

4-1-3 Basic Design Principle

In addition to the complicated structure of the Research Center, full consideration must be given to the special character of the research

activities. Such activities should be carried out in collaboration of three sections, microbe/analysis, post-harvest processing/storing and agronomy, including technical cooperation from Japan. In order to facilitate the high-grade research activities, basic design should be executed according to the following basic principles:

(1) To give full consideration to the safety of researchers and to provide an effective system to discharge toxic substances generated in laboratories.

(2) The Center shall consist of rooms where the limited source of facilities and equipment can be completely utilized. The outdoor space shall also be utilized as supplementary work space.

(3) The space must be fully utilized by joint use of the functions common to various research fields. The research activities contradictory to each other must be separated as practically as is possible, in order not to hinder the effects of each activity.

(4) To lower operation and maintenance cost, special care must be taken to obtain good air-conditioning effect and to select the proper finishing materials.

(5) To adopt such a building system that research equipment and samples can be stored and preserved well under local climatic conditions of high temperature and high humidity.

(6) To provide the configulation of rooms with such adaptability and flexibility as to cope with the installation increases due to future change in research activities.

(7) To design the facilities durable and adjustable to flood and ground subsidence, frequently observed in Bangkok. Special care must be taken on ground sinking because severe damage is often caused.

(8) The proposed building site is an independent lot of ground. However, since it is adjacent to the campus of Kasetsart University and the other research institutes of the Ministry of Agriculture and

Cooperatives located in the neighborhood, the new building must be designed in good harmony with the existing buildings and their environment.

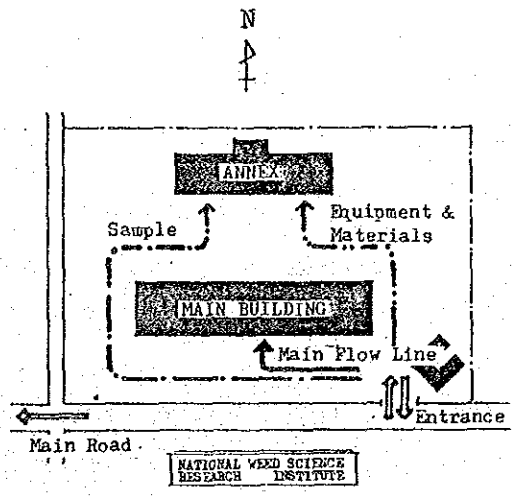
(9) The materials and equipment must be procured locally as much as available. The adoption of the equipment and materials should be carefully examined so that no problem may occur after the completion of the facilities.

4-2 Basic Design

4-2-1 Block Layout

(1) Traffic line planning

The approach to the proposed site is available from the western main road between the ground of the Department of Agriculture and Kasetsert University. In addition to the main flow line leading to the entrance hall of the main building, two supplementary flow lines are planned - one for transporting the samples for post-harvest processing and storage sections and the other for transporting agricultural implements and other equipment to the workshops. These roads are arranged as shown in the drawing according to the purpose and the frequency of utilization. A single entrance is proposed to facilitate control.



(2) Dispersed arrangement according to the functions

The functions of this Research Center are widely diversified; such as the research and experimental activities, trial production of agricultural machinery and implements, post-harvest processing and storage of maize. These functions are necessarily separated from each other. To cope with future change of these activities, each section must be able to meet with an installation increase. Accordingly, the dispersed arrangement is adopted as follows:

1) Two buildings are built as the most important buildings: a main building and an annex. These two buildings are to be located in a place that creates good harmony with the National Weed Science Research Institute (NWSRI) and its surroundings. The two buildings are to be built along two imaginary parallel East-West lines. When arranged along the east-west axis, these two buildings will not be affected by the strong sunshine in the afternoon. Moreover, it is possible to install big windows and other openings on southern and northern sides of the building and also to effectively protect against the strong wind that blows throughout the year. The work in the annex is different from that of the main building, and the inside measurement of ceiling height and the air-conditioning size are also different. Because noise is generated during the manufacture of implements, it is to be separated from the main building by a buffer zone.

The buffer zone between these two buildings is to be used as a passage for researchers and as a sun drying yard for the drying work, while the beam in front of the Workshop Section is to be effectively utilized for the deposit of implements or as a place of manufacturing. The materials are to be transported to the annex by vehicles through the road on both western and eastern sides.

An imaginary south-north axis is set up on the eastern side of the building site, and the facilities for water supply and drainage are to be arranged along this line.

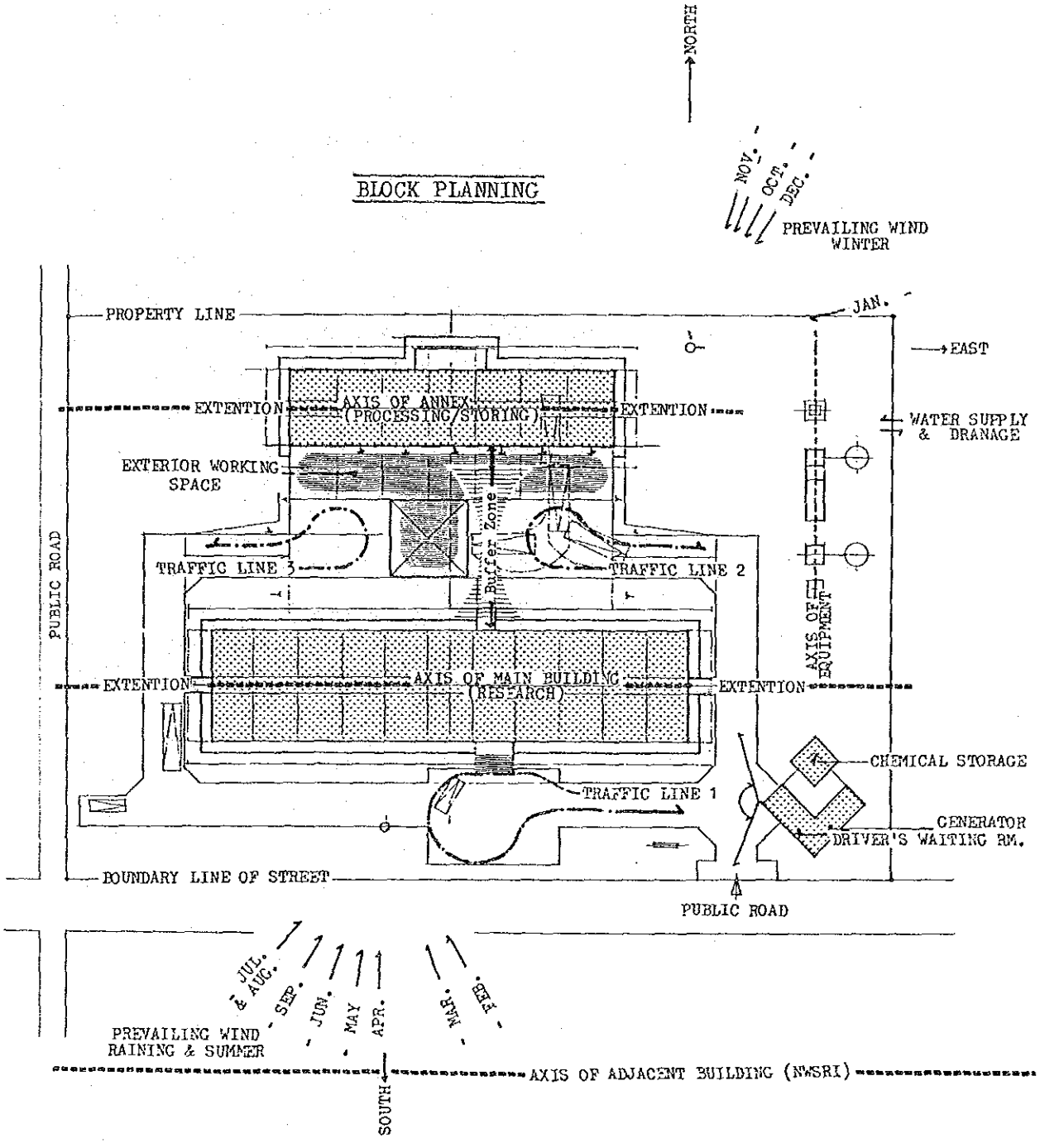
2) Stock room II

This is a storage room to keep the solvents to be used for the research. Because of the property of the chemicals to be stored, this must have structural features equivalent to that of storage rooms of similarly dangerous articles in Japan, and the building must be separated from other buildings. For emergency purposes, a lightweight roof must be used and it should be kept a minimum of 3 meters away from the other buildings nearby.

3) In one corner of the Generator Room, from where it is easy to see an extensive view of the front entrance and the approach to it, a waiting room is to be built for car drivers for a better arrangement of their daily work.

4) Generator Rm.

This is also to be separated from the main building in order to exclude the vibration and noise due to generator operation. The room is to be placed close to the above stock room II, together forming the annex group.


BLOCK PLANNING
NORTH
NOV.
OCT.
DEC.
PREVAILING WIND
WINTER
PROPERTY LINE
JAN.
EAST
EXTENTION
AXIS OF ANNEX
(PROCESSING/STORING)
EXTENTION
WATER SUPPLY
& DRANAGE
EXTERIOR WORKING
SPACE
PUBLIC ROAD
Buffer Zone
TRAFFIC LINE 3
TRAFFIC LINE 2
AXIS OF
EQUIPMENT
EXTENTION
AXIS OF MAIN BUILDING
(RESEARCH)
EXTENTION
CHEMICAL STORAGE
TRAFFIC LINE 1
GENERATOR
DRIVER'S WAITING RM.
BOUNDARY LINE OF STREET
PUBLIC ROAD
JUL.
& AUG.
SEP.
JUN.
MAY
APR.
MAR.
FEB.
PREVAILING WIND
RAINING & SUMMER
AXIS OF ADJACENT BUILDING (NWSRI)
SOUTH

(3) Study of Different Floor Levels

1) Evaluation of the functions of the facilities

The features of the space required for main functions are classified as follows;

a) Research and experimental functions

Despite its small scale, the building is divided into the sections of administration, research and experiment. It is impossible to build the rooms for these sections in different positions. Especially, the research and experiment sections are closely related to each other, and it is desirable to place these sections on the same floor.

b) Storage and manufacturing functions

Because of the convenience for transportation of samples, equipment and materials for trial manufacture and because of the use of external space,it is difficult to build these sections on the upper floor or on different floors. Because much noise and dust are generated in these sections, the functions of these sections are contradictory to those of the main building.

Accordingly, these two functions must be built on two separate floors.

2) Effective utilization of floor area

When a two-storied system is adopted, area loss and a complicated facility system may be involved as follows:

a) Duplication of service rooms such as toilet, kitchinet, stock room, etc.

b) Furnishing of staircases, air-conditioning duct and water supply and drainage piping space.

3) Efficiency and safety of the pipings

On the lower floor of two-story buildings, care must be taken on the following points :

a) The extension of the horizontal length of the ducts for exhaust air and ventilation may decrease the efficiency of the ducts and increase the damage due to equipment failure.

b) Because this is a Research Center, a great number of pipes are installed. Also, chemicals compound in drainage water by mistake. Preventive measures are necessary to avoid trouble on the piping inside the ceiling.

For this reason, the buildings are to be designed in a one-story structure not only because building construction is simple and its control and maintenance are easy but also because for the safety and benefit of its users.

4-2-2 Floor Plan Design

Middle corridor type is adopted for the planning of the research building because of the following reasons:

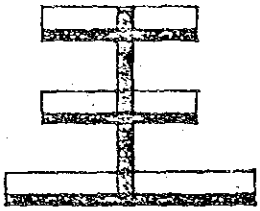
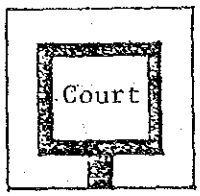
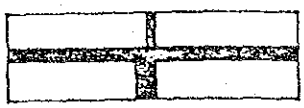
(1) The corridor portion is reduced as non-productive space, and construction cost is minimized by efficient arrangement of floor area. (See the Evaluation of Corridor Area.)

(2) Construction cost is reduced by common use of inner wall of each room and by reduction of the outer wall surface. At the same time, the loss of air-conditioning efficiency will be minimized.

(3) It is possible to shorten the piping and wiring for air-conditioning, water supply and drainage, and power supplies.

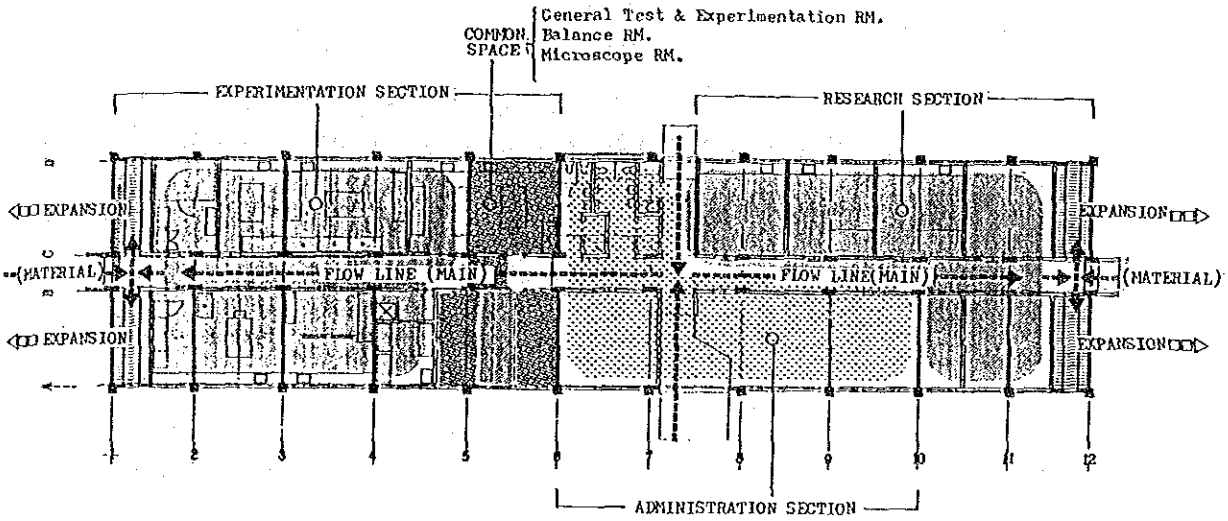
(4) Flow lines between research rooms and laboratories are shortened. It is also possible to effectively utilize the equipment, materials and space because the adopted system is able to accommodate the equipment, materials and space necessary for each research section and laboratory.

Evaluation of corridor area

	A. Finger plan	B. Square type (Original draft based on the request)	C. Middle corridor type (Adopted type)
Plan pattern Corridor			
Remarks	. The same natural lighting and ventilation are obtainable for all rooms. . This plan is often adopted for large scale building. . The connection between rooms is inconvenient.	. The connection between rooms is convenient because of diversified flow lines. . Free and extensive view is obtained from all rooms and floors facing to the inner court.	. Convenient connection between rooms. . The smallest area in terms of corridor area. . Defective in natural lighting and ventilation.
Corridor area (compared with the plan C)	+45 - 50%	+25 - 30%	±0%

To meet with future change in the research activities, the buildings are provided with as much flexibility and adaptability as needed to cope with installation increases in future. The rooms are classified into the following sections according to each research field and its relationship. All sections are arranged in organic composition as shown below to cope with any changes in future.

MAIN BUILDING (RESEARCH)



Two sections of Experimentation and Research are arranged on both sides because many changes are expected in the character and methods of the research.

In the experimentation section which is most likely to undergo installation increase, those rooms having common functions with the experimentation room or the rooms having the main functions of this Research Center should be built in the center so that, in case of any installation increase, they can be kept in their original position, without changing the overall function of the building.

The main function of the annex building is roughly divided into three sections: the space for experimental work and for experiments for post-harvest processing and storage, the space for manufacturing research and development of the equipment and implements and the storage space for the samples. The activities including dynamic works are expected in the building. The following points must be carefully noted in the building plan:

(1) Transportation route to the building

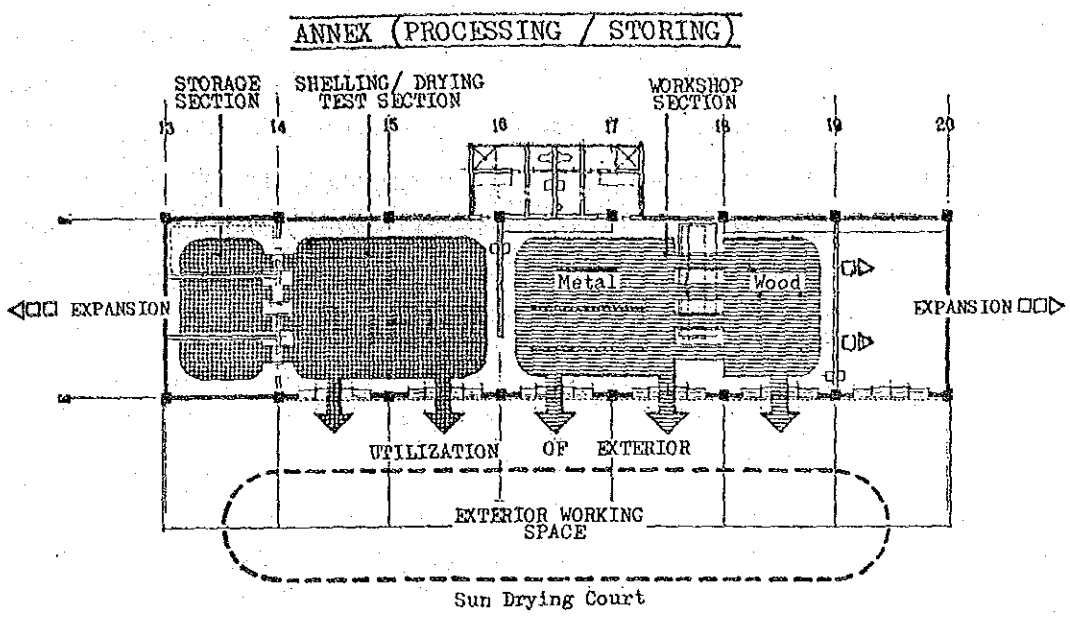
Special facilities to transport the materials for trial production and the trial implements to and from the building have not been planned. Instead, vehicles are allowed to enter into the building for loading and unloading, and a passage for vehicles is planned.

(2) Span of the building

Ample space is kept for the vehicle length and the work space for unloading. This is planned at 6 meters, by considering the dimensions of the steel frames and the panels used for the production of agricultural implements.

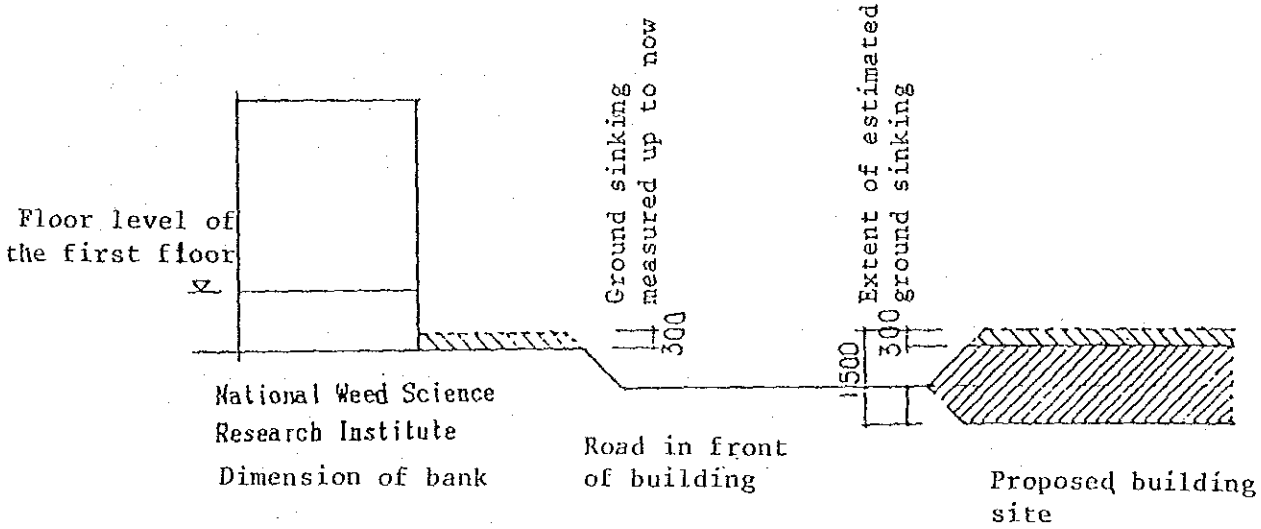
(3) Flexibility of the plan

A wide variety of work is to be performed in the annex building, and no strict room composition is needed as in the case of the research building. Generally, open space type rooms are adopted. Partition walls to limit the scale of work are reduced as much as possible, while big openings are provided on the southern side wall, facing the buffer zone, to promote the utilization of outdoor space.



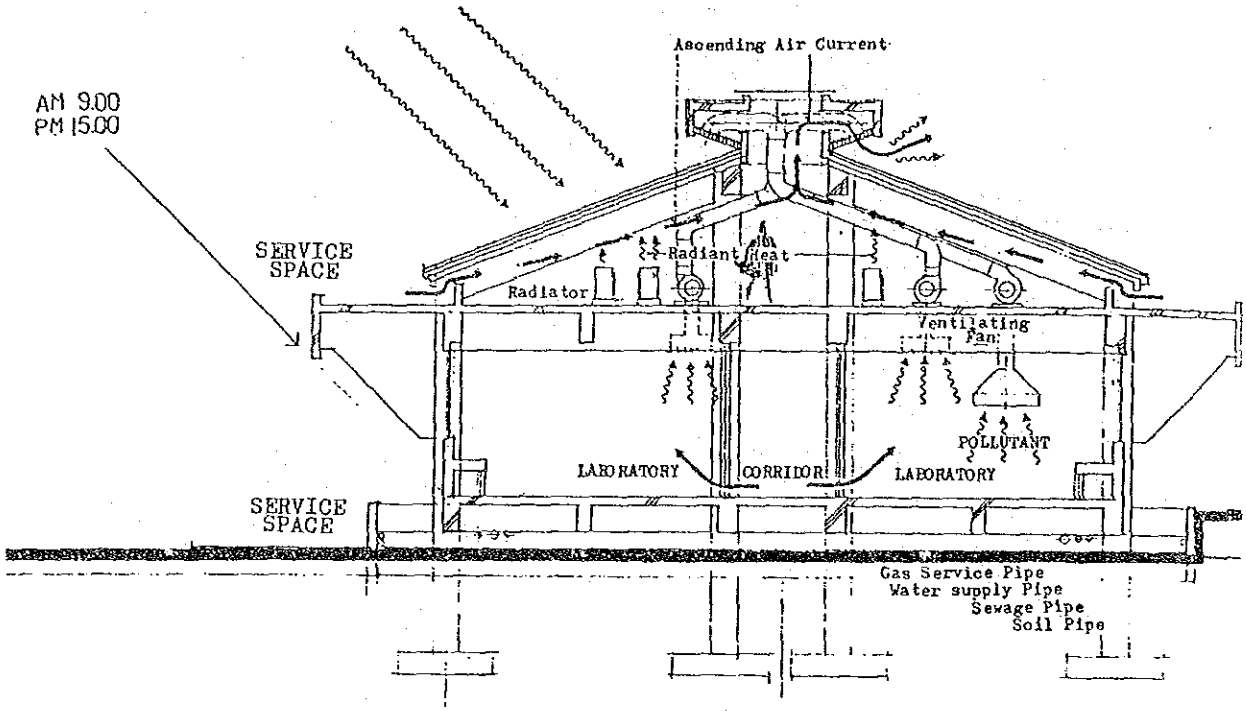
4-2-3 Sectional Design

Section planning including the filling and grading plan (which is to be borne by the Thai side) is studied by considering the adaptability to special local factors such as subsidence of ground, submersion due to flood, protection from sunshine and natural light.



At and around the proposed site, the subsidence of ground (which is reported to be 5 - 10 cm annually due to water pumping through wells) damages terraces outside the building and also exterior walls. For the floor level of the first floor (ground floor), the elevated floor system is adopted for almost all buildings of the Department of Agriculture, except storage rooms.

The adjacent NWSRI is the most representative of the national research institutes under the Department of Agriculture among the similar facilities investigated. The planned buildings should be modelled after this with regard to the elevated floor system and the ground height in order to protect the facilities from a flood. Regarding other points, special consideration should be given to reduce the operation and maintenance cost of the buildings.



SECTION PLANNING

(1) By the adoption of the elevated floor system, the following protection is assured:

1) Protection against water submersion

Although water drainage canals are provided in the area including the proposed building site, the same system as in similar facilities of the Department of Agriculture is adopted to protect the buildings in case of power interruption or other emergency cases.

2) Protection against subsidence of ground

Special space for piping should be maintained under the floor in advance to protect water supply and drainage pipings from experimentation rooms against ground sinking. Such space for piping should facilitate the inspection at the time of trouble or the extension, in case of installation increase. For exterior walls, too, protective measures are taken against ground sinking by reducing the ground-contact surface, to minimize the damage due to sinking as little as possible.

3) Moisture-proofing and ventilation

The infiltration of moisture from ground surface would be prevented by the air section. Also, moisture staying under the floor of the building should be prevented.

The adoption of the elevated floor system is indispensable for storage space of important samples or for the Shelling and Drying space, where post-harvest processing and storage works of maize are carried out.

(2) Utilization of attic space

1) Roof shape and the ventilating and heat-radiating functions

The quality ad accuracy of the local waterproof materials are unsuitable for the proposed facilities, where the important research equipment and implement and the research records are stored. For this reason, roof tiles will be added to the normal roof slabs in the present plan. This eliminates direct influence of radiant heat to the interior of the rooms by accumulating heat in roof slabs and by increasing the air-conditioning efficiency at the same time. It also helps reduce the operating cost.

Roof shape has been determined according to the gradient, at which rainwater leakage is eliminated from the overlapped and

other engaged portions of roofing materials and also to the gradient to increase the natural ventilation.

In the daytime, when research activities are conducted, the heated air runs along roof the gradient, causing an ascending air current, which helps the natural circulation of the air, promoting ventilation and heat radiation.

2) Utilization of air shaft

Air shaft space is utilized as the space for the exhaust air duct, electric wiring, outdoor unit of air-conditioners and air exhaust unit. At the same time, it helps dilute and diffuse exhaust air containing toxic substances effectively from the roof top into the open air.

Protection of outdoor units of air-conditioners

For the machines and devices of outdoor specification, the protection on the roof is effective in prolonging the service life and in reducing the equipment failure. The utilization of air shaft space provides protection to outdoor units as well as pipe connections. At the same time, sufficient space is secured for perfect piping construction and for daily inspection. The weight of such device is so light that no special structural consideration is necessary. The strength of normal roof slab will suffice.

Effectiveness of exhaust air facilities

In a research institute, where toxic substances and chemicals are handled, it is very important how exhaust air is treated. In the present facilities, exhaust air is brought from all positions along room ceilings to the attic through vertical duct and is discharged from the roof top, utilizing the features of a one-storied structure. This eliminates the cause for re-contamination due to the accumulation of toxic substances within the duct, often caused by horizontal duct

(air shaft), generally used. The discharge of exhaust air from the roof top, which is located at the remotest position from windows of the research room, eliminates the re-contamination of the room. This is considered to be the most effective method for the present facilities where toxic substances are handled.

(3) Eaves

1) Interruption of direct sunshine

Direct sunshine on wall surfaces, windows and other openings are interrupted by eaves to keep pleasant indoor room conditions. Shady spots are generated by eaves, reducing the operating cost of air-conditioning. The protruding dimensions of the eaves have been determined according to the data on the sun height in Thailand. In the high temperature season, sunshine is to be interrupted from 9:00 to 15:00 when it is supposed to be the strongest.

2) Protection of exterior wall surfaces

Eaves prevent water leakage from exterior walls and the openings caused by heavy rain and strong wind. Further, exterior wall finishing surface is protected, thus reducing the maintenance costs of the building.

(4) Openness of work space

Regarding the annex, proper consideration should be given to the following special character of the building as a work space:

1) Effective natural lighting and ventilation

Natural lighting should be positively brought in to acquire good working conditions. Sufficient open space must be provided because of the dust generated from various works, and an effective exhaust system should be furnished to discharge the dust. A sky light system is adopted for natural

ventilation and for natural lighting in order to clean up room space and to prevent moisture and heat.

(5) Study of ceiling height

A high ceiling is indispensable for the present facilities where stress is placed on natural lighting to reduce the operating cost. In Japan, the ceiling height for similar research institutes is about 3 meters. Investigation of similar institutes in Thailand revealed that most of the institutes have a ceiling height of more than 3 meters. Standard ceiling height for the present facilities has been determined to be about 3 meters. Effective inside measurement of ceiling height for the annex has been determined to be more than 4 meters because the implement materials (commercially available standard item; 6 meters long) are to be brought in by trucks and assembled at the work area.

4-2-4 Structural Design

(1) Basic concept

1) Basic concept is to adopt a structural system that is economical and durable, simple and clear.

2) A structural system most suitable to the local conditions and climate as well as to the scale and purpose of the buildings has been adopted.

3) In determining the structural system, full consideration has been given to the local supply ability of construction materials, material quality, construction technique, etc. so that local products utilized are as practical as possible.

4) To fit the functions of the present planning, it is necessary to maintain a horizontal floor surface for the manufacture and assembly of agricultural implements at the annex and at on the berm before building. A strong structural system will be adopted for the protection of piping and of the accuracy of experiments.

(2) Design of structures

1) Because it is generally accepted in Thailand, the reinforced concrete rigid frame structure will be adopted, as the structural system. The walls consist of concrete or bricks laid in combination within the frame work.

2) An attempt has been made to simplify the structure by giving uniform column spacing and by allocating the columns to support vertical load.

3) The use of a steel frame has been studied and will be used as the frame material for the annex building. But, the same reinforced concrete structure as adopted for the research building is also to be used for the annex, because, despite the common fabrication of lightweight iron materials, fabrication of welded structures using heavyweight iron frames is rarely seen in Thailand. Since the building has big openings on the southern and northern sides and the doors and windows are supposed to be opened most of the time, it is necessary to choose a rigid structure, which can endure the blow-up phenomenon from the interior of the building due to wind pressure.

4) Because ground conditions are very bad in Bangkok, a pile driving foundation is adopted. Precast concrete piles are to be used.

5) Structural calculations shall be carried out by the working stress design method conforming to the various standards of the Architectural Institute of Japan.

6) With regard to the allowable unit stress of structural materials, reference is made to the standards in Thailand and in Japan. The designated grade shall be maintained by giving full consideration to local fabricating skills and the variations in material quality.

a.	Reinforcing bar	Deformed bar SC30
b.	Concrete	FC 210 kg/cm^2 (four week age strength)
c.	Cement	Normal Portland cement (ASTM standards)
d.	Steel material	SS41 or equivalent
e.	Pile	Precast concrete pile

(3) Design loads

The design loads such as the external force or load applied on the building shall be in accordance with "the Bye-Laws of the Bangkok Metropolis, Re; Control of the Construction of Building, 1979"

1) Dead loads

a.	Reinforced concrete	2.4 t/m^3
b.	Structural steel	7.85 t/m^3
c.	Bricks and concrete blocks	1.9 t/m^3

2) Live loads

a.	Roof (normal)	50 kg/m^2
b.	Roof	100 kg/m^2
c.	Toilet	150 kg/m^2
d.	Office, meeting room and corridor	300 kg/m^2
e.	Research room	400 kg/m^2
f.	Workshop (Truck load supposed)	2,000 kg/m^2

3) Wind loads

The load according to the Bangkok Bye-laws is adopted as wind loads.

Height	Wind pressure
10 m or less	50 kg/m^2

4) Seismic loads

It is customary not to think about earthquakes in Thailand. But, it was recorded that an earthquake measured at 5.0 occurred on April 15, 1983 and that earthquakes measured at 5.5 and 5.3 occurred on April 22, 1983 about 200 km northwest of Bangkok.

However, the present facilities are designed in one-story structure and are fully resistant to earthquakes. There were no problems in a trial calculation of the resistance to seismic activity.

4-2-5 Finish Design

In general, the external and internal finishing materials for a building are selected according to the intended use, the function of the room, local climatic conditions, environmental conditions of the building site, construction period, conditions to acquire construction materials, etc. For the materials used for the proposed facilities, care must be taken on the following points:

(1) Materials to satisfy the functions and performance necessary for the research and experiment.

(2) Material endurable or resistant (to chemicals, water, etc.)

(3) Materials, for which maintenance is easily maintained (easily sustainable in clean condition)

(4) Materials to provide the completed facilities with the distinctive style and dignity as a national institute.

(5) Full consideration should be given to the harmonious combination with the related facilities in the surroundings.

(1) Most significant exterior finishing materials

Roof	Roof slab + clay tile Roof slab + Waterproofing mortar
Roof waterproofing	Metallic waterproofing compound Waterproofing mortar
Exterior wall	Aggregate exposed finish by washing Finish coating by exposed concrete
External window	Aluminum sash (local procurement)

(2) Most significant interior finishing materials

Office
Research Rooms
Director's Room
Meeting Room

Floor	Vinyl tile
Baseboard	Vinyl baseboard
Wall	Mortar troweled painting
Ceiling	Rock-wool acoustic board *
Door	Plywood flush painting

* Because all other components are made of sound-reflecting materials, material to absorb sound was selected to keep sound disturbances down due to the reflection of voices and sounds in order to keep the rooms quiet.

Analytical Instrument Rm. Extraction & Purification Rm. Bio-Hazard (Germ-Free) Rm. Incubation Rm. Microscope Rm. Stock Rm. I Thin-Layer Chromatography Rm. Culture Medium & Microscopic Sample Preparation Rm. Sample Preparation Rm. Balance Rm. General Test & Experiment	Floor	Polyvinyl chloride flooring * welding joint
	Baseboard	Polyvinyl chloride flooring welding joint
	Wall	Mortar troweled painting Asbestos slate painting
	Ceiling	Asbestos slate painting
	Door	Plywood flush painting Aluminum door

* Because water and chemicals are used in rooms, the materials endurable or resistant to water and chemicals should be used. (Vinyl floor tiles are costly because waterproof treatment is needed.) Polyvinyl sheet welding method is the most suitable method because the materials should be selected so as to keep the rooms clean. (Material with joints is not suited.) Also, the materials with high workability should be selected. (Terrazzo and coated floor are too hazard and too exhaustible.)

Instrument Sterilization Washing Rm.

Floor	Mosaic tile
Baseboard	Terrazzo block
Wall	Mortar troweled painting
Ceiling	Asbestos slate tile
Door	Plywood flush painting

Corridor & Entrance Hall

Floor	Terrazzo block
Baseboard	Terrazzo block
Wall	Mortar troweled painting
Ceiling	Rock-wool acoustic board
Door	Plywood flush painting

Workshop

Shelling & Drying Experiment

Equipment Storage for Field Survey

Generator Rm.

Floor	Mortar troweled
Baseboard	Mortar troweled
Wall	Mortar troweled painting
Door	Steel sash painting

Constant Temp. & Humidity Rom.

Air-Tight (Gas Test & Fumigation) Storage

Floor	Mortar troweled
Wall	Prefabricated insulation panel
Ceiling	Prefabricated insulation panel
Door	Steel sash painting

Driver's Rm.

Floor	Mortar troweled
Baseboard	Mortar troweled
Wall	Mortar troweled painting
Ceiling	Asbestos slate painting
Door	Plywood flush painting

Stock Rm. II

Floor	Mortar troweled
Baseboard	Mortar troweled
Wall	Mortar troweled painting
Door	Steel sash painting

Toilet
Shower Rm.

Floor	Mosaic tile *
Wall	Semi-porcelain tile
Ceiling	Asbestos slate painting
Door	Plywood flush painting

* This material was selected because it is easy to wash and is not slippery.

4-2-6 Utility Design

Based on general conditions at the local site, practical and rational facility planning has been set up to suit the proposed project, giving full consideration to easy maintenance and inspection and to low operating costs.

(1) Electrical installation

Electrical facilities	Local conditions	Actions to be taken	Selection
Power generating facilities	Not available	To be installed in preparation to excessive voltage drop beyond the control of voltage regulator and power interruption. Also, for air-conditioning of research equipment and materials as well as storage facilities	To be selected
Illumination level in research room	200 - 500 Lx	To be adapted to local conditions	300 Lx
Type of outlets	Direct mounting type	"	Direct mounting type
Lighting level of office room	200 - 500 Lx	"	300 Lx
Type of equipment	Direct mounting type	"	Direct mounting type All receptacle outlets to be used for equipment must be completely grounded.
Telephone facilities	Available	"	To be selected
TV antenna facilities	Available	"	To be selected

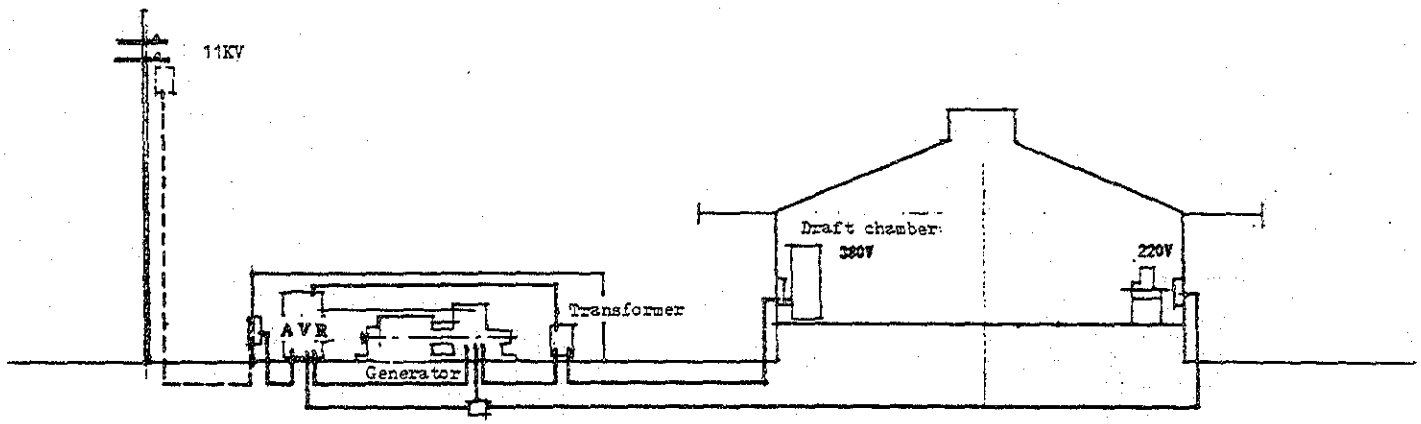
Electrical facilities	Local conditions	Actions to be taken	Selection
Fire alarm system	Sensor, push-button and bell	Smoke detectors should be installed in the rooms where heat-generating equipment is installed or many equipment and devices are installed. Buttons with a bell should be furnished in the other rooms.	To be selected
AVR facilities	Partially installed	A voltage regulator must be installed to prevent a voltage drop in the whole facility because measuring instruments for research may not indicate the proper measurement because of such a voltage drop.	To be selected
Voltage	220 V	Most of the equipment and devices are supplied with 220 V power, while some devices such as draft chamber are connected with 380 V power supply.	220 V 380 V

(2) Water supply and drainage installation

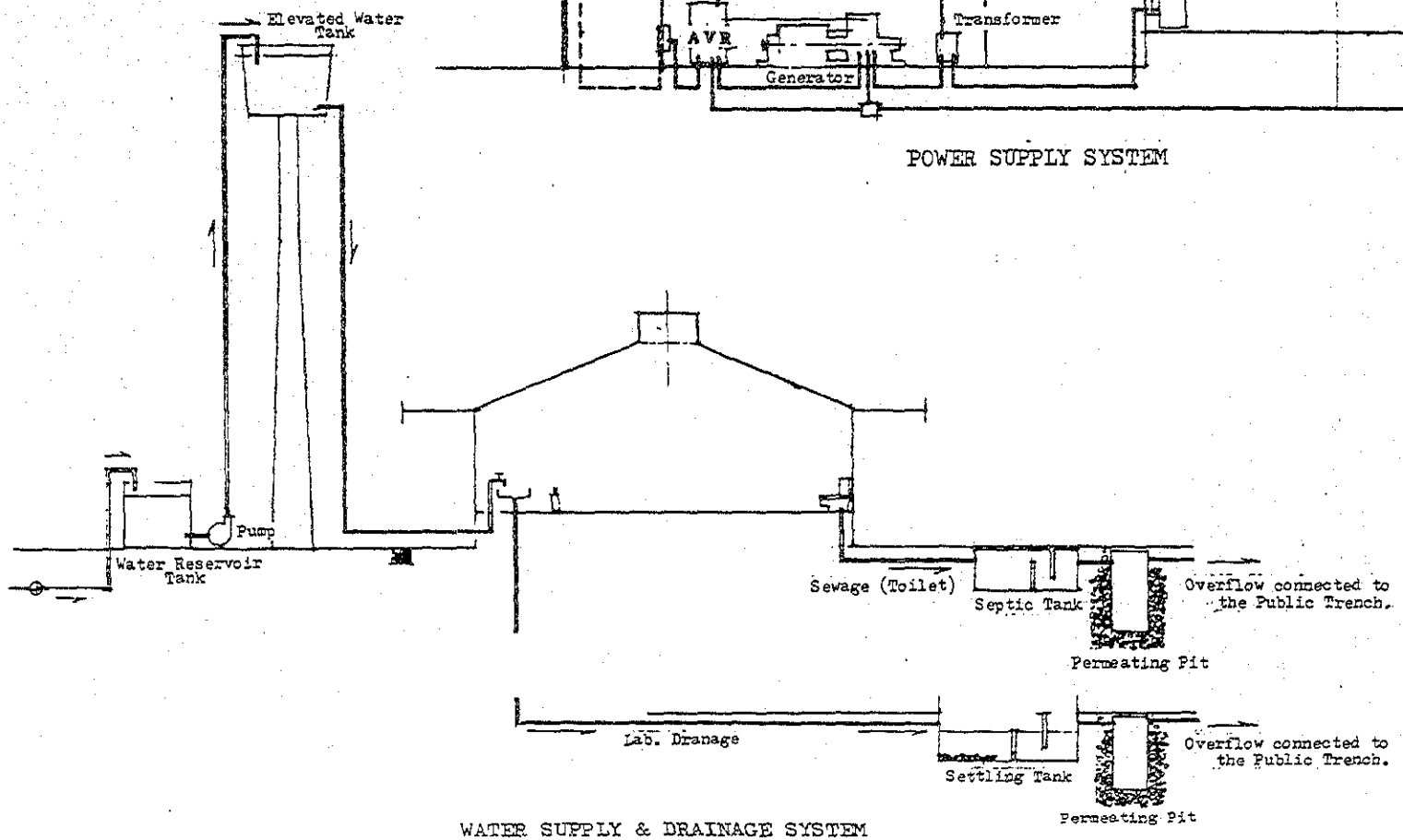
Water supply and drainage facilities	Local conditions	Actions to be taken	Selection
Water supply quantity			8 m^3 - 10 m^3/day
Water supply system	Gravitational system Direct coupled system	Proper measures should be taken against a water pressure drop in the evening due to the increase in general water consumption.	Gravitational system
Water heating source	LP gas is generally used.	To be adapted to local conditions	LP gas
Hot water supply system	Separate system is common.	Stress was placed to easy handling and easy action in case of trouble.	Separate system instantaneous gas water heater

Water supply and drainage facilities	Local conditions	Actions to be taken	Selection
Water drainage system	Direct discharge, septic tank + permeating pit	Based on the special characteristics of the research and on the investigation results of similar facilities in the neighborhood, drain water from experiment rooms and toilet drainage were separated in the present facilities. The system is superior to the system generally used at local sites. An open-air settling tank was installed to evaporate the solvents, which were discharged into the water drainage for experiment rooms by mistake. Drainage water must stay in the tank for more than 24 hours, and the danger of the counterflow of evaporated gas into piping is prevented. The chemicals used in the research room are not discharged into the drainage system but are collected into collecting containers, which are to be carried away by chemical manufacturers. Such is the system generally adopted in Thailand. The contaminated implements and tools used for the experiments on aflatoxin are immersed into detergent for a certain period of time. This is also the system generally adopted locally, and the used detergent is neutralized and discharged into drainage system.	Settling tank + permeating pit are to be installed for the drainage system of experiment rooms, while a septic tank + permeating pit are to be furnished for the normal sewage system.
Gas facilities	LP gas	To be adapted to local conditions	LP gas
Fire fighting facilities	Fire extinguishers are used in the case of small buildings.	To be installed according to the regulations in Thailand	Fire extinguisher
Incinerators	Incinerated on ground	Necessary to dispose combustible garbage produced during research activities. Calculated garbage quality: 25 kg/day Incinerator capacity: 30 kg/hr	To be installed.

Water supply and drainage facilities	Local conditions	Actions to be taken	Selection
Piping materials			
. Water supply pipe	Steel pipe	To be adapted to local conditions. Polyvinyl chloride pipe is not completely reliable when pressure is applied to joint portion.	Steel pipe
. Drainage pipe	Polyvinyl chloride pipe	To be adapted to local conditions.	Polyvinyl chloride pipe
. Sewage pipe	Polyvinyl chloride pipe		Cast iron pipe



POWER SUPPLY SYSTEM



WATER SUPPLY & DRAINAGE SYSTEM

(3) Air-conditioning installation

Air-conditioning facilities	Local conditions	Actions to be taken	Selection value
Heat source for air-conditioning	Electricity	To be adapted to local conditions.	Electricity
Air-conditioning system (Cooling)	Room air-conditioner	The system suitable to the intended use of the room should be adopted. 100% OA air-conditioning system should be used in Bio-hazard Room	Room air-conditioners are installed in normal rooms, and the package type air-conditioner is to be used in the Bio-hazard Room.
Room temperature and humidity			
. General rooms	At cooling: DB 24 - 26°C RH 50%	Temperature and humidity settings should be raised a little to reduce operating costs.	DB 27 - 28°C RH 50 - 80%
. Storage room		Settings must be consistent with the intended use of the rooms.	
External temperature and humidity	Bangkok DB 36°C RH 70%	To be adapted to local conditions.	DB 36°C RH 70%
Degree of dust-cleaning in air-conditioning	Pre-filter of room air-conditioner	To be consistent with the intended use of the rooms	Filters are to be used. (Bio-hazard Room)
Ventilating frequency			
. General rooms	5 - 7 times/hr.	To be adapted to local conditions	5 - 7 times/hr. 10 times or more for the rooms where toxic substances and chemicals are used.
. Toilet and storage rooms	8 - 10 times/hr.	To be adapted to local conditions	8 - 10 times/hr.
. Operating system	Independent operation	To be adapted to local conditions	Independent operation
Air-conditioner operating time	Generally, 8 hours/day	To be adapted to local conditions	8 hours/day; 24-hour operation for storage room.

Air-conditioning facilities	Local conditions	Actions to be taken	Selection value
Automatic control facilities			
. Equipment control	Independent system	To be adapted to local conditions	Independent system
. Alarm		Alarm system should be installed for safety of the samples in storage rooms.	Only the alarm system is to be installed.
Control staff	Ordinary engineers are assigned.	The method easy for operation control should be used.	The method easy to use for ordinary engineers and research staff should be adopted.

(4) Ventilation facilities

In the research institute where toxic substances and chemicals are handled, it is really important how air is ventilated. In the proposed facilities, vertical duct is installed from an arbitrary position on the room ceiling. Utilizing the features of a one-story building, the duct is guided to the attic, and the air is discharged from the roof top. This will eliminate the problem of re-contamination caused by the accumulation of toxic substance due to the use of horizontal ducts now generally used. This is a very effective method for the Research Center where toxic substances are handled.

It is generally said that Aspergilius flavus to produce aflatoxin normally exists in the world naturally. But, it is important to avoid direct contact with it as much as it is practically possible. If it is likely to happen that any powder contaminated with highly concentrated aflatoxin may be generated in the research room, it is necessary to install separating doors to protect the researcher from toxic substances. The air must be effectively and quickly discharged from the room and must be diluted and diffused into the open air.

4-2-7 Equipment Planning

The equipment for the Project has been selected with a full understanding of the functions and roles and under close consultation with the staff of executive organizations in Thailand. Basic concepts are:

(1) Because this Center will play an important role in the research and study of aflatoxin, the equipment should be prepared not only for the analysis of aflatoxin but also for the study of the mechanism of the occurrence of contamination by aflatoxin.

(2) High-precision analysis in ppb units is demanded for analytical instruments. All instruments used must be able to be analyzed accurately and quickly with high reproducibility.

(3) Because the aflatoxin to be studied is a toxic substance, special care should be taken to prevent any chance of contact with the researcher.

(4) With regard to a series of equipment for post-harvest processing of maize, such as shelling, drying, storage, etc. at the annex building, the handling of the objects to be studied must be limited to the farmers or to the village middleman, working close to the farmers.

(5) It is expected that Technical Cooperation will be offered to this Center from Japan, in the near future. Accordingly, the equipment and devices should be utilized and maintained under the guidance of Japanese experts. Also, main analytical instruments should be such that the technical services after installation are locally available.

(6) All equipment and devices must be energy-saving in operations and so that they can be used at the lowest possible operational cost.

EQUIPMENT LIST

I. Main Building

No.	Description	Number of Units
(1)	Stock Room I	
1.	Freezer	2
2.	Prefabricated Constant Temp. Room	1
3.	Sample Storage Cabinet	4
4.	Sample Storage Case	20
(2)	Sample Preparation Room	
1.	Ventilation Air Oven	1
2.	Center Table	1
3.	Sample Divider, Riffle Type	1
4.	Sample Divider	1
5.	Cutting Mills with Cooling Device, Willey Type	1
6.	Ultra Centrifugal Mill	1
7.	Sieve Shaker	1
8.	Portable Moisture Meter	1
9.	Glass Desiccator	2
10.	Vacuume Polyethylene Bag Sealer	1
(3)	Extraction & Purification Room	
1.	Laboratory Table by the Wall with Shelves	2
2.	Stainless Sink with Water & Hot Water Supply	1
3.	Laboratory Center Table	1
4.	Draft Chamber	3
5.	Shelves for Chemicals & Miscellaneous	2
6.	High Speed Refrigerated Centrifuge with Roater & Tube	1
7.	Rotary Evaporator Set with Cold Water Supply Device	3
8.	Shaker Set	2
9.	Ultra Speed Homogenizer	1
10.	Waring Blender	1
11.	Compressor	1
12.	Alminum Heating Block with N2 Gas Dry	1
13.	Hot magnetic Stirrer	1
14.	Columun Set for Purification	2
15.	Miscellaneous for Laboratory	1
16.	Glass Wares	1
17.	Mixer for Test Tube	2
18.	Centrifugal Evaporator	1
19.	PH Meter	1
20.	Freeze Dryer with Ample Adapter	1
21.	Ample Burner	1
22.	Auto Still Unit	1
23.	Laboratory Chair	3

No.	Description	Number of Units
(4) Analytical Instrument Room		
1.	Laboratory Table by the Wall	2
2.	High Speed Liquid Chromatograph Set With Pump, Spectrophotometer, Fluorescence Monitor, Columun Oven, Sample Injector, System Controller and Data Processing Device	1
3.	Gas Chromatograph Set with Data Processing Device	1
4.	Recording Spectrofluorometer	1
5.	Double-beam Spectrophotometer	1
6.	Ultrasonic Cleaner	2
7.	Minicolumn Detector Set	1
8.	Hot Air Oven	1
9.	Ultraviolet Lamp, long wave & short wave	2
10.	Circular Cooling Water Bath	1
11.	Ultra Pure Water Unit	1
12.	Laboratory Chair	3
13.	Refrigerator	1
(5) Thin-Layer Chromatography Room		
1.	Laboratory Table by the Wall	1
2.	Draft Chamber	1
3.	Chromato-view Cabinet	1
4.	Densitometer	1
5.	Dual-wavelength TLC Scanner	1
6.	Ultraviolet Lamp, long wave & short wave	1
7.	TLC Apparatus	1
8.	Laboratory Chair	3
9.	Shelves for Chemicals & Miscellaneous	1
(6) Culture Medium & Microscopic Sample Preparation Room		
1.	Refrigerator	1
2.	Cook Top	2
3.	Hot Magnetic Stirrer	2
4.	PH Meter	1
5.	Draft Chamber	1
6.	Laboratory Center Table	1
7.	Labo Cart	3
8.	Low Temp. Water Bath Incubator	1
9.	Electronic Oven	1
10.	Balance 500g, 0.1g	1
11.	Horizontal Plate	1
12.	Culture Medium Dispenser	1
13.	Paraffin Processer for Microscopic Sample	1
14.	Paraffin Melting Oven	1
15.	Paraffin Strecher	1
16.	Table-type Exhauster	1
17.	Gas Burner	2
18.	Laboratory Chair	3

No.	Description	Number of Units
(7)	Bio-hazard Room	
1.	Bio Bench	1
2.	Safety Cabinet	1
3.	Water Bath Shaking Incubator	2
4.	Laboratory Table	1
5.	Loop Sterilizer	2
6.	Auto Pipeter	2
7.	Laboratory Chair	2
(8)	Incubation Room	
1.	Programmable Low Temp. Incubator	2
2.	Low Temp. Shaking Incubator with flask	1
3.	Low Temp. Rotary Incubator with flask	1
4.	Low Temp. Constant Temp. & Humidity Chamber	1
5.	Water Bath Circle Shaker Set	1
6.	Labo Cart	3
(9)	General Test & Experiment Room	
1.	Electronic Moisture Tester	1
2.	Infrared Moisture Tester	1
3.	Rotary Air Oven	1
4	Weighing Can	50
5.	Glass Desiccator	1
6.	Kjeldahl Apparatus Set	1
7.	Soxhelt's Apparatus Set	1
8.	Muffle Furnace	1
9.	Vacuum Air Oven	1
10.	Draft Chamber	1
11.	Vacuum Box Type Desiccator	2
12.	Vacuum Pump	2
13.	Chemical Storage cabinet	1
14.	Glassware Cabinet	1
15.	Refrigerator	1
16.	Laboratory Table	1
17.	Laboratory Chair	3
18.	PH Meter	1
(10)	Instrument Sterilization & Washing Room	
1.	Laboratory Table by the Wall	1
2.	Auto Still Unit	2
3.	Drying Shelves with Caster	2
4.	Ultrasonic Pipette Washer	1
5.	Pipette Dryer	1
6.	Sink Unit	1
7.	Autoclave with Rack	2
8.	Drying Sterilizer with Rack	1
9.	Ventilation Air Oven	1
10.	Automatic Ice Machine, Cube & Flake	1
11.	Shelves	2
12.	Labo Cart	3
13.	Laboratory Chair	3

No.	Description	Number of Units
(11)	Balance Room	
1.	Top-pan Balance 20 kg, 100g	1
2.	Balance 2 kg, 0.1g	2
3.	Electronic Balance 200g, 1mg	1
4.	" 200g, 0.1mg	2
5.	Precision Balance with Table, capacity 20g, sensitivity 0.001mg	1
6.	Laboratory Chair	3
(12)	Microscope Room	
1.	Microtome	1
2.	Multi-function Microscope with Photomicrograph Apparatus and Table	1
3.	Vertical Microscope with Photomicrograph Apparatus and Table	1
4.	Stereo-microscope with Table	1
5.	Desiccator	1
6.	Laboratory Chair	3
7.	Close-up Photography Set	1
8.	Ultraviolet Lamp	1
9.	Shelves	1
(13)	General Office & Other Rooms	
1.	Slide Projector	1
2.	Overhead Projector	1
3.	Screen	1
4.	Personal Computer	2
5.	Drafter Set	1
6.	Drawing Copying Machine	2

II. Annex Building

No.	Description	Number of Units
(1)	Sample Preparation	
1.	Probe	5
2.	Double Tube Triers, long	1
3.	Double Tube Triers, short	1
4.	Sample Divider, Riffle Type	2
5.	Sample Crushing Mill	1
6.	Ultra Centrifugal Mill	1
7.	Sieve Set	2
8.	Vacuum Cleaner	1
9.	Top Pan Balance, 20 kg	1
10.	Top Pan Balance, 5 kg	2
(2)	Shelling Experiment	
1.	Corn Sheller	1
2.	Dockage Tester	1
3.	Test Separator	1
(3)	Drying Experiment	
1.	Flat Bed Type Dryer	5
2.	Maize Dryer	2
3.	Air Flow Meter/Anemometer	1
4.	Manometer	1
5	Portable Moisture Meter	3
6.	Platform Scale, 500 kg	2
7.	Thermo Couple With Recorder	2
8.	Hygro-Thermograph with 10 Sensors	1
9.	Basket-type Container	50
10.	Labo Cart	2
11.	Triangle Sample Pan	6
12.	Calipers	5
13.	Dial Thickness Gauge	2
14.	Clinometer	2
15.	Hygrometer	2
16.	Desiccator	1
17.	Shelves	1
(4)	Storage Experiment	
1.	Constant Temp. and Humidity Room	1
2.	Gas Analyzer	1
3.	Shelves	6
4.	Sprayer	2
5.	Fumigation Sheet	5
6.	Gas Mask	3
7.	Gas Absorption Can	6
8.	Protective Closing	3
9.	Gas Concentration Detecter	1
10.	Grain Thermometer	10

No.	Description	Number of Units
(5) Workshop (Wood)		
1.	Circular Saw	1
2.	- " - (portable)	2
3.	Electric Drill	1
4.	Drill Bits	1
5.	Jig Saw	3
6.	Belt Sander	1
7.	Orbital Sander	1
8.	Tool Cabinet	1
9.	Vacuum Cleaner	1
10.	Reciprocating Type Power Hacksaw	1
11.	Tools for Woodwork	1
(6) Workshop (Metal)		
1.	Engine lathe	1
2.	Shears	1
3.	Jig Saw	1
4.	Spot Welder	1
5	Acetylane Welder	1
6.	Electric Welder	1
7.	Tool Cabinet	1
8.	Grease Gun	1
9.	A.V. Meter	1
10.	Electric Drill	1
11.	Drill Bits	1
12.	Bench Vice	1
13.	Hydrolic Jack	1
14.	Variable Speed Motor	1
15.	Wire Cutters	3
16.	Tachometer	2
17.	Grinder	1
18.	Compressor	1
19.	Tools for Metalwork	1
(7) Field		
1.	Station Wagon Jeep	2
2.	Cold Box	2
3.	Truck	1
4.	Micro Bus	1
5.	Sprinkler Unit with Pump (Movable)	2
6.	Tractor	1

Scale of rooms

Main building

Room name	Area m^2	Remarks
General office	45.7	For 7 persons 6.5 m^2/person
Research Rm for Microbe	34.2	For 6 persons
Research Rm for Agronomy	34.2	For 3 persons, including stock space
Research Rm for Storing and processing	34.2	For 4 persons
Research Rm for Expert	17.1 x 3 rooms = 51.3	Single room for expert
Director's Rm.	34.2	Single room for director, including reception space
Team Leader's Rm.	34.2	Single room for expert
Meeting Rm.	37.8	For 24 persons 1.5 m^2/person
Analytical Instrument Rm.	22.5	Scale calculation according to equipment arrangement
Extraction & Purification Rm.	45.9	"
Bio-Hazard (Germ-Free) Rm.	15.7 Anteroom 6.7	"
Incubation Rm.	17.1	"
Microscope Rm.	15.4	"
Stock Rm. I	26.1	"
Thin-Layer Chromatography Rm.	15.4	"
Culture Medium and Micro-scopic Sample Preparation Rm.	34.2	"

Room name	Area m^2	Remarks
Sample Preparation Rm	25.2	Scale calculation according to equipment arrangement
Balance Rm.	15.4	"
General Test & Experiment	34.2	"
Instrument Sterilization Washing Rm.	34.2	"
Store Rm.	15.3 4 rooms 61.2	"
Corridor & Entrance Hall	184.0	About 20% of total floor area
Toilet & Shower Rm.	18.2	Shower rooms, one each for men and women

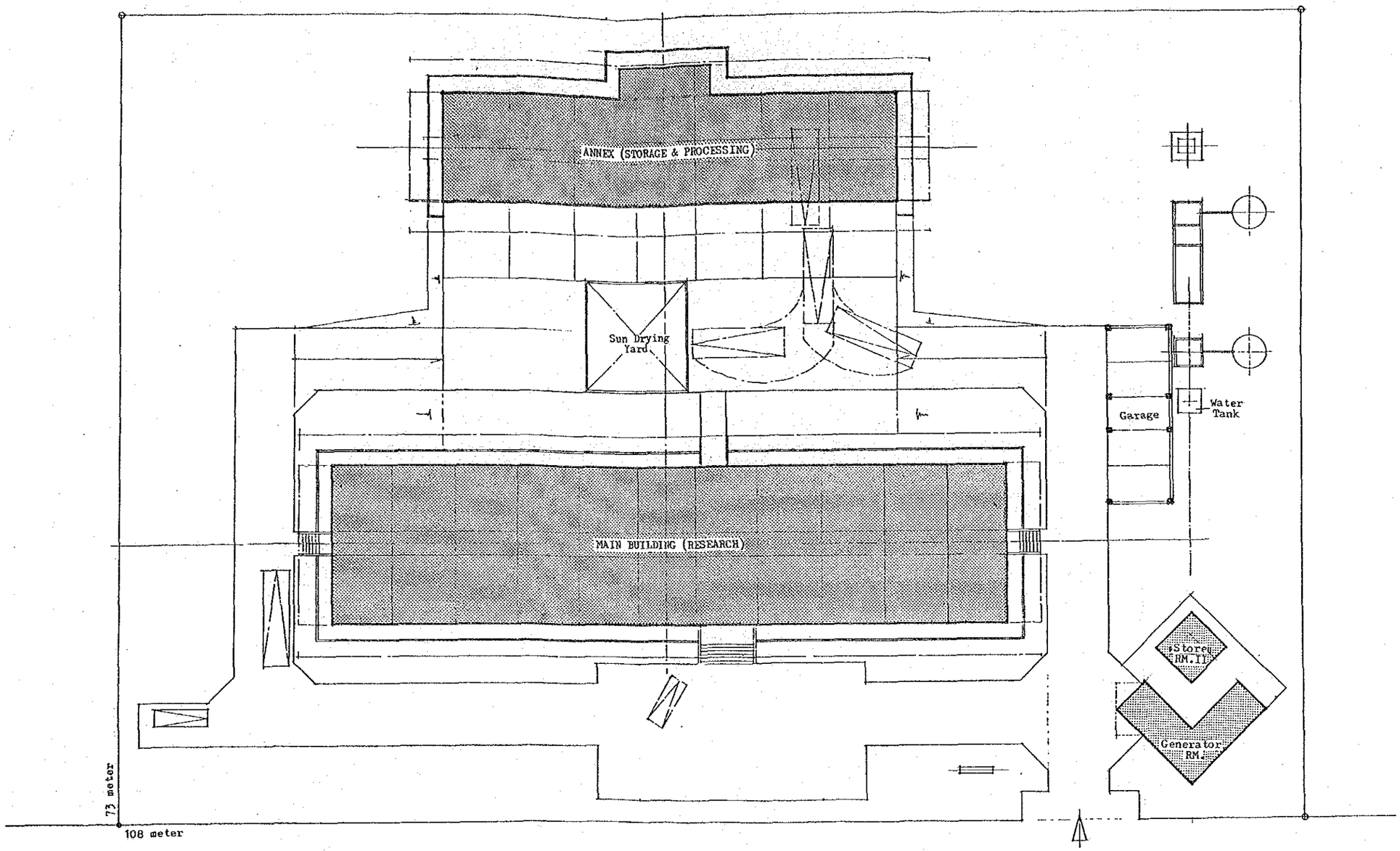
Annex and other buildings

Room name	Area m^2	Remarks
Workshop	171.0	Scale calculation according to equipment arrangement
Shelling & Drying Test Sample Preparation	114.0	"
Constant Temp. & Humidity Rm.	19.2	"
Air-Tight (Gas Test & Fumigation) Storage	18.6	"
Storage	19.2	"
Equipment Storage for Field Survey	57.0	"
Driver's Rm.	16.6	Waiting room for 3 persons
Generator Rm.	31.3	Scale calculation according to equipment arrangement
Stock Rm. II	20.0	"

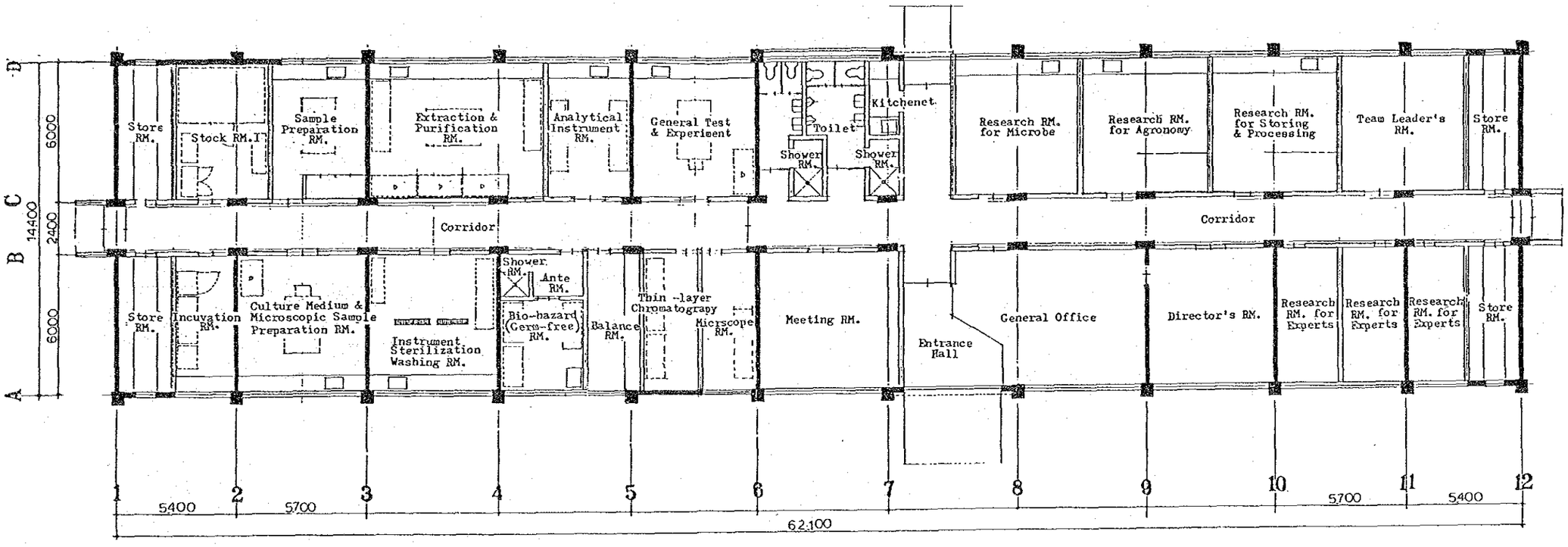
Room name	Area m^2	Remarks
Toilet & Shower Rm.	11.4	Shower rooms, one each for men and women
Garage	100.0	

Total floor area

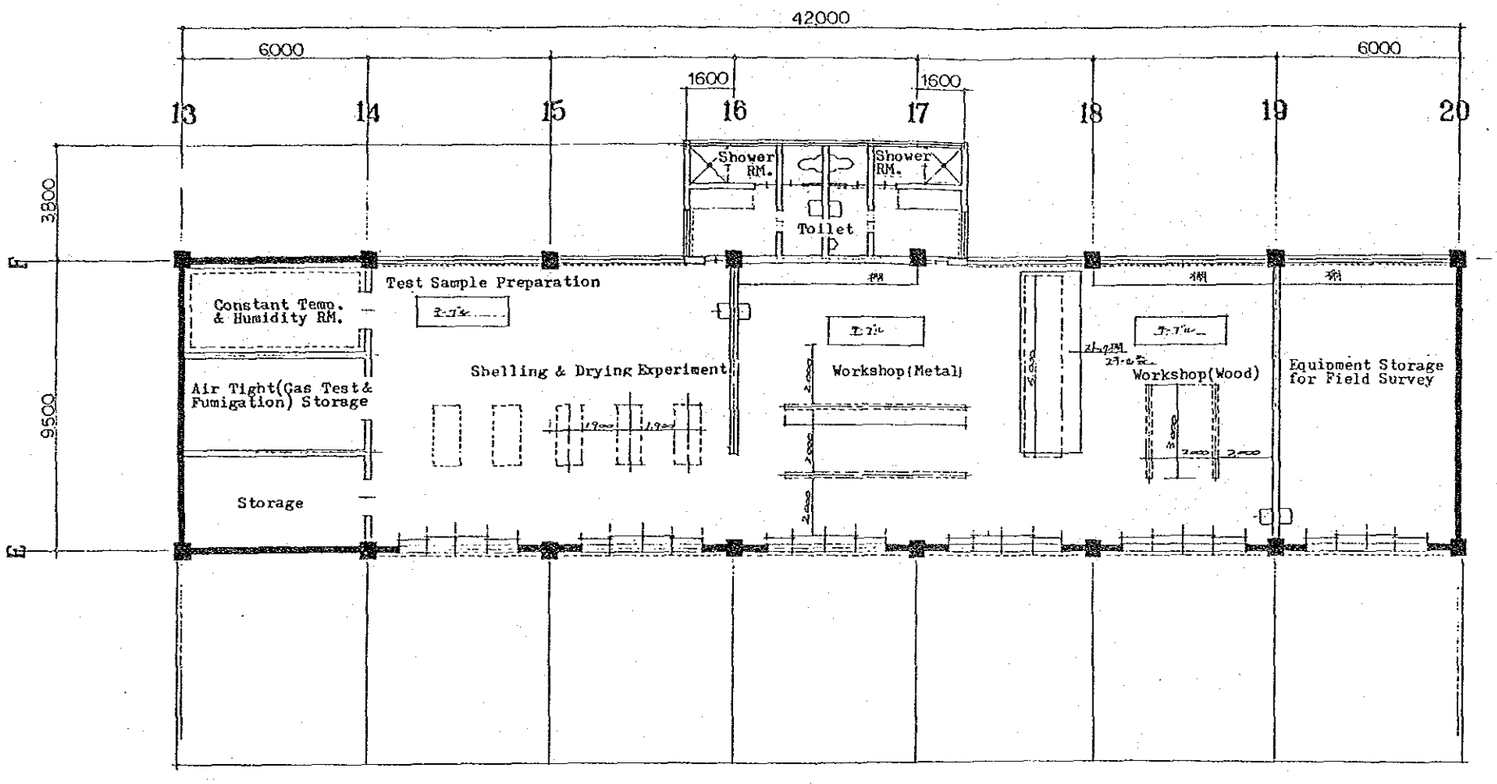
Building name	
Main building	894.24 m^2
Annex	433.96 "
Others	171.81 "
Total	1,500.01 m^2

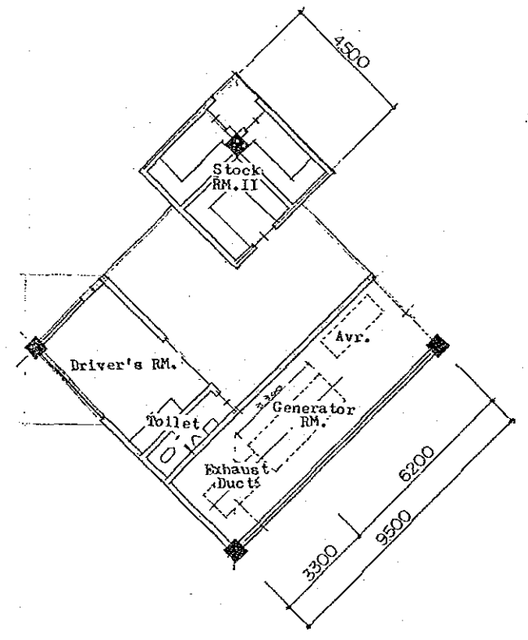


BLOCK PLAN S 1:400



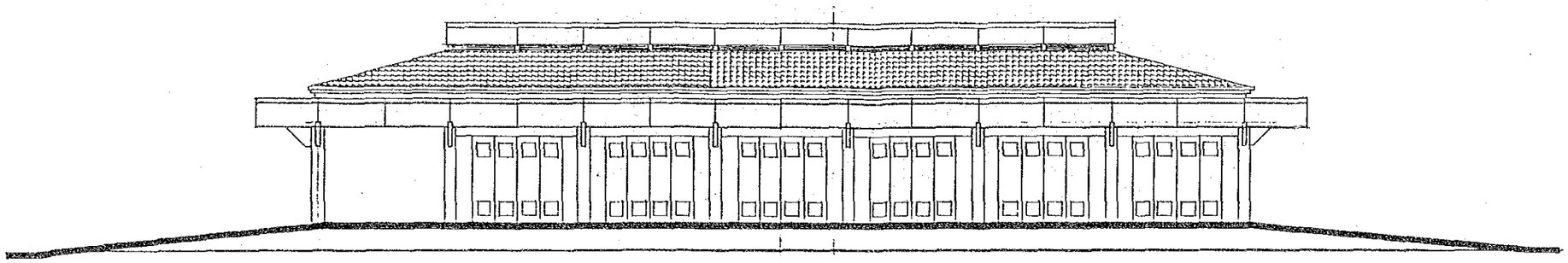
MAIN BUILDING (RESEARCH) FLOOR PLAN S 1:200



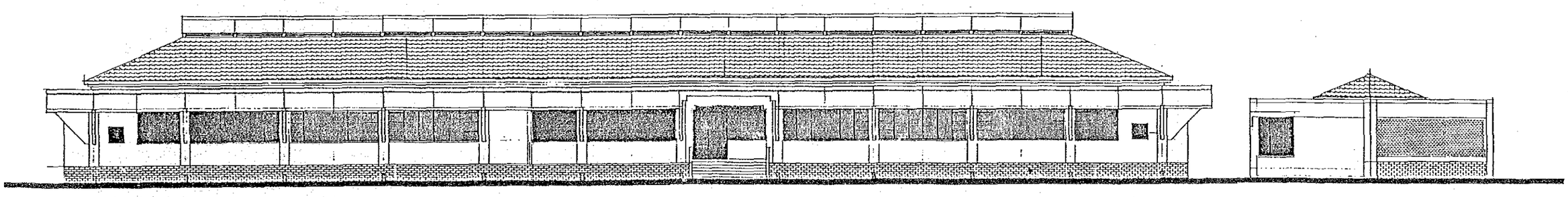


ANNEX (STORAGE & PROCESSING)

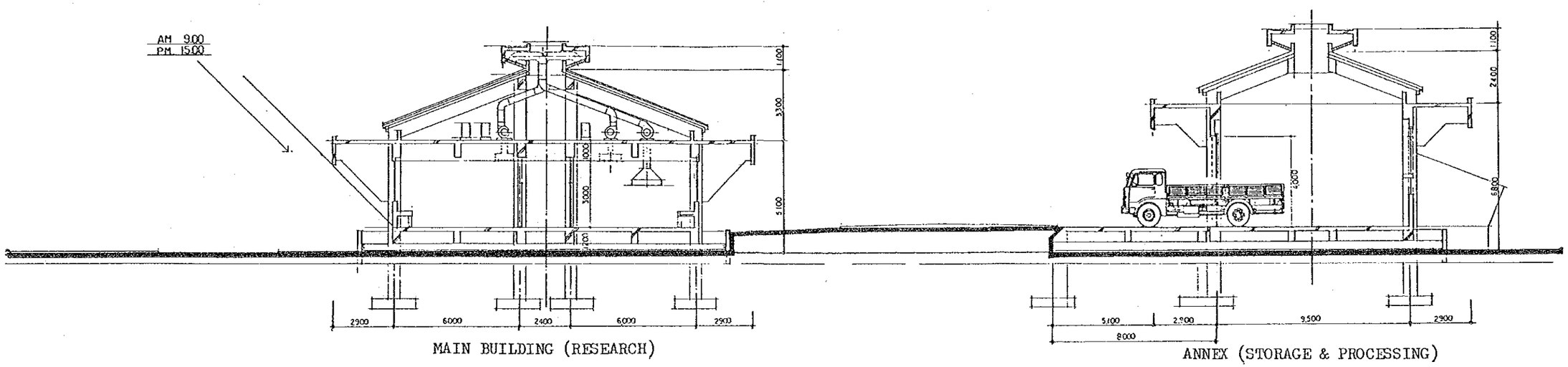
FLOOR PLAN S 1:200



ANNEX (STORAGE & PROCESSING)



MAIN BUILDING (RESEARCH)



MAIN BUILDING (RESEARCH)

ANNEX (STORAGE & PROCESSING)

SECTION S 1:200

4-3 Approximate Cost Estimate of Works to be undertaken by the Government of Thailand

(1)	Clearing, filling and levelling	2,160,000	Baht
(2)	Gardening	100,000	"
(3)	Fencing	490,000	"
(4)	Gate (include an exterior lighting)	15,000	"
(5)	Electricity distributing line (include a transformer)	342,000	"
(6)	Water distribution main	40,000	"
(7)	Telephone trunk line to the main distribution panel (one line, ten extensions)	100,000	"
(8)	General furniture	98,800	"
(9)	Paving the approach	450,000	"
(10)	Boring test	40,000	"
	Total	3,835,800	Baht

5. PROJECT EXECUTION SCHEME

5.PROJECT EXECUTION SCHEME

5-1 Execution Scheme

(1) Project executive organization:

As described in 3-3-1 Management System, executive organization shall be the Department of Agriculture of the Ministry of Agriculture and Cooperatives, Government of Thailand.

(2) Consultant:

Immediately after the Exchange of Notes (E/N) between two Governments, the Japanese consultant shall conclude a consultant contract with the Department of Agriculture of the Government of Thailand in accordance with the procedure of Japanese Grant Aid Program. According to this contract, the consultant shall execute the following works:

a) Detail design

- Preparation of detail design drawings, specifications, and other design documents.

b) Tendering

- Advice and guidance related to the construction contract.

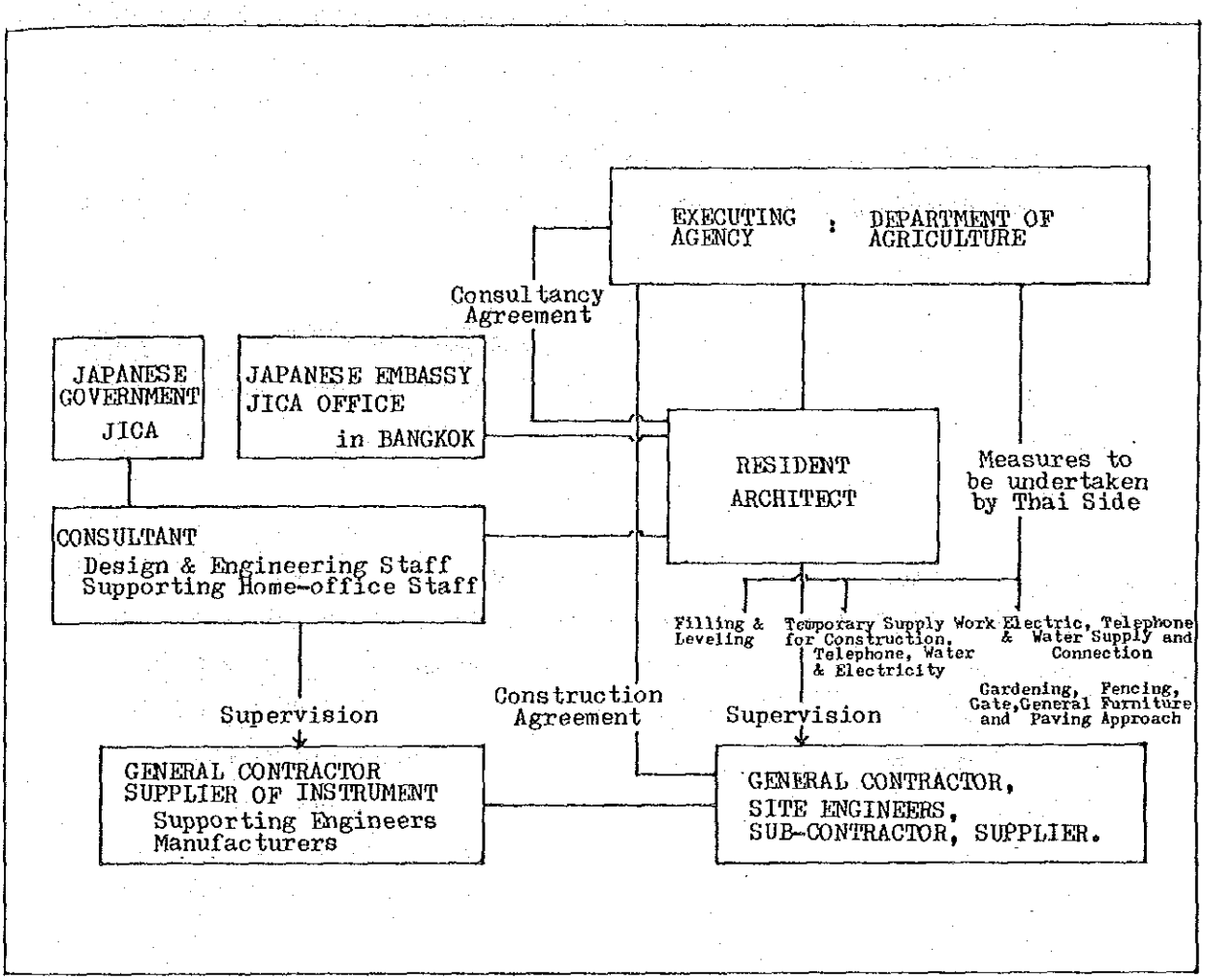
c) Construction

- Supervision of the execution of the construction contract, and the supply and installation of equipment contract.

: Remuneration for the consultant shall be covered by the grant.

(3) Construction contractors:

Building construction and procurement of equipment shall be executed by the Japanese contractors chosen by the tender. The construction shall be completed within the contracted period and shall be delivered to the Department of Agriculture, which is the executive organization of this Project.


EXECUTING AGENCY : DEPARTMENT OF AGRICULTURE
Consultancy Agreement
JAPANESE GOVERNMENT JICA
JAPANESE EMBASSY JICA OFFICE in BANGKOK
RESIDENT ARCHITECT
Measures to be undertaken by Thai Side
CONSULTANT
Design & Engineering Staff
Supporting Home-office Staff
Filling & Leveling
Temporary Supply Work for Construction, Telephone, Water & Electricity
Electric, Telephone & Water Supply and Connection
Gardening, Fencing, Gate, General Furniture and Paving Approach
Supervision
Construction Agreement
Supervision
GENERAL CONTRACTOR SUPPLIER OF INSTRUMENT
Supporting Engineers
Manufacturers
GENERAL CONTRACTOR, SITE ENGINEERS, SUB-CONTRACTOR, SUPPLIER.

5-2 Execution Plan

(1) Execution plan

Immediately after the Exchange of Notes between the two governments, the consultant contract must be concluded, and the consultant and the Department of Agriculture shall make detailed arrangements and the adjustment of opinions, in order to execute the detailed design in accordance with the basic design principle. At the same time, the Department of Agriculture shall start the boring test, and site preparation, which should be completed before the starting of building construction. This will be an important point in the present planning execution.

In order to execute the present project smoothly, it is important to accurately materialize the primary aim of basic design.

(2) Supervision Plan

Close contact must be kept between the local supervision system and the back-up system in Japan regarding the scope of construction and the time of transportation for the construction of research equipment and buildings. It is important to establish a positive and firm back-up system, including the dispatching of resident supervisors at the construction site as well as the short-term staff to dispatch when necessary. All important matters concerning the construction progress, payment procedure, completion and delivery must be reported to the officials in charge in the Japanese Government.

5-3 Equipment and Material Procurement Planning

(1) Equipment and material procurement for the facilities

Various types of construction materials are produced in Thailand, but few of these products meet with the special requirements. For example, it is anticipated that acid solution and organic solvents will be used and toxic substances will be generated in the experi-

ment room. As the finishing materials for floors, and baseboards, wear-resistandt, flexible materials should be selected to endure the long, continual work and frequent washing of the research staff. However, it may be hard to find such materials in Thailand, at present, and these should be brought from Japan.

With regards to the equipment, some local manufacturers produce high-level products. In general, it would be appropriate to get these products locally as much as is practically possible for the convenience of maintenance and repair. But, the high-performance, special purpose, equipment such as the air-conditioner for the sterilization room or other devices, not locally available, should be supplied from Japan.

The procurement program for principal materials and equipment concerning the project is as follows:

Local Procurement	Imported from Japan
Cement and Aggregates (Sand, concrete and concrete products)	Special purpose air-conditioners
	Pumps
	Generators
Reinforcing Bars and	Ventilating fans
Lumber	Lighting outlets (specify) for experiment rooms
Galvanized iron sheets and plates	Panelboards
Wood doors and windows	Receptacle outlets and switches for experiment rooms
Metal fittings (aluminum sash and steel sash)	
Glassware	
Bricks	
Asbestos cement products	
Paint	
Interior finish materials (Materials for floor, wall and ceiling)	
Piping materials	
Cable conduit and cable	
Pipe fittings and valves	
Air-conditioning instruments	

(2) Procurement of Equipment

As to the transportaion and installation work of the equipment, a safe and punctual schedule should be made according to the progress of construction.

At present, the period between the arrival of the equipment at the site and the handing over is estimated at about 3 months. Because the whole construction period is estimated at 10 months, the procurement work for the equipment, such as manufacturer's preparation, inspection, packing and transportation, should be finished on time so that the installation of equipment can begin in the 6th to 7th month of the construction period (7 - 8 months after the conclusion of contract) when electrical work will be completed.

Since most of the experimental devices and equipment are vulnerable to impact, humidity and high temperature, full consideration should be given to the packing and transportation. A strict inspection should be performed, prior to shipping.

A few items of equipment, not Japanese produced equipment, may be selected. In such cases, it is important to take special care to procure the equipment within the framework of the above working period.

5-4 Scope of Undertakings

According to the basic principle of the Grant-Aid Program of the Government of Japan, the scope of work to be covered by the Japanese side comprises the construction of the Research Center, to improve the quality of maize, and also for the equipment and devices necessary for the research. The scope of the construction work shared by Thailand is specified in the minutes of the discussion dated April 18, 1986 by the study team, and the works shared by both countries are to be as follows:

Item	Work borne by Thailand	Work borne by Japan
(1) Main construction	. Boring test	
① Site preparation	. Filling and levelling the site before commencement of construction	
② Water supply	. Leading-in of the pipe from water supply main pipe to the project site . Cost for the leading-in of the pipe	. To provide water supply facilities inside the project site after the work done by Thai side
③ Drainage	. Connection to drainage main . Cost for the connection	. To provide septic tank, settling tank, permeating pit and piping work inside the project site
④ Electric power	. Leading-in from main power line to the power receiving facilities in the project site . Cost for the leading of such power lines and a transformer	. To provide power supply facilities after the work done by Thai side
⑤ Telephone	. Leading-in from main line to main distribution panel . Cost for the leading of such telephone lines	. To provide telephone facilities inside building after the work done by Thai side
(2) Building	. All costs regarding the application for building permission . Construction of all facilities suppiled other than by Japan	. To construct buildings and equipments

Item	Work borne by Thailand	Work borne by Japan
(3) Outdoor facilities	. Lighting, gates, fences, and gardening . Paving the approach up to the project site	. To construct the approach up to the buildings inside the project site
(4) Equipment and materials	. Procurement of the equipment and materials not supplied by Japan	. To provide equipment, materials and vehicles required for research which is listed in Article 4.2.7
(5) Furniture and fixtures	. Curtains, desks, chairs and other fixtures	
(6) Transportation of equipment and materials	. To ensure prompt unloading, tax exemption, customs clearance at Port of disembarkation in Thailand	. Shipping matters and inland transportation
(7) Others	. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement . To accord Japanese nationals whose service may be required in connection with the supply of products and the services under the varified contract such facilities as may be necessary for their entry into Thailand and stay therein for the performance of their work	

Item	Work borne by Thailand	Work borne by Japan
	. 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	

Budgetary Measures of Thailand Side

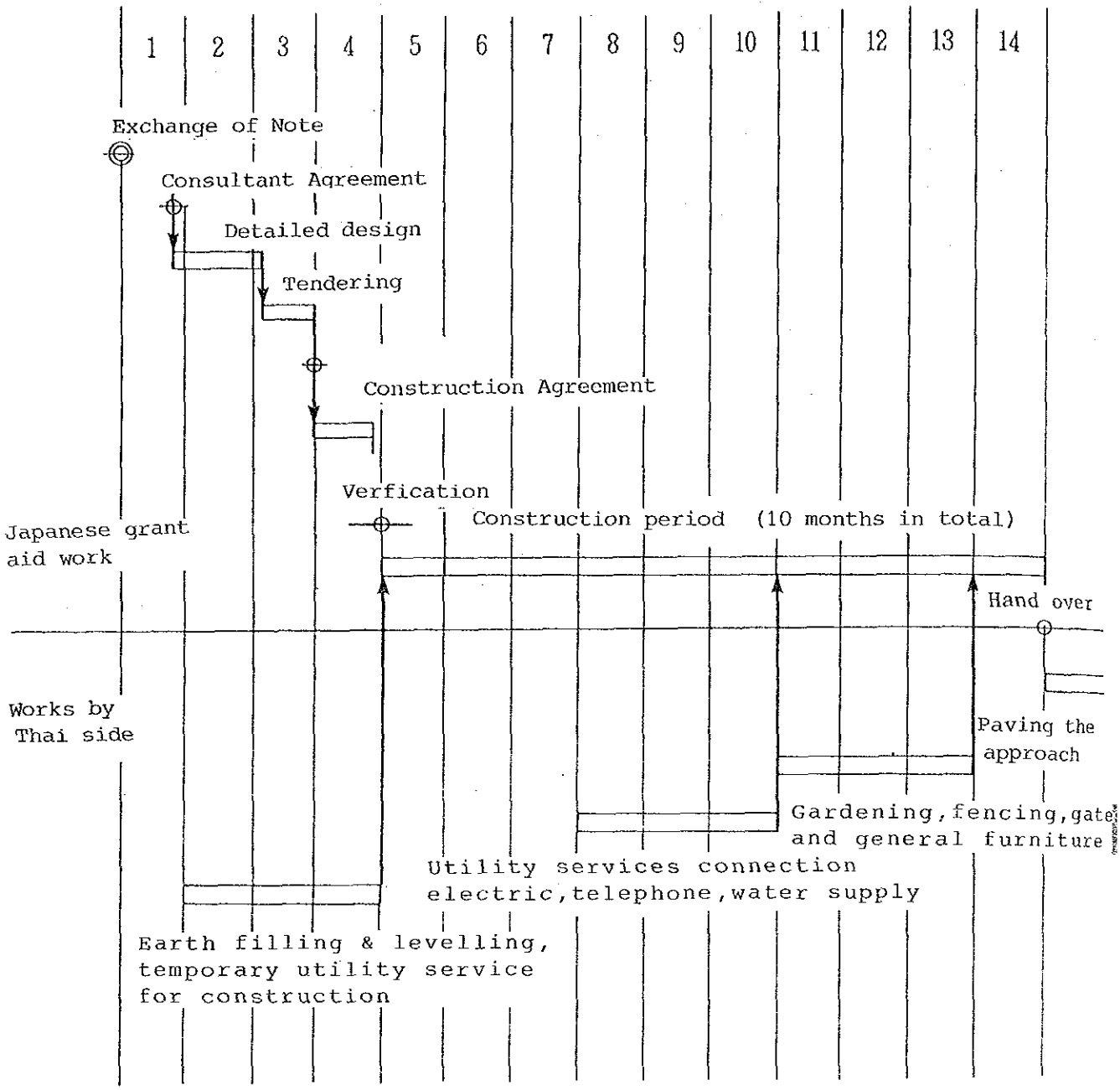
Fiscal year in Thailand starts in October. Accordingly, the Department of Agriculture started to prepare the request budget from December of the previous year. In the budgetary process, a period of about 2 - 3 months is required - each for the adjustment at the Bureau of Budget and for the authorization at the cabinet session and the parliament. For this reason, the Project cost for measures to be undertaken by the Thailand side is to be covered by the provisional budget. The cost for each step of the present Project is to be covered each time, with the progress of the Project, by the provisional budget. The cost of the boring test (40,000 Baht) is to be paid in advance temporarily by the ordinary budget under the approval of the Bureau of Budget.

For the past 2 - 3 years, the Department of Agriculture has not requested the provisional budget, and DOA is asked to promptly meet the requirements for the work schedules, as will be explained later. For this reason, it is very important to determine the priority for all related government organizations, which will be responsible to execute the works necessary for the budget inside or outside DOA.

For the budgetary procedure and execution schedule of the work under the responsibility of Thailand, discussions were made and the possibility has been confirmed, including the procedure for the provisional budget before the Exchange of Note. It is necessary, however, to make adjustments and arrangements in detail with all the related organizations

5-5 Execution Schedule

The execution schedule for the construction of the facilities and the procurement of materials and equipment after the Exchange of Notes between the two governments in accordance with the procedures of the Japanese Grant-Aid Program are as shown below:


1
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9
10
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14
Exchange of Note
Consultant Agreement
Detailed design
Tendering
Construction Agreement
Verfication
Construction period (10 months in total)
Japanese grant aid work
Hand over
Works by Thai side
Paving the approach
Gardening, fencing, gate and general furniture
Utility services connection electric, telephone, water supply
Earth filling & levelling, temporary utility service for construction

6. OPERATION AND MAINTENANCE SCHEME

6.OPERATION AND MAINTENANCE SCHEME

6-1 Plan for Operation and Maintenance

Most of the tasks of the Research Center related to the operation and maintenance will be undertaken by various sections of the Department of Agriculture. Services will also be provided by these sections of related divisions, in regards to the operation and maintenance of facilities and equipment.

Is is considered that there will be no difficulty with the continued operation and maintenance of research equipment, because the technological capability of the private sector is at a relatively high level.

(1) Operation and Maintenance of Facilities

Reduction of tasks related to maintenance and control as well as ease of operation were taken into consideration, in the making of the building plan. Sufficiently larger eaves are being adopted to protect the exterior wall and windows from harsh natural conditions (in local places). Traditional roof tiles are selected as roofing materials, by taking into consideration such factors as availability of materials, reliability of local work, durability and ease of maintenance. For the purpose of finishing the inside of the building, materials meeting the requirements of various research activities, tests and operations are being selected. However, the equipment and materials will not function effectively unless they are maintained well through routine inspection and cleaning. The activities of the Research Center will include a variety of areas including precision testing, trial production of agricultural equipment and processing of corn. Arranging things in an orderly fashion and cleaning facilities and equipment thoroughly is needed to cope with dust and trash and to keep a clean working environment. Furthermore routine operation of maintenance and control may lead to early discovery of damage and potential problems and prolong the life of the facilities.

Periodical check and repair of the following items are recommended.

. Repair and repainting of exterior finish and inspection of cracks in crumbling concrete.	once every 5 years
. Repainting of surrounding fences	once every 5 years
. Check the roof and roof tiles	once every 3 months
. Check and partial repair of roof waterproofing	once every 3 months
. Check and clean the tank, gutter, manhole, etc.	once every 3 months
. Check and adjust the finish hardware	once every 3 months

With regards to air conditioning and ventilation equipment in the building facilities, their operation directly affects test results and working conditions of the research equipment, and plays an important role in protecting researchers from contamination by aflatoxin. A generator is designed to continue to supply power even in the case of an emergency like a power failure or a decline of voltage so that test and research activities will not be interrupted, and so that several major samples or reagents may be stored in a restricted environment at each testing processing area. The repair and maintenance of electrical and air conditioning equipment will be implemented by a Repair & Maintenance section of AED. For the purpose of such implementation, it is necessary to adopt a system of maintenance and control designed to prevent the occurrence of trouble and accidents by periodically inspecting or through other administrative programs.

Drainage facilities should also be checked periodically because the subsidence of earth is likely to cause damage to drain pipes and affect the drainage processing tanks.

The cycle of this regular inspection of general equipment is as follows:

Electrical installation

: Lighting outlets	once every 6 months
: Distribution board and control panel	once every 6 months
: Generator	
— Check the body function and operation	once every 6 months
— General check	once a year
: Check the electrical motors and other rotary machines	once a year

Air conditioning installation

: Cleaning or replacing various air filters	once a month
: Cleaning and adjustment of air outlet and air inlet	once every 2 months
: Fan and exhaust fan	once every 2 months

Plumbing installation

: Pumps	once every 2 months
: Cleaning the drainage installation	once every 6 months
: Adjustment of the water flow in the toilet	once every 6 months
: Cleaning the water reservoir tank	once a year

Fire fitting equipment

: Fire extinguisher once every 6 months

: Fire alarm

(2) Operation and Maintenance of Research Equipment

Each piece of equipment will be operated and maintained under the Management System described in 3-3-1. The following items are assigned to each Section, and the Chief of each Section is in charge of them.

1) Administration Section

. Equipment provided in General Office & Other Rooms

2) Microbe/Analysis Section

. Stock Room
. Sample Preparation Room (Main Building)
. Extraction & Purification Room
. Analytical Instrument Room
. Thin-Layer Chromatography Room
. Culture Medium & Microscopic Sample Preparation Room
. Bio-hazard Room
. Incubation Room
. General Test & Experiment Room
. Instrument Sterilization & Washing Room
. Balance Room
. Microscope Room

Equipment contained in the above rooms

3) Agronomy Section

. Equipment provided for Field Survey and Experiment

4) Post-harvest Processing/Storing Section

. Sample Preparation (Annex Building)
. Shelling Experiment
. Drying Experiment
. Storage Experiment
. Work Shop (Wood)
. Work Shop (Metal)

Equipment contained in the above.

As for the equipment and devices, see the Equipment List for more detailed information.

Most of the equipment is currently being used in various Research Institutes in Thailand. Moreover, Japanese specialists will be sent to provide technical assistance, it will be possible to maintain and control the equipment at a more advanced level than currently expected in Thailand. There would be no difficulty with the system of operating and maintaining the equipment properly in the new Center, because after-sale services are provided, locally, by manufacturers, in regards to large analytical equipment.

The major equipment requiring regular inspection and maintenance are listed below. The period may vary depending upon the frequency of use.

(Every 3 months)

. Replacement of the raw water filter in the auto still unit.

(Every 6 months)

. Replacement of the carbon brush in high speed refrigerated centrifuge

. Replacement of the grease in the shaking incubator

. Replacement of the grease in the rotary incubator

. Replacement of the pure water filter in the auto still unit

. Replacement of the grease in the lathe

(Every 1 to 1.5 years)

. Replacement of the vacuum pump oil in the freezing drier

. Check and replacement of the binding on the gas pipe section (connection part) in gas chromatography

. Replacement of the vacuum pump oil

. Replacement of the ion exchange resin in the auto still unit and scale removing in the unit

6-2 Expenses for Operation and Maintenance

The expenses necessary for the operation of the Research Center for operation and maintenance are appropriated from the overall budget by the Department of Agriculture. According to the preliminary calculation based on the annual maintenance expenses of AED, FCRI and PPMD, who are scheduled to participate in the Project, as well as the analysis of data, the expenses for each item are estimated to be as follows;

Personnel expenses	4,470,900	Baht
Electrical charges	256,900	"
Telephone charges	19,300	"
Fuel costs (diesel, gas)	33,400	"
Water rates	9,400	"
Transportation costs	836,300	"

Maintenance of equipment	Spare parts, Chemicals, Other supplies	———	688,500 "
Maintenance of building and equipment		———	32,200 "
Other miscellaneous expenses		———	148,000 "
Equipment & building		———	399,000 "
Total			8,893,900 Baht

As described previously, most of the above-mentioned items will be undertaken, by each section under charge of the Department of Agriculture, and the expenses are to be appropriated from the overall budget of the Department. Therefore there will be no major difficulty regarding the operation and financing. Since the preliminarily estimated operation expenses represent only 0.9% of the total budget of the Department of Agriculture, it is considered possible to request for the increase of the Department's budget owing to the establishment of the Research Center.

7. EVALUATION OF THE PROJECT

7.EVALUATION OF THE PROJECT

Maize is a very important crop for the Thai national economy. The product, however, is contaminated by an active carcinogenic substance called aflatoxin. The problem has hindered the development of maize production and has also become a barrier in maize trade. The Government of Thailand has tried to cope with this problem by enacting comprehensive measures in combined efforts with various authorities concerned with this subject, university, research institutions and non-governmental sectors.

The Center to be established according to this Project aims at introducing modern analytical equipment and technology, thereby investigating the cause of aflatoxin contamination. For this purpose, it also aims at studying and clarifying the relationship amongst cultivation, harvesting, processing and marketing. It further aims at establishing a practical method to eliminate the contamination and at proposing an improvement enforcement plan.

(1) Effect of this Project

This Project produces the following effects to Thailand.

1) Direct Effect

This Center and its activities will produce the following effects on improvement on the aflatoxin contamination of maize.

a) Strengthening test/research functions

b) Enhancing test/research technology

c) Clarifying the cause of contamination and proposing controlling measures

--- Clarifying the contamination occurring factors in cultivation and preparing an controlling method

---- Studying the contamination occurring in the post-harvest processing practices and preparing an controlling method

---- Studying the contamination occurring factors in the marketing of maize and preparing a controlling method

---- Developing an analytical/detecting method which can be used in each stage of marketing of maize.

2) Indirect Effect

The achievements of the research conducted by this Center will contribute to the national economy of Thailand in the following manner.

a) Increase in the income of farms producing maize

Farmers will be able to obtain more income due to improvement in the quality of maize which can be attributed to decreases in aflatoxin contamination. As most of maize is cultivated in the up-land fields where low-income farmers are dominant, a great effect is expected.

b) The earning of foreign currencies by an increase in the exportation of maize

It will become possible to export quality maize, not only to conventional overseas markets but to new markets as well. This will contribute to the stable earning of foreign currencies.

(2) Appropriateness of the Project

The target, scale and activities of this Project are realistic and appropriate considering Thailand's technical levels.

1) Technical View

This Project focuses on studies of aflatoxins which contaminate maize. Also the scale of test/research is simply planned in each field of microbe/analysis, post-harvest processing/storing and agronomy.

2) Operation and Management View

Total annual expenditures in this plan are kept to the smallest possible amount in operating and managing the facility after it is set up.

3) Organization and Personnel View

A few, specially assigned researchers will be responsible that this Project is conducted properly. The Japanese technical assistance, which is expected in the near future, should be utilized effectively in each research field, and technology should be transferred properly.

In view of the importance of this Project, the government of Thailand gives it top priority. The Department of Agriculture of the Ministry of Agriculture and Cooperatives of Thailand is the responsible authority for this Project, organizing the system for operating, maintaining and managing it. It also appropriates the budget necessary to carry out the activities and operations of this Center.

If the achievements accomplished by the activities of this Center contribute to effectively decreasing the aflatoxin contamination of maize, this Project will produce a very positive effect on Thailand.

8. CONCLUSIONS AND RECOMMENDATIONS

8.CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION

Recently, the problem of aflatoxin contamination has become a serious issue in foreign trade in Thailand since a number of importing countries of maize started to limit aflatoxin content. The Government of Thailand has an urgent need to overcome the problem as much as possible to encourage farmer's production in increasing a better quality of maize and to gain more foreign currency as well.

The execution of this Project establishes a system ensuring the best research functions to control the aflatoxin contamination of maize, which will also result in the enhancement of the technical standards of the country.

If the improvement measures are gradually adopted over a wide area of pre and post-harvest practices of maize, then this problem is sure to be solved. The Thai government is fully prepared to carrying out this Project.

It is concluded that this Project has great significance, when executed as a Grant Aid Cooperation of Japan, and the Project is highly appropriate for the cooperation.

RECOMMENDATIONS

The following recommendations are proposed to the Thai government in order to realize this Project as effectively as possible and to make it possible to achieve the expected objectives.

(1) Education and Positioning of Personnel

To enable this Center to operate effectively and achieve the expected objectives, it is necessary to educate the persons responsible in three research fields and to clarify the role of each responsible person.

(2) Maintenance of the Equipment

Some of the equipment to be provided for this Project is highly sensitive. It is therefore necessary to manage and maintain the equipment properly so that its functions can be fully utilized.

(3) Necessity of Enhancing the Technology

In order for this Project to be executed efficiently, it is desirable that overseas experts give long-term technical assistance in three fields of this Project: microbe/analysis, post-harvest processing/ storing and agronomy. In addition to these, short-term Technical Cooperation may be necessary depending on the purpose of the research and experiment.

(4) Necessity of Public Relation Services and Extension Activities

This Center, which belongs to the Department of Agriculture, aims at clarifying the cause of aflatoxin contamination and at proposing improvement measures to farmers. Therefore, public relation services and extension activities will be necessary to make it possible to achieve the expected objectives.

9. APPENDICES

9.APPENDICES

9 - (1) Basic Design Study Team

(a) Minutes of Discussions
(b) Survey Schedule
(c) Member of the Survey Team

9 - (2) Basic Design Study (draft) Team

(a) Minutes of Discussions on the Draft Final Report
(b) Survey Schedule
(c) Member of the Study Team

9 - (3) Officials Concerned in Thailand

(1) Basic Design Study Team

(a) Minutes of Discussions

MINUTES OF DISCUSSIONS

ON

THE ESTABLISHMENT PROJECT OF THE CENTER FOR MAIZE QUALITY IMPROVEMENT IN THE KINGDOM OF THAILAND

MINUTES OF DISCUSSIONS
ON
THE ESTABLISHMENT PROJECT OF THE CENTER FOR MAIZE QUALITY IMPROVEMENT IN THE KINGDOM OF THAILAND

In response to the request of the Government of the Kingdom of Thailand, the Government of Japan decided to conduct a basic design study on the Project for the Establishment of the Center for Maize Quality Improvement (herein after referred to as "the Project"), and entrusted the study to the Japan International Co-operation Agency (JICA). JICA sent to Thailand the Study Team (herein after referred to as "the team") headed by Dr. Masaru MANABE, Director of Applied Microbiology Division, National Food Research Institute, MAFF from April 9 to May 1, 1986.

The team had a series of discussions on the Project with the officials concerned of the Government of the Kingdom of Thailand headed by Dr. Yookti Sarikaphuti, Department of Agriculture, MOAC, and conducted a field survey in Thailand.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Signed in Bangkok, in duplicate, this
...18th... day of .April... 19.86.

Masaru Manabe

Dr. Masaru Manabe
Leader,
The Basic Design Study Team,
JICA

Yookti Sarakaphuti

Dr. Yookti Sarakaphuti
Director General
Department of Agriculture

1. The objective of the Project is to assist improvement of the present quality of maize in Thailand by controlling aflatoxin contamination through accommodation of modern and equipped facilities.

2. The contents of the project are construction of building and supply of pertinent equipment.

3. The site of the Project is in Bangkhen, Bangkok as shown in Annex I.

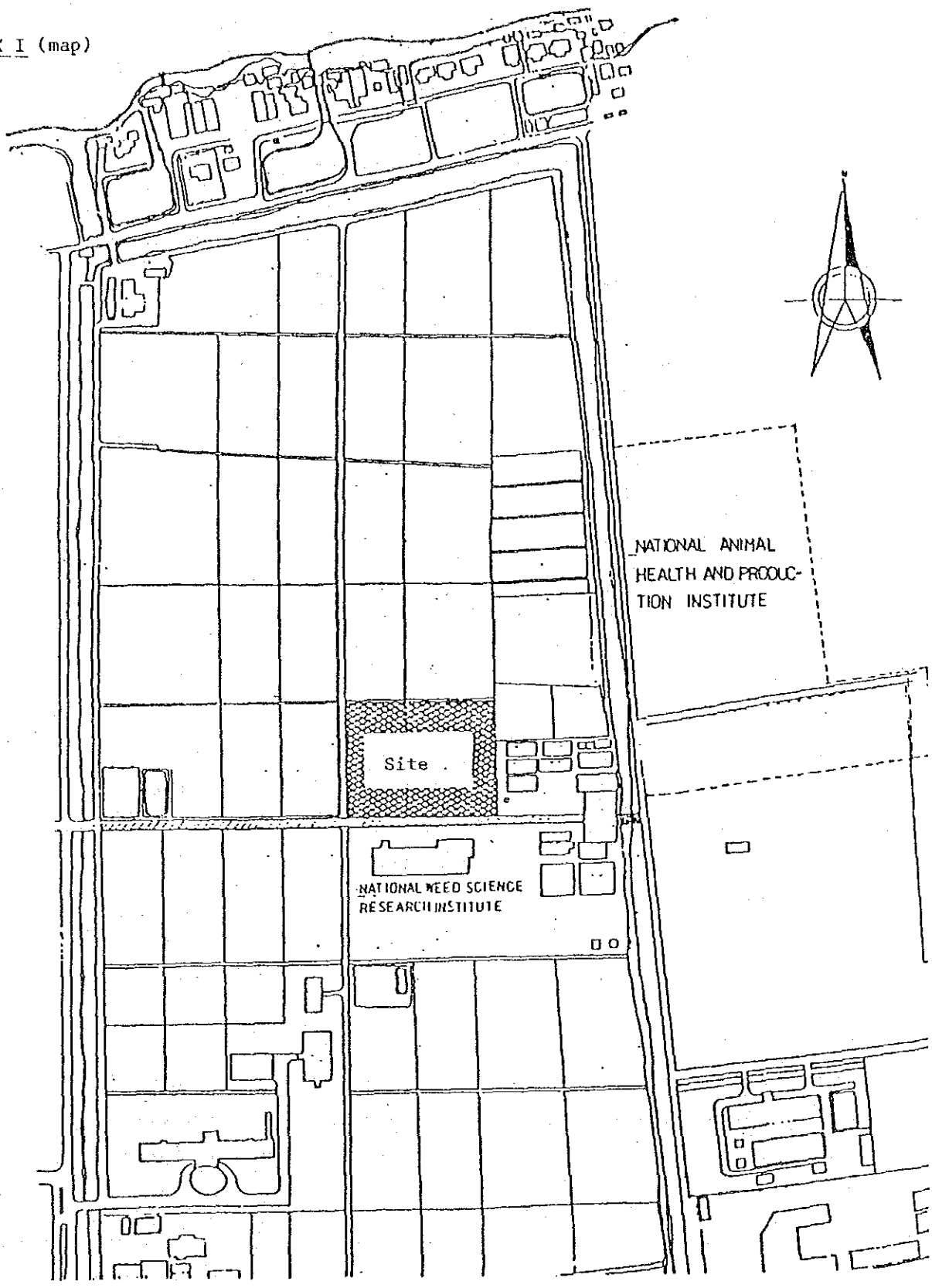
4. Department of Agriculture, MOAC is responsible for the administration & execution of the Project.

5. The Japanese Study Team will convey to the Government of Japan the desire of the Thai Government that the former takes necessary measures to cooperate by providing the building & other items: within the scope of Japanese Grant Aid System.

6. The Thai side understood Japan's Grant Aid System explained by the team.

7. The Government of the Kingdom of Thailand will take necessary measures listed in Annex II on the condition that the Grant Aid would be extended to the Project.

ANNEX I (map)


NATIONAL ANIMAL
HEALTH AND PRODUC-
TION INSTITUTE
Site
NATIONAL FEED SCIENCE
RESEARCH INSTITUTE

ANNEX II

The Government of the Kingdom of Thailand will take necessary measures on the following matters:

(1) To secure approval of building plan.

(2) To secure a suitable size of land for the Project.

(3) To clear, fill and level the site (1.5 meters in height from the existing ground level) before commencement of the construction.

(4) To undertake incidental out-door works such as gardening, fencing, gates and exterior lighting in and around the site.

(5) To provide facilities for distribution of electricity, water supply, telephone, drainage and other incidental facilities to the Project site.

1) Electricity distributing line to the site.

2) City water distribution main to the site.

3) Drainage main to the site.

4) Telephone trunk line to the main distribution panel of building.

5) General furniture such as curtains, tables, chairs and others.

6) To pave the approach up to the site indicated on ANNEX I (Map).

7) To undertake the boring test (depth 35 meters below ground level).

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

9) To ensure prompt unloading, tax exemption, customs clearance at Port of disembarkation in Thailand.

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

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

(8) To bear all the expenses other than those to be borne by the Grant Aid.

(b) Survey Schedule

-Basic Design Study Team-

4/ 9 (Wed.) Tokyo → Bangkok by TG 641

/10 (Thu.) AM. Embassy of Japan : Courtesy call and explanation of the survey schedule.
PM. Dr. Tanongchit W. Deputy Director General, DOA : Courtesy call

/11 (Fri.) AM. DOA : Discussion on the survey schedule.
PM. DOA(PTD,PPMD,AED,FCRI) : Confirmation of the contents of request.

/12 (Sat.) Observation of similar & related facilities of DOA.
Compiling the matters discussed, data and information.

/13 (Sun.) AM. Field survey of the proposed site.
PM. Compiling the matters discussed,data and information.

/14 (Mon.) AM. Observation of OMIC Bangkok Branch & Laboratory.
Embassy of Japan : Courtesy call and reporting on progress of the field survey.
DOA(PTD,AED) : Discussion on the Project.
Collection of data & information related to construction.
PM. JICA Bangkok Office : Reporting on progress of the field survey.

/15 (Tue.) AM. Observation of Trade Training Center Project.
PM. DOA : Meeting.

/16 (Wed.) AM. Mr.Kasit B. Deputy Director General, Economic Bureau, Ministry of Foreign Affairs : Courtesy call.
DTEC : Meeting.
DOA(PTD,PPMD) : Meeting.
Collection of data & information related to construction.

/17 (Thu.) AM. Dr.Yookti S. Director General, DOA : Courtesy call.
DOA(AED,PTD) : Meeting.
PM. DOA : Discussion of Draft Miniutes.

/18 (Fri.) AM. Mr.Talerng T. Permanent Secretary, MOAC : Courtesy call.
DOA(PPMD,FCRI,PTD) : Meeting.
PM. Signing of the Minutes.
DOA(PTD,FCRI) : Meeting.

/19 (Sat.) Observation of similar & related facilities of DOA.
Compiling the matters discussed, data and information.

/20 (Sun.) Compiling the matters discussed, data and information.

/21 (Mon.) AM. Dr.Anucha C. Advisor to the Prime Minister, Office of Prime Minister : Courtesy call.
Mr.Chachaval S. Deputy Director General, Department of Foreign Trade, Ministry of Commerce : Courtesy call.
PM. Embassy of Japan : Reporting on the result of the survey.
JICA Bangkok Office : -ditto-
DOA(AED,PTD) : Meeting.
Collection of data & information related to construction.

/22 (Tue.) Team leader Manabe, team member Hiraga and Numata return to Japan by JL 476.
DOA(PTD,AED) : Meeting.
Observation of Phra Putthabat, FCES.

/23 (Wed.) DOA(PTD,AED,PPMD) : Meeting.
Observation of AED in Khlong Luang.

/24 (Thu.) AM. DOA(PTD,AED,PPMD,FCRI) : Meeting.
PM. Observation of greenhouses & Rhizombium Building.

/25 (Fri.) AM. Dr.Tanongchit W. Deputy Director General, DOA : Meeting.
PM. DOA(PTD,FCRI,PPMD) : Meeting.
Observation of Poison Research Building & NWSRI.

/26 (Sat.) Compiling the matters discussed, data & information.

/27 (Sun.) Field survey of the project site.
Compiling the matters discussed, data & information.

/28 (Mon.) AM. Dr.Tanongchit W. : Meeting.
PM. DOA(PTD,PPMD,FCRI) : Meeting.

/29 (Tue.) AM. DOA(PTD,PPMD, FCRI,AED) : Meeting.
PM. Observation of the National Animal Health & Production Institut and Central Forest Laboratory Center.

/30 (Wed.) AM. DOA(PTD) : Meeting.
PM. Embassy of Japan : Reporting on the result of the survey.
JICA Bangkok Office : -ditto-

5/ 1 (Thu.) Bangkok→Tokyo by TG 640.

(c) Members of the Survey Team

Team Leader

Dr. Masaru Manabe
Director of Applied Microbiology Division
National Food Research Institute
Ministry of Agriculture, Forestry and Fisheries

Grant Aid Policy

Mr. Tomikazu Hiraga
Grant Aid Division
Economic Cooperation Bureau
Ministry of Foreign Affairs

Project Planning

Mr. Michimasa Numata
Senior Planning Officer
Grant Aid Planning & Survey Department
Japan International Cooperation Agency

Chief Architect

Mr. Yukio Iijima
Shigehiko Sugi & Architects Inc.

Expert on Instrumental Technology

Mr. Makoto Yamada
Overseas Merchandise Inspection Co., Ltd.

Architect

Mr. Ryo Obata
Shigehiko Sugi & Architects Inc.

Architect

Mr. Shigeru Osawa
Shigehiko Sugi & Architects Inc.

(2) Basic Design Study (draft) Team

(a) Minutes of Discussions on the Draft Final Report

MINUTES OF DISCUSSIONS

ON

THE DRAFT FINAL REPORT OF THE BASIC DESIGN STUDY

ON

THE ESTABLISHMENT PROJECT

OF

THE CENTER FOR MAIZE QUALITY IMPROVEMENT

IN

THE KINGDOM OF THAILAND

MINUTES OF DISCUSSIONS
ON
THE DRAFT FINAL REPORT OF THE BASIC DESIGN STUDY
ON
THE ESTABLISHMENT PROJECT
OF
THE CENTER FOR MAIZE QUALITY IMPROVEMENT
IN
THE KINGDOM OF THAILAND

The Government of Japan has sent, through the Japan International Cooperation Agency (JICA), a Basic Design Study Team to the Kingdom of Thailand from 7 to 16 July, 1986 for the purpose of presenting and explaining the Draft Final Report of the Basic Design Study on the Establishment Project of the Center for Maize Quality Improvement.

After a series of discussions between the Basic Design Study Team and the authorities concerned of the Government of Thailand, both sides confirmed the following results attached herewith (ATTACHMENT).

Signed in Bangkok, in duplicate, this
..11.th..... day of ..July.. 19.86

Mr. Michimasa NUMATA
Leader,
Basic Design Study Team,
Japan International
Cooperation Agency

Dr. Yookti SARIKAPHUTI
Director-General
Department of Agriculture

ATTACHMENT

1. Both sides agreed to reconfirm the Minutes of Discussions which was mutually signed on April 18, 1986.

2. The Thai side has agreed in principle to the basic design proposed in the Draft Final Report and appropriate alterations agreed by both sides in the course of discussions will be incorporated in the Final Report.

3. The Thai side has understood Japan's grant aid system and the arrangement to be taken by the Thai side for realization of the Project, such as the land preparation by the end of December, 1986.

4. The Final Report (10 copies in English) will be submitted to the Thai side before the end of October, 1986.

(b) Survey Schedule

- Basic Design Study (draft) Team -

7/ 7 (Mon.) Tokyo - Bangkok by JL 491.

/ 8 (Tue.) AM. Dr.Tanongchit W. Diputy Director General, DOA : Courtesy call, explanation of the draft final report and deliberation on the schedule.

JICA Bangkok Office : -ditto-

PM. Embassy of Japan : -ditto-

/ 9 (Wed.) Dr.Yookti S. Director General, DOA : Courtesy call.
DOA : Presenting the draft final report and meeting.

/10 (Thu.) DOA(Dr.Tanongchit,PPMD,AED,FCRI,PTD) : Meeting.

/11 (Fri.) AM. Preparation of Minutes.
PM. Signing of Minutes.
Compiling the matters discussed, data and information.

/12 (Sat.) Observation of similar and related facilities of DOA.

/13 (Sun.) Compiling contents of discussion.

/14 (Mon.) AM. JICA Bangkok Office : Reporting on the survey.
PM. DOA : Confirmation of the schedule for the preparatory work undertaken by Thailand.

/15 (Tue.) AM. Mr.Tarlerng T. Permanent Secretary and Mr.Chaisop S. Deputy Permanent Secretary, MOAC : Courtesy call.
PM. Mrs.Puangpetchra K. Director-Economic Services Division I, Buget Burea : Courtesy call.
Embassy of Japan : Reporting on the result of the survey.
JICA Bangkok Office : -ditto-

/16 (Wed.) Bangkok - Tokyo by TG 740.

(c) Member of the Study Team

Team Leader

Michimasa Numata
Senior Planning Officer
Grant Aid Planning & Survey Department
Japan International Cooperation Agency

Chief Architect

Yukio Iijima
Shigehiko Sugi & Architects Inc.

Expert on Instrumental Technology

Makoto Yamada
Overseas Merchandise Inspection Co., Ltd.

(3) Officials Concerned in Thailand

Name	Position
Mr. Charas Chunram	Deputy Director, PPMD
Mr. Salin Phuvipadawat	FCRI
Mr. Kasit Bhiromta	Deputy Director General, Economic Bureau, Ministry of Foreign Affairs
Dr. Anucha Chintakanand	Advisor to the Deputy Prime Minister, Office of Prime Minister
Mr. Chachaval Sukitjavanich	Deputy Director General, Department of Foreign Trade, Ministry of Commerce
Mr. Talerng Thamrongnavasawad	Permanent Secretary, Ministry of Agriculture & Cooperatives

NAME	POSITION
Mr. Talerng Thamronghavasawad	Permanent Secretary, MOAC
Mr. Chaisop Sopsarn	Deputy Permanent Secretary, MOAC
Mr. Thavatchai Satrusajang	Foreign Agricultural Relations Div. MOAC
Mr. Chachaval Sukitjavanich	Deputy Director-General, Department of Foreign Trade, Ministry of Commerce
Dr. Anucha Chintakanand	Advisor to the Depty Prime Minister, Office of Prime Minister
Mr. Pracha Chaowasilp	Deputy Director General, Department of Technical and Economic Cooperation (DTEC)
Mr. Sutin Susila	DTEC
Mr. Surayuth Kungsadan	"
Mrs. Puangpetchra Klaharn	Director, Economic Services Division I Budget Bureau
Mr. Kasit Bhiromta	Deputy Director General, Economic Bureau, Ministry of Foreign Affairs

Dr. Yookti Sarikaphuti	Director General, DOA
Dr. Tanongchit Wongsiri	Deputy Director General, DOA
Mr. Chanuan Ratanawaraha	Director, PTD
Dr. Vijai Nopamornbodi	PTD
Mr. Dumrong Jirasutas	"
Mr. Charoen Khaoparisuthi	"
Mrs. Boonluck Seetanun	"
Mrs. Siriporn Sindhusake	"
Mrs. Lawan Chalanant	"
Mrs. Poolrat Ruangsukonth	"
Mr. Sunthron Witayatherarat	"
Mrs. Surojana Atigarnbordee	"
Mr. Prachuab Mogmued	"
Mrs. Wanna Kaewmongkol	"
Mrs. Permpoon Sarnthoy	"
Mrs. Wipada Supakalin	"
Mr. Pararat Sareewatana	"
Mr. Chak Chakkaphak	Director, AED
Mrs. Sriwai Singhagajen	AED
Mr. Parasitchai Suktavee	"
Mr. Tawat	"
Mr. Naewbanij Maitri	"
Mr. Suraweth Krishansreni	"
Mr. Charas Chunram	Deputy Director, PPMD
Mrs. Dara Buangsuwon	PPMD
Mr. Prawat Tanboon-ek	"
Mr. Nopporn Nabheerong	"
Mr. Narongsak Senanarong	FCRI

Mrs. Lily Kaveefa	FCRI
Mr. Salin Phuvipadawat	"
Mr. Korntong Poungprakhon	Prabuddhabat Field Crops Ex. Station
Mr. Sukapong Vayuparp	"
Mr. Samark Yingyong	Bangkhen Rice Ex. Station