3-3-4 Outline of the Facilities and Equipment

It is considered appropriate to include the following facilities and equipment in this project in order to materialize the contents of the project.

(1) Outline of the Facilities

1) Main building ..... approx. 4,525 m^2

a. Precise inspection division

- Pathological inspection:
  pathological inspection room
- Virological inspection:
  virological inspection room, purification room
- Entomological inspection:
  entomological inspection room, insectarium rooms, feeding room, preparation room
- Nematological inspection:
  nematological inspection room
- Treatment:
  treatment room, cold material storage, material storage, chemical storage, fumigation biotron room, balance room, instrumental analysis room
- Tissue culture:
  tissue culture room, preparation room, inactivation room
- Common facilities:
  common preparation room, specimen room, dark room, storage

b. Plant quarantine/treatment division:
reception hall, quarantine inspection room, treatment room, treatment preparation room, fumigation room, vapor heat treatment room, fumigation mechanical room, storage

c. Administration division:
administration office, director's room, meeting room, library, printing room, secretary's room, reception

2) Outdoor ancillary facilities ..... approx. 1,415 m^2

Glasshouse, net house, soil sterilization house, mist house, compost house, incinerator, gas cylinder room, rabbit shed, garage, workshop

(2) Outline of the Equipment

The outline of the equipment which will be supplied to the planned quarantine facilities are as follows.

1) Equipment for pathological inspection such as of bacteria and micoplasms etc., viorologial inspection, entomological inspection, and nematological inspection as well as for the development of inspection techniques

2) Equipment for tissue culture to produce virus free seedlings

3) Equipment for the development of disinfestation techniques

4) Equipment for collection and processing of quarantine information, training of staff and administration

5) Equipment for strengthening function of seaport and airport plant quarantine stations

- Equipment for Pathological Inspection:
  Equipment and apparatus for separation, identification and storage of bacteria/micoplasms etc.

- Equipment for Virological Inspection:
  Equipment and apparatus for separation, identification, and purification of virus/viroids
  Equipment and apparatus for production and storage of anti-serum

- Equipment for Entomological Inspection:
  Equipment and apparatus for collection, rearing and identification of insects
  Apparatus and instruments for preparation and storage of insect specimens
  Soft X-ray apparatus

- Equipment for Nematological Inspection:
  Equipment and apparatus for separation, rearing, identification, and storage of nematodes

- Equipment for Disinfestation:
  Equipment for temporary storage of test materials
  Apparatus for propagation of test insects
  Equipment and apparatus for disinfestation tests
  Equipment for disinfestation treatment

- Equipment for Tissue Culture:
  Apparatus for thermotherapy
  Equipment and apparatus for tissue culture

- Equipment for Inspection (Common-use):
  Incinerator
  Apparatus and instrument for meteroological observation
  Apparatus for dark room

Equipment and instruments for management of test field and glasshouses

Vehicles for transportation (X-forklift)

- Equipment for Administration & Information:

  Equipment for clerical work

  Equipment for information management

  Equipment for training

- Equipment for Plant Quarantine Stations:

  Equipment and apparatus for quarantine inspection

3-3-5 Maintenance and Management Plan

(1) Facilities/Equipment Maintenance and Management System

In planning the facilities and equipment, consideration will be given to ease maintenance and management. In order to ensure smooth operation of the facilities and equipment, it is desirable to establish a maintenance and management system taking notice of the following points.

1. The Government of Sri Lanka should appoint responsible persons to take charge of operation of the facilities and equipment for each section. These responsible persons are required to have a thorough knowledge of the method of maintaining and managing the facilities and equipment concerned.

2. All expenses necessary for maintenance and management of the facilities and equipment should be budgeted so that all supplies and spare parts can be managed effectively for smooth, continuous operation of the facilities and equipment.

3. A facilities/equipment repair system which involves manufacturers should be established so that any facility or equipment breakdown can be quickly dealt with. In selecting building materials and machines, therefore, careful attention should be paid to whether they are locally available or whether maintenance services are locally available.

(2) Methods of Maintenance and Management of the Facilities

The maintenance section of the administration division will take charge of the general maintenance and management of the facilities. The Ceylon Electricity Board will be responsible for the maintenance and management of the primary wiring. And the Sri Lanka Telecommunication Department will be in charge of maintenance of the telephone equipment.

The important points to note in maintaining and managing the facilities and equipment are itemized below.

1) Building

- Gutters should be inspected and cleaned about twice a year to prevent choking.
- When external metal parts of the building gather rust, the rust should be removed with a file or the like and then the metal should be repainted to prevent corrosion.
- The window and doors should be regularly kept open for ventilation in order to prevent the internal walls from getting moldy or causing condensation.
- When moving heavy objects, appropriate measures should be taken to protect the floors and walls from being damaged.

- When a water leak occurs, the cause should be immediately investigated and the plumber should be contacted for repair.

2) Building utility equipment

Though there is no building utility equipment which requires high maintenance techniques, the system capability of the water treatment unit, septic tank etc. should be kept at a certain level. It is advisable to have full-time maintenance staff to make daily inspection of those facilities. It is also advisable for the maintenance staff to attend at the time of construction of the planned facilities in order to understand the maintenance and operation techniques of the building utility equipment installed.

(3) Maintenance and Management Plan for Equipment

1) Maintenance Work

Maintenance work for equipment may differ by each kind of equipment, but generally consists of the following items.

1. Cleaning
   Equipment, particularly that used with chemicals, liquid samples, perishable matters and soil shall be cleaned thoroughly.

2. Lubrication
   Movable parts in equipment with an engine shall be lubricated with oil or grease in accordance with indications.

3. Consumables
   Consumables such as batteries for back-up electric sources and lamps shall be changed or supplied as occasion calls in accordance with indications or alarms from the equipment.

4. Inspection

The accuracy of thermostats installed in equipment and balances shall be periodically inspected and adjusted.

5. Safety inspection

The safety of fumigation and vehicles shall be inspected not only at the time of use but also periodically.

2) Periodical Inspection

Periodical inspection shall be carried out by inside staff and/or outside experts according to the following criteria shown in Table 3-3.

Table 3-3 Periodical Inspection Requirement

Equipment	By inside staff	By outside experts
General lab. equipment	2 times/year	In case of trouble
Analysis equipment	3 times/year	Once/year
Optical equipment	Once/month	Once/year
Audio-visual equipment	Once/month	Once/year
Copying machine	Once/week	3 times/year

3) Method of Maintenance

1. Inspection and maintenance by staff

Most of the maintenance work can be conducted by the equipment users. A detailed operation manual for each equipment shall be supplied at the time of delivery in order to facilitate such maintenance work by staff.

2. Inspection and maintenance by experts

Maintenance work shall be conducted by experts from the relevant manufacturer or agent.

3. Maintenance contract

With regard to copying machines and personal computers, it is

advisable to make a maintenance contract with the agent so as to receive quick service.

(4) Maintenance and Management Expenses

The annual maintenance and management expenses necessary for the operation of the facilities which shall be prepared by the Sri Lankan side is estimated as shown below. The expenditure items are personnel expenses, facility operation expenses, and facility maintenance expenses. Though there will be income from treatment charges, they are not considered in the estimate because the total amount of the income is considered small.

1) Personnel Expenses (Total 1,010,000 Rs)

The personnel expenses shown in Table 3-4 were estimated based on the figures included in the personnel plan for the project. The average monthly income as of the end of 1989 was used for the estimation.

Table 3-4 Personnel Expenses

Position/Qualification	Salary	No.	Total (Rs./month)
DR	6,000	2	12,000
MS	3,600	7	25,200
Asst. Inspector (AL)	2,000	6	12,000
Assistant (OL)	1,500	6	9,000
Inspector	1,200	5	6,000
Cleark	1,100	10	11,000
Others	900	10	9,000
Total (Month)		46	84,200
Total (Year)			1,010,000

2) Facility Operation Expenses (Total 890,000 Rs)

The facility operation expenses were broken down into the following items.

Table 3-5 Facility Operation Expenses

Item	Expenses (Rs/year)
Electricity rates	822,000
Telephone charges	37,000
LP gas rates	13,500
Fuel expenses (Generator)	18,000
Total	≒ 890,000

The expenses shown in Table 3-5 were estimated as follows.

① Electricity Rates

As the planned equipment load is 470kW and considering additional load in the future, a 500 kVA transformer will be installed. The electricity rates were estimated on the assumption that the maximum power requirements will be about 40 percent of the capacity of the transformer, namely 200kVA.

Table 3-6 Estimated Power Consumption

Items	Load (Kw)	Power consumption		
Lighting	60	60kW×0.2×8h/day ×260day/year	=	24,960 kWh/year
Air-conditioning/ Ventilation	110	110kW×0.2×8h/day ×260day/year	=	45,760kWh/year
Sanitary	20	20kW×0.2×24h/day ×365day/year	=	35,040kWh/year
Inspection equipment	260	260kW×0.1×8h/day ×260day/year	=	54,080kWh/year
Others	20	20kW×0.1×8h/day ×260day/year	=	4,160kWh/year
Total	470			164,000kWh/year

- Calculation of Electricity Charges

  Basic fee (demand fee) : 200kVA×140Rs/kVA·M×12M/Y=336,000Rs/Y

  Fixed fee : 240Rs/M×12M/Y=2,880Rs/Y

  Rates (unit rates) : 164,000kW/Y×2.95Rs/kWh=483,800Rs/Y

  Total 822,680Rs/Y≒822,000Rs/Y

② Telephone Charges (37,000Rs/Y)

The telephone charges were estimated on the following assumptions.

- Thirty of the staff members will make five minutes/man·day telephone calls.
- Two of the staff members will make five minutes/man·day long distance telephone calls to Kandy.

Estimation of the telephone charges

- 30 staff×5minutes/man·day×1.3Rs/2minutes×260D/Y=25,350Rs/Y
- 2 staff×5minutes/man·day×1.3Rs/0.3minutes×260D/Y=11,267Rs/Y

  Total 36,617Rs/Y≒37,000Rs/Y

③ LP Gas Rates (13,500Rs/Y)

LP gas consumption for each of the inspection rooms and the pantries are assumed as shown below.

- Burners for inspection rooms
  15, estimated consumption: 500kcal/h/unit
- Gas range for pantries
  2, estimated consumption: 4,000kcal/h/unit
- Demand rate for 9 hours/day:
  20 percent for burners, 40 percent for gas ranges

  LPG gas calorific value: 11,670kcal/kg

  Unit price of LPG gas: 574rs/40kg

Estimation of the LPG gas rates

- 15units×500kcal/h/unit×0.2×9h/D×260D/Y=3,510,000kcal/Y
- 2units×4,000kcal/h·unit×0.4×9h/D×260D/Y=7,488,000kcal/Y

Total 10,998,000kcal/Y

(10,998,000kcal/Y÷11,670kcal/kg)×(574Rs/40kg)≒13,500Rs/Y

④ Fuel Expenses

Calculating assumption:
4-hour operation/month of the generator

Calculation

150kVA×1.2Rs/kVA×0.165kg/ps·h×(1/0.87kcal/ℓ)×4h/M×12M/Y
×10.9Rs/ℓ=17,861Rs/Y≒18,000Rs/Y

3) Facility Maintenance Expenses (Total 960,000 Rs)

① Maintenance expenses for the facilities

As maintenance expenses vary by the number of years after being built, the annual maintenance expense is calculated on the assumption of 40Rs/m^2·yr which is estimated as an average of the future 20 years.

40Rs/m^2·year×6000m^2=240,000Rs/year

② Maintenance expense for utility equipment

Maintenance of sanitary equipment, air-conditioning equipment and electrical equipment includes replacement of parts and repair of equipment. The annual maintenance expense for utility equipment is calculated on the assumption of 60 Rs/m^2·year.

60Rs/m^2·year×6000m^2=360,000Rs/year

③ Maintenance expense for quarantine equipment

It is assumed that the cost of spare parts and consumables for quarantine equipment will be 0.3 percent of the price of equipment which needs them.

(price of equipment)×0.3%≒320,000Rs

As estimated above, maintenance expenses for the facilities is calculated as follows,

Personnel Expenses	1,010,000 Rs
Facitity Operation Expenses	890,000 Rs
Facility Maintenance Expenses	960,000 Rs
Total	2,860,000 Rs

3-4 Technical Cooperation

This project is to establish a new independent organization to combine a research and development function with former quarantine division. And it is required for staff of the new facilities to have thorough knowledge of equipment which will be introduced to each technical section of the facilities. Therefore, it is concluded that a technical cooperation is highly important at the commencing time of the project.

Though an official request for technical cooperation has not been submitted by the Government of Sri Lanka, the Sri Lankan side wishes the implementation of a project type technical cooperation as well as grant aid. However, practical personnel assignment plan of the necessary staff for the project, which the Sri Lankan side is responsible for, has not been decided yet. Therefore, it is necessary to examine the feasibility of a technical cooperation in consideration of the personnel assignment plan which the Sri Lankan side will implement.

CHAPTER 4 BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Design Policy

In formulating the facility and equipment plans for this project, the natural and social conditions and the situation of the construction industry of Sri Lanka, as well as the present situation of the implementation organization of the project are considered, the following shall be set as the basic design policy for the project.

(1) Design Policies set in light of Natural Conditions

The climate around the project site, which is situated in the Southwest Asian monsoon zone, is characterized by high temperature, high humidity, heavy rainfalls and strong sunlight. Especially, it rains heavily accompanied by strong winds blowing from the southwest or the northeast. Located about 1km away from the coastline, the project site is likely to be affected by the sea breeze blowing from the southwest.

The following design policies are set taking into account the above-mentioned natural conditions.

① The main building should lie on southwest-northeast axis to prevent rainwater blowing into the building.

② When the buildings lie on southwest-northeast axis, it is expected that direct sunlight will enter at low angles. As measures to cope with this, deep eaves and hanging balconies should be attached to the exterior walls on the buildings.

③ Building materials which are resistant to salt should be used in the exterior parts of the buildings.

(2) Design Policies set in light of the Situation of the Local Construction Industry

In Sri Lanka, particularly in and around Colombo City, the construction industry is well developed. However, there are problems such as shortages of locally manufactured materials and skilled construction workers. As a result, prices of building materials are rising at an annual rate of more than 20 percent. The following design policies are set considering the above-mentioned situation of the local construction industry.

① Priority should be given to the traditional methods of construction, which are widely used in Sri Lanka, in the architectural plan for this project.

② Locally available building materials should be used as much as possible, and at the same time the kinds of building materials should be minimized.

③ When building materials imported from Japan or third countries are to be used, utmost emphasis should be put on their durability.

(3) Design Policies set in light of the Facility/Equipment Maintenance and Management Ability of the Implementing Organization of the Project

The Government of Sri Lanka is directing the public organizations to cut down on expenses. The architectural plan for this project should be worked out giving due consideration to the following points so that the financial burden imposed on the implementing organization of this project may be alleviated.

① Designing of unnecessarily spacious rooms should be avoided as much as possible. All the planned facilities should be of an economically practicable scale.

② Natural ventilation and lighting should be utilized as much as possible in order to reduce the energy cost.

③ Building materials which are highly durable and which are not easily soiled should be used as much as possible.

④ Quarantine equipment which guarantees maximum economic effects should be selected.

(4) Design Policies set on the Scope of the Planned Facilities and Equipment

This project is aimed mainly at streamlining quarantine of imported plants by reinforcing the plant quarantine system. On the other hand, the Government of Sri Lanka regards the acquisition of foreign exchange through the promotion of exports of agricultural products as one of its most important agricultural policies. For this reason, the Government of Sri Lanka attaches great importance to its plant quarantine system.

The following design criteria are set on the scope of the planned facilities and equipment in light of such agricultural policies of the Government of Sri Lanka.

① The facilities and equipment necessary for the research and development of treatment technology, which is indispensable for the export quarantine of agricultural products, should be provided.

② Supply of the equipment for primary inspection at the plant quarantine stations of Colombo Seaport and Katunayake Airport, where more than 90 percent of exported plants are handled, should be included in this project.

(5) Policies on the Term of Construction/Equipment Work

The project site is on newly reclaimed land. Its ground is level and there are no obstacles, such as existing buildings, to the implementation of this project. For this reason, the period of time required for preparations for the implementation of this project will be rather short, and it is expected that the earth and foundation work can be started relatively easily. In addition, the project site is located close to Colombo City, which means easy procurement of the building machines and customs clearance/inland transportation of imported materials. The basic policies on the term of work set in light of these facts are as follows.

① The entire term of work (the construction and equipment procurement/ installation work) should not be divided into phases. The planned term of works is 12 months.

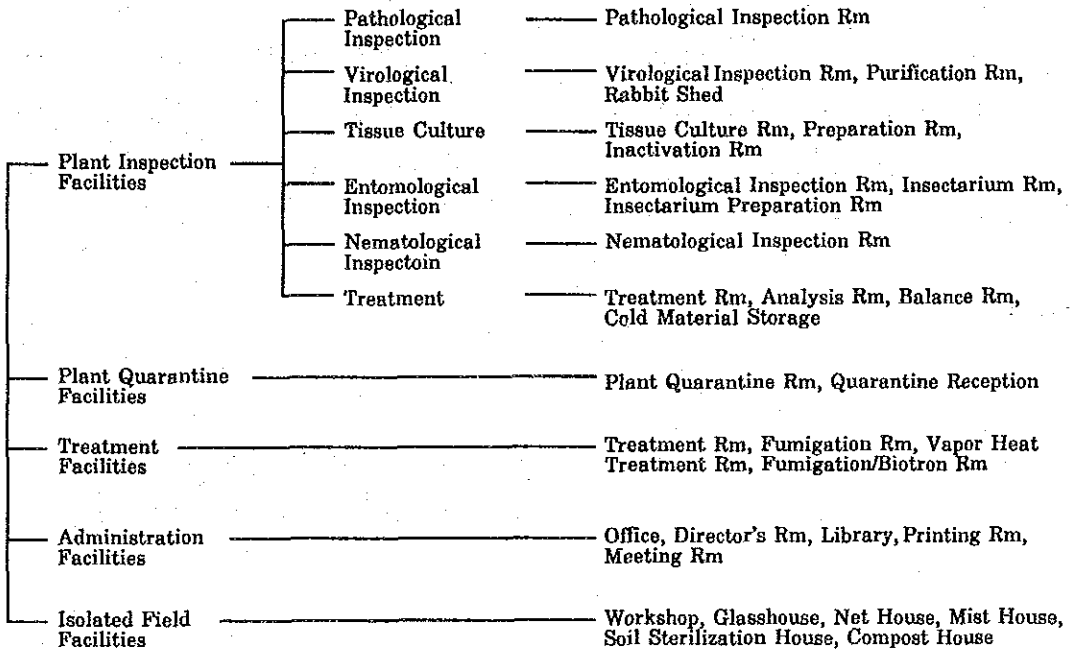
② All the buildings should be planned with at most two-storied buildings adopting Sri Lanka's traditional methods of construction.

4-2 Examination of the Basic Design Conditions

In working out the basic design, the following items shall be examined as the design conditions.

(1) Composition of Facilities

The project is composed of the following facilities.



(2) Conditions for Determination of the Scale of the Facilities

The scale of each room should be determined on the basis of the function or functions required and the number of staffers as well as with reference to the scale of similar facilities in Sri Lanka. The number of staffers to be considered for the project is 46 in total, 26 for technical and 20 for administration.

1) Inspection Rooms

The scale of each room should be determined in accordance with the

equipment layout plan. As a lab center table is to be installed in each inspection room, the length of each inspection room should be calculated by setting the intervals between lab center table at 3.0 meters and multiplying the number of lab center table by 3.0m.

2) Staff Rooms

Each staff room which is to serve as a space for doing office work related to inspection work, such as preparation and sorting of data, should be located adjacent to an inspection room. As each inspection section is to have a staff of three to four, the space per inspector should be $10m^2$ on average taking into consideration the space required for the chief and the work spaces.

3) Meeting Room

The floor space of the meeting room should be determined on the basis of the room area per staff of $2.0m^2$ and on the assumption that the meeting room is to be used for conferences and workshops for 26 to 30 technical staff members.

4) Office Room

As the office room is to be occupied by ten staff, the space per staff should be $10m^2$ in consideration of the space required for the administration, manager's room, telephone operator, and for storing files and other reference materials.

(3) Applicable Laws and Standards

The following laws and standards are applicable to the basic design for this project.

1) Architectural Plan:

- Planning and Building Regulations
- The Air Navigation Act (provides for the height of buildings related to air navigation)

2) Structural Plan:

- Reinforced Concrete Calculation Standards (Japan)

3) Electrical Plan:

- IEC (International Electrotechnical Commission) Standards
- IEE Wiring Regulations

4) Mechanical Plan:

- General Standards for Discharge of Effluents into Inland Surface Waters
- Rules of the Fire Department of Airport & Aviation Services Ltd.

The metric system is used in determining the module for use in each of the above plans.

(4) Other Basic Design Conditions to note

1) Project Site

① The project site is reclaimed land developed by raising the ground level of swampland. For this reason, the ground of the project site may subside. It will be necessary, therefore, to take this into consideration in designing the outdoor facilities, such as the drain ditches and roads.

② As the project site is only about 200 meters away from the airport's runway, the planned buildings may be affected by the noise of the airplanes. It will be necessary to be very careful in choosing the method of installing precision machines and instruments which are vulnerable to noise and vibrations.

2) Measures to Protect against Termites

Generally, it is necessary to take measures against termites when constructing a building in Sri Lanka. In some parts of the planned facilities, however, pests will be reared for the purpose of carrying out plant quarantine operations. For this reason, it will be impossible to use chemicals for exterminating termites in the planned facilities. It will be necessary to select building materials taking this into consideration.

3) Natural Conditions

① Lightning:

It will be necessary to take adequate measures to protect against lightning as the area surrounding the project site is often hit by heavy thunderstorms.

② Earthquakes:

There will be no need to give consideration to the effects of earthquakes when working out the structural plan.

③ Hailstorms:

There will be no need to work out measures against hailstorms.

4-3 Basic Plan

4-3-1 Site and Layout Plans

(1) Site Utilization Plan

The project site, an area of approximately 8ha, is situated at the western end of the premises of Katunayake International Airport. At the front, the project site borders a trunk road and a railway track connecting the airport and the center of Colombo City, and in the back it borders an open space near the airport's runway. As the runway is only 200 meters away from the project site, there are restrictions on the height of the buildings (0 to 45 meters) for reasons of air navigation control, as shown in Fig.4-1. In addition, modern airport facilities and factories of foreign companies are located in the areas surrounding the project site. In the future, this areas is expected to constitute a large industrial complex centered around the airport.

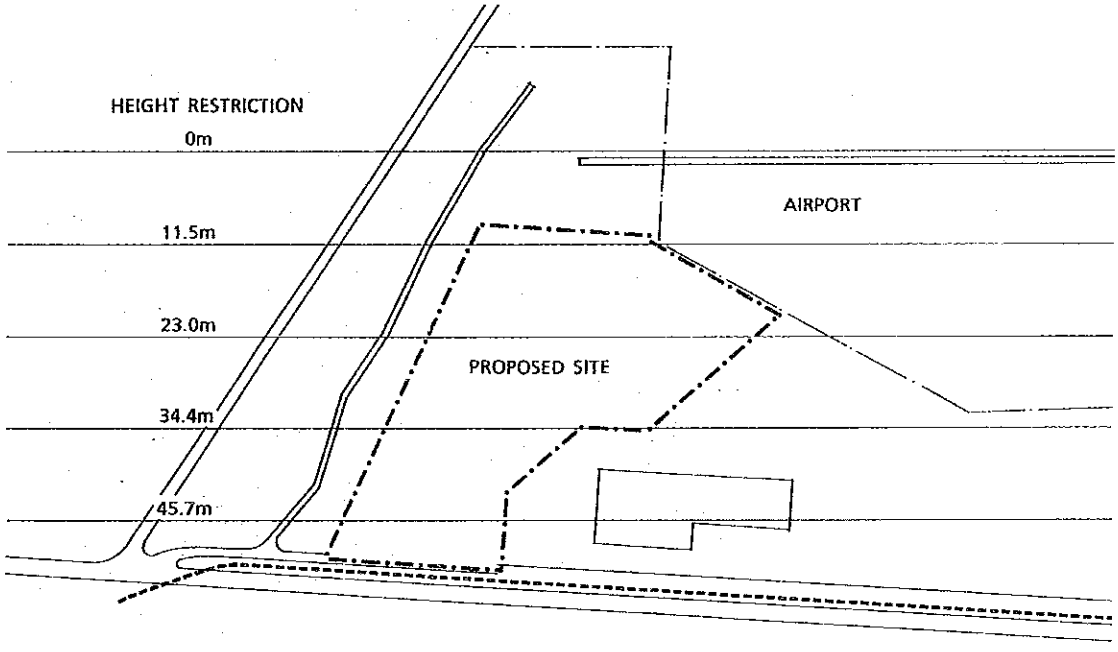


Fig. 4-1 Height Restrictions in the Project Site

The project site can be accessed from the trunk road running in front by crossing the railway track. The western side of the project site is now used as a rain water draining route from the runway and it is necessary to retain this route as it is. As the project site is reclaimed land, it is entirely level, and there are no restrictions imposed from its configuration.

The site utilization plan, considering the above conditions, should be worked out as shown in Fig.4-2. The buildings should be concentrated in a space near the access road, and the isolated field should be constructed in a space near the airport runway where there is a strict restriction on the height of the buildings. Furthermore, the space located to the east of the buildings and the isolated field should be used for the housing which the Sri Lankan side plans to construct in the future.

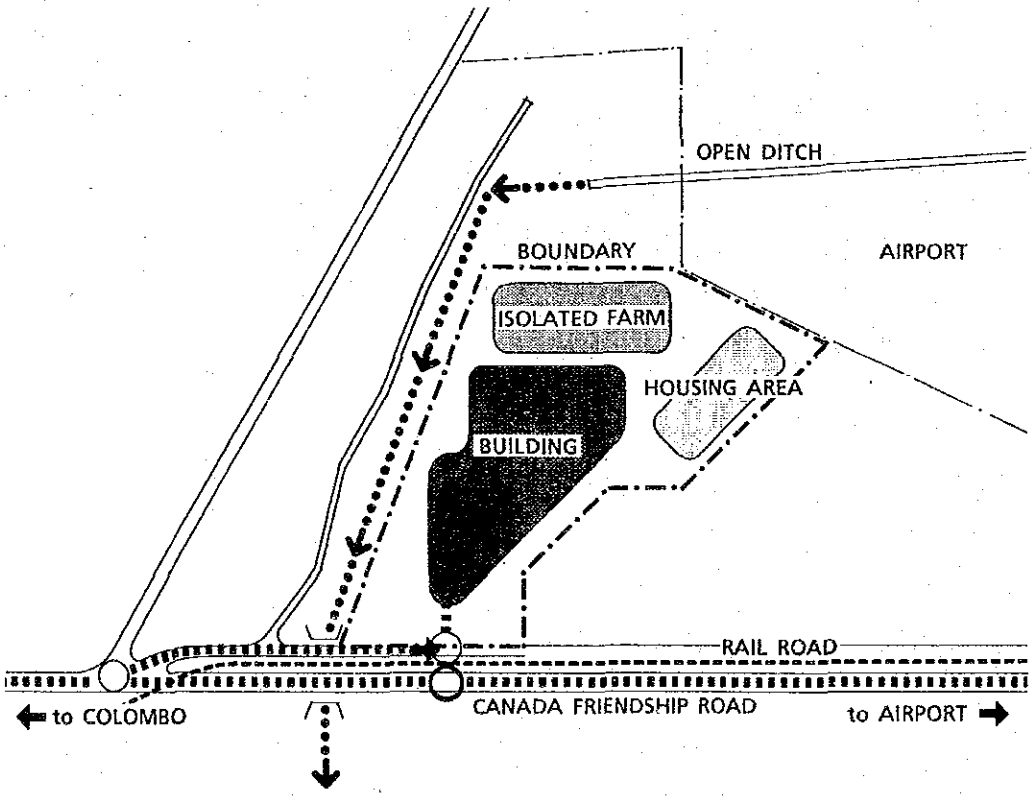


Fig. 4-2 The Site Utilization Plan

(2) Layout Plan

The organization of the planned facilities can be divided broadly into a plant inspection block, a plant quarantine/treatment block, an administration block and an outdoor facilities block. The layout plan for each block is as outlined below.

1) Plant Inspection Block

The main task of this block will be to conduct precise inspection of the plants which are judged to require close inspection as a result of the primary quarantine conducted at the plant quarantine stations within the seaports and airports. Its main facilities are laboratories, where precise machinery which is vulnerable to vibrations and dust is installed.

- All the facilities in this block should be located in isolation from those of other blocks in order to prevent pest contamination.
- As the activities of this block are closely linked with those of the outdoor facilities block and the plant quarantine/treatment block, it should be planned so as to make it easy to communicate between each other.
- The building will have two stories and corridors on one side to allow natural ventilation and lighting.

2) Plant Quarantine/Treatment Block

This block will conduct primary quarantine of plants, export quarantine of plants and will give guidance on treatment. When necessary, this block will issue export quarantine certificates.

- The facilities in this block should be located in places where the traders can directly access by car. The flow of visitors should not disturb the activities in the other blocks.

- The facilities in this block should be located on the ground floor so all the visitors can be received at ground floor level.

3) Administration Block

This block will be responsible for general administration and preparation and storage of data and information as the headquarters of plant quarantine in Sri Lanka.

- The main entrance to the building should be located in this block separately from the entrance for traders.

- The building will have two stories and corridors on one side to allow natural ventilation and lighting.

4) Outdoor Facilities Block

This block will mainly be composed of small one-storied facilities such as glasshouses and net houses.

- These facilities should be located close to the main building and connected with the walkway.

- They should be so arranged as to make it possible for vehicles carrying test materials to access them easily.

Those four blocks will be located as shown in Fig. 4-3, considering the relations among each block, the configuration of the project site, the natural conditions and future expansion.

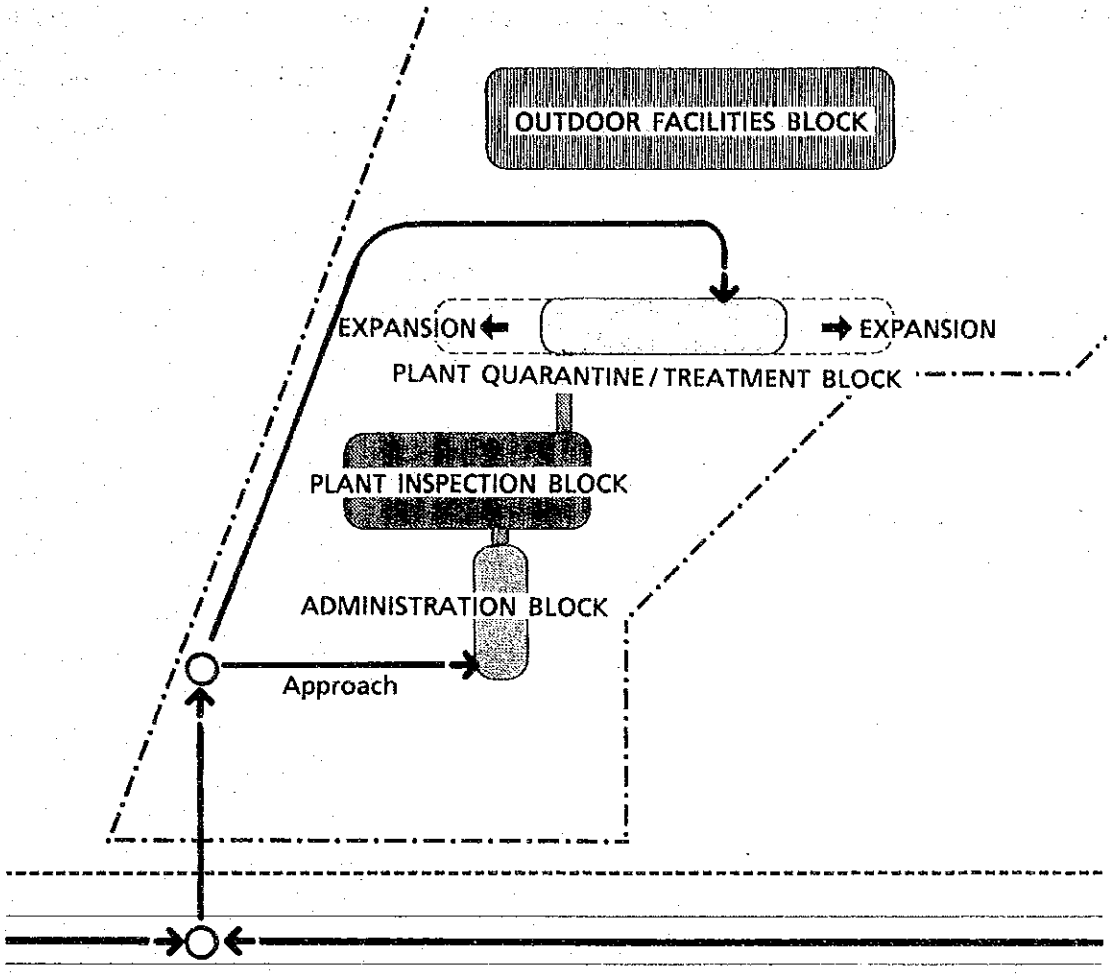


Fig. 4-3 Layout Plan of Facilities

4-3-2 Architectural Plan

(1) Determination of Module

The module, to provide consistency between the space design and the architectural techniques, is to be determined provided it is applicable to both the space design and architectural techniques. In other words, the module should be applicable to the common dimensions of each different space, while also applicable to the achievement of rationalization and economical efficiency of the material dimensions in construction. As a result of examining the dimensions of human bodies, movement and articles,

a module of 60cm and a unit room space of 6.0m×6.6m were adopted for the project. The 60cm module is a multiple of the 30cm, a basic dimension of construction materials. This means that this module can be expected to achieve economical efficiency in construction.

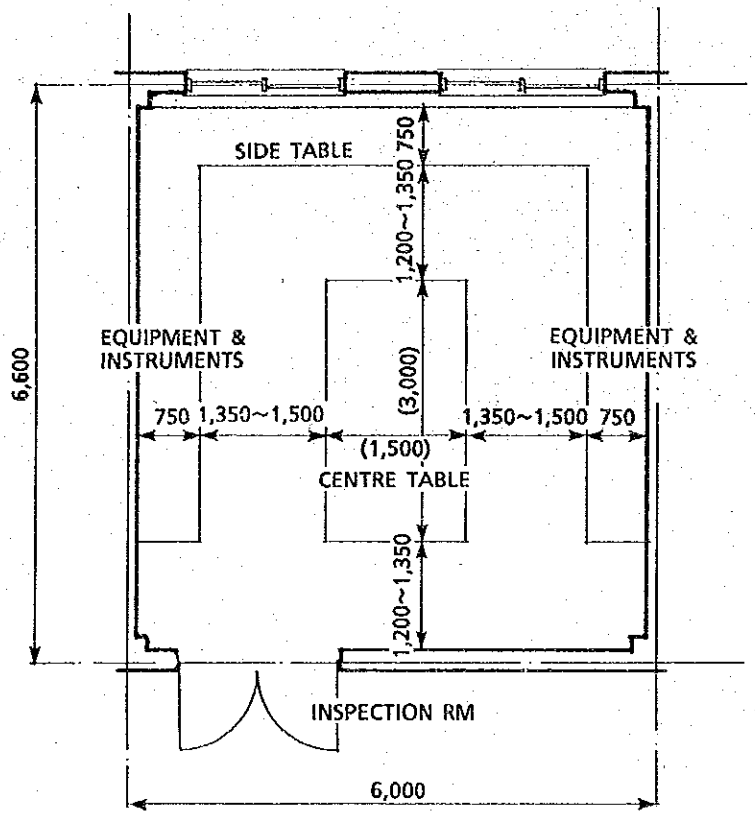


Fig. 4-4 Examination of Unit Room Space

(2) Determination of the Size of the Rooms

Of the rooms comprising the facility, the size of the plant inspection rooms are determined based on the arrangement of the equipment, while the office rooms and the staff rooms will be based on the number of their occupants. Table 4-1 shows the rationale for determining the size of the rooms required. It should be noted that the areas in the table indicate actual areas from the basic design drawing, which was worked out on the basis of the determining module.

Table 4-1 Size of Required Rooms

PLANT INSPECTION BLOCK

Occupancy	Determining Factor	Area(m^2)
1. PATHOLOGICAL INSPECTION		
Pathological Inspection Rm	By the layout of equipment	100
Staff Rm	4persons×10m^2/person	40
2. VIROLOGICAL INSPECTION		
Virological Inspection Rm	By the layout of equipment	60
Purification Rm	By the layout of equipment	80
Staff Rm	3persons(+1person)×10m^2/person	40
3. TISSUE CULTURE		
Tissue Culture Rm	By the layout of equipment	40
Preparation Rm	By the layout of equipment	40
Inactivation Rm	By the layout of equipment	40
Staff Rm	3persons(+1person)×10m^2/person	40
4. ENTOMOLOGICAL INSPECTION		
Entomological Inspection Rm	By the layout of equipment	80
Preparation Rm	By the layout of equipment	80
Insectarium Rm (1)	By the layout of equipment	20
Insectarium Rm (2)	By the layout of equipment	20
Insectarium Rm (3)	By the layout of equipment	40
Feed Storage	By the layout of equipment	20
Staff Rm	4persons×10m^2/person	40
5. NEMATOLOGICAL INSPECTION		
Nematological Inspection Rm	By the layout of equipment	80
Staff Rm	3persons(+1person)×10m^2/person	40
6. TREATMENT		
Treatment Rm	By the layout of equipment	80
Instrumental Analysis Rm	By the layout of equipment	50
Balance Rm	By the layout of equipment	10

Occupancy	Determining Factor	Area (m^2)
Chemical Storage	By the layout of equipment	60
Material Storage	Assume by the amount of materials	80
Cold Material Storage (1)	Assume by the amount of materials	20
Cold Material Storage (2)	Assume by the amount of materials	20
Staff Rm	3 persons (+1 person)×10m^2/person	40
7. COMMON FACILITIES		
Common Preparation Rm	By the layout of equipment	60
Specimen Rm	By the layout of specimen shelves	60
Dark Rm	By the layout of equipment	20
Canteen	Planned as a staff refreshing place	85
Corridor, Toilet, etc.		1,067
Total		2,552

PLANT QUARANTINE/TREATMENT BLOCK

Occupancy	Determining Factor	Area (m^2)
1. PLANT QUARANTINE		
Quarantine Inspection Rm	By layout of equipment and its activities	81
Reception	Time for issuing certificates	81
Staff Rm	5 persons ×8m^2/person	40
2. TREATMENT FACILITIES		
Treatment Rm	Vacuum fumigation chamber + working space	126
Fumigation Rm	Treatment capacity: 30m^3	18
Vapor Heat Treatment Rm	By the Layout of Vapor Heat Treatment apparatus (1 m^3, 2 units)	36
Fumigation/Biotron Rm	By the layout of equipment	36
Treatment Preparation Rm	By the layout of equipment	54
Fumigation Mechanical Rm	By the layout of equipment	36
Storage	Storage of field tools	36

Occupancy	Determining Factor	Area (m^2)
3. ANCILLARY FACILITIES FOR ISOLATED FIELD		
Workshop	Storage for field machinery and working space	162
Rabbit Shed	By the layout of cage and working space	36
Corridor, Toilet, etc.		154
Total		896

ADMINISTRATION BLOCK

Occupancy	Determining Factor	Area (m^2)
Director's Rm	Working and reception space	54
Deputy Director's Rm	Working and discussion space	27
Meeting Rm (Director)	Visitor's meeting room	36
Secretary's Rm	For 1 secretary	10
Admin. Office	10 staff with discussion space	108
Library	3,000 books and reading space for 4	36
Printing Rm	By the layout of equipment	18
Meeting Rm (Staff)	Capacity for maximum 26 staff	54
Reception	For 1 staff	10
Expert's Office (1)	Capacity for maximum 4 experts	54
Expert's Office (2)	Expert leader, with discussion space	27
Entrance Hall		173
Corridor, Toilet, etc.		250
Total		857

OUTDOOR FACILITIES BLOCK

Occupancy	Determining Factor	Area (m^2)
1. FIELD RELATED SPACE		
Glasshouse	1 in number, with A/C and including Mist House	210
Net House	3 in number	630
Soil Sterilization House	By the layout of equipment, and working space	135
Compost Shed	Making and storing compost for field	35

OUTDOOR FACILITIES BLOCK

Occupancy	Determining Factor	Area (m^2)
2. WATER SUPPLY & DRAINAGE, ELECTRICITY		
Pump House (1)	By the layout of equipment (for building)	45
Pump House (2)	By the layout of equipment (for field)	25
Drainage Treatment	By the layout of equipment	25
Electric Rm	By the layout of equipment	110
3. OTHERS		
Garage	Capacity for 2 buses, 2 cars	160
Guard House	Capacity for 2 guards with toilet and bed	40
Total		1,415

(3) Floor Plan

The floor plan for each block is as outlined below.

1) Plant Inspection Block

The facilities in this block will consist mainly of inspection rooms for six specialized fields. As the routine work of these specialized fields are closely linked with each other, all these rooms should be located in a same building in order to shorten the flow of people and materials. In this plan, the rooms of the treatment section, which is closely related to the sections of the plant quarantine/treatment block located on the ground floor of an other building, and the rooms of the entomological section, which require frequent coming and going of materials as well as floor washing, will be located on the ground floor. The rooms of the pathological inspection, biological inspection, tissue culture and nematological inspection sections will be located on the first floor. The rooms of each section are arranged around a small courtyard to shorten the paths of flow between these

sections and also to ensure natural ventilation and lighting by means of the courtyard.

The floor space of each inspection room will be calculated on the basis of the common unit floor space which is 6.0m wide and 6.6m deep. According to the arrangement of equipment, the width of each inspection room is determined by multiplying 0.5, 1.0, 1.5 and 2.0 by the common unit width of 6.0m.

2) Plant Quarantine/Treatment Block

The main facilities in this block will be used for quarantine and treatment of plants brought from outside and issuing plant quarantine certificates as required. A workshop for repairing and storing the equipment used in the isolated field will be attached to these facilities. As it is expected that large materials will be transported in large quantities to and from these facilities, all these facilities should be planned in a one-storied building to make it possible for large motor vehicles, like trucks and container carriers, to access. As the facilities in this block, mainly the treatment facilities, are expected to be expanded or extended in the future to cope with increases in the country's exports and imports, adequate open spaces should be planned around these facilities.

3) Administration Block

The administration block will be planned to have the functions of preparing and managing records and reference materials concerning the plant quarantine as the central organization of plant quarantine services throughout the country. The main entrance to the entire facilities is planned within this block so that the coming and going of staff and visitors will be controlled at this block. As the number of visitors are expected to be rather small, the floor space of the entrance hall can be minimized. Also the facilities in this block

will be planned completely independent and as a separate building from the facilities of the plant inspection block as to avoid any flow confusion on the services of each block.

(4) Elevation

Around the project site are modern facilities such as Katunayake International Airport, the Institute of Technician Training, and factories of foreign enterprises. The project site faces a trunk road connecting the international airport and the center of Colombo City. This means that the facilities constructed on this site will be very visible to people leaving and coming into Sri Lanka. In light of such geographic conditions of the project site, it is advisable to design the facilities in a manner that makes them look modern as if they were part of the international airport, while making them retain the factor of traditional architectural style by the use of locally available building materials. Furthermore, in order to achieve uniformity among the facilities of the project, great emphasis should be placed on the coordination of the building materials, the colors and the details for use in the exterior walls in planning the elevation.

(5) Section

In planning the section, due consideration should be given to securing good natural ventilation, preventing rainwater from entering the buildings and shutting out direct sunlight. More specifically, corridors with deep eaves or balconies will be planned at the perimeters of the buildings so that the windows can be kept open to secure good ventilation even when it rains. The floors of the corridors and balconies should have a proper pitch to make it easy to drain rainwater.

Each room on the first floor will have a false ceiling in order to prevent radiant heat from the roof. Each room on the ground floor, in principle, will also have a false ceiling for design and sanitary purposes, as the water supply and drainage pipes from the testing benches on the first floor will be exposed on the ceilings of the ground floor.

The project site is adjacent to the rainwater discharge channel of the runway of the airport, so it is often flooded. For this reason, the ground floor level should be set at 1.0m above the ground level.

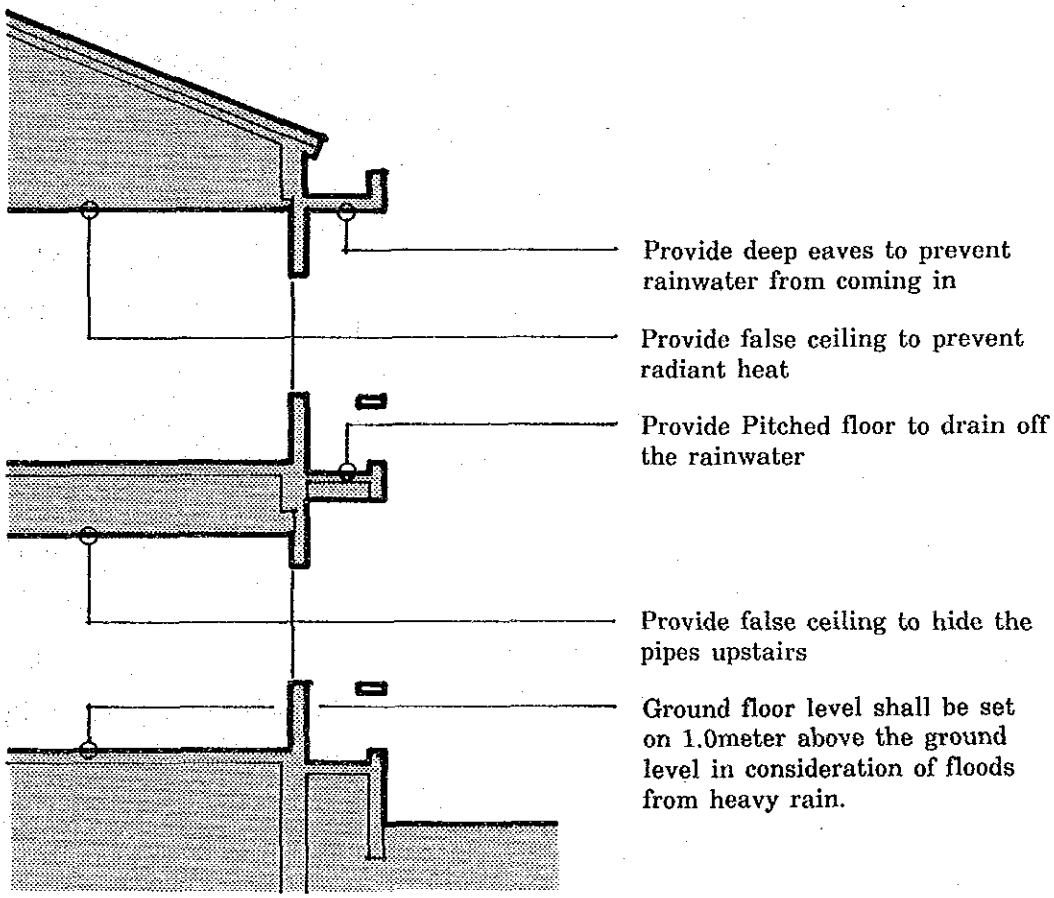


Fig. 4-5 Section Plan

(6) Landscape Plan

1) Access roads

Two access roads should be constructed; one crossing a railway track from the front trunk road, and the other reaching the site along the railway track. In the case of the latter access, it will be necessary to lay a culvert where it crosses the rainwater discharge route. Furthermore, an additional direct access route from the premises of the airport should be secured at the back of the site.

2) Roads within the premises

A road which general vehicles and visitors can use to approach the administration block and another for transporting quarantine plants to and from the plant quarantine/treatment block will be constructed.
A road of simple structure around the isolated field will also be constructed.

3) Parking lot

A parking lot capable of accommodating about 20 general vehicles should be constructed near the main entrance. In addition, a parking space with an area of about 20m by 40m (including a space for handling) for the exclusive use of vehicles transporting quarantine plants will be secured.

4) Outdoor structures

The guard house and a garage will be planned.

5) Planting

The spaces around each building should be grassed to prevent dust. The trees in the northeastern part of the project site should remain

intact as far as possible in order to protect the facilities against the noise of airplanes, and tall trees should be planted around each building in order to protect it against sunlight and rainwater.

4-3-3 Structural Plan

(1) Outline of Structure

The planned facilities are for plant quarantine and inspection, and are roughly divided into four blocks: the plant inspection block, the plant quarantine/treatment block, the administration block and the outdoor facilities block. The buildings are planned practically and functionally independent by each block and will be connected by a roofed walkway. These buildings in the plant inspection block and in the administration block will have 2 stories while the plant quarantine/treatment block and the outdoor facilities block will have only one. The basic building span of 6.0m×6.6m with an exception of 6.0m×9.0m are adopted according to the occupancy.

(2) Structural System

The structural system adopted for the project will be a reinforced concrete rigid frame structure in consideration of the scale of building, economic efficiency, natural conditions and situation of the construction industry in Sri Lanka. Each building is connected by a roofed walkway but structurally separated by expansion joints considering the differential settlement of the soil.

(3) Dead Load and Live Load

1) Deal load

The dead load shall be calculated in conformity with the actual weights of materials used in the design.

2) Live load

The live load shall be in conformity with the Japan Building Standards.

The Live Load for each occupancy is as tabulated in Table 4-2.

Table 4-2 Live Load for Each Occupancy

(Unit: kg/cm^2)

Occupancy	Slab/Beam	Frame
Office / Meeting rm	300	180
Laboratories	400	200
Workshop	500	300
Toilet	180	130
Library / Store	800	600
Canteen	300	180

(4) Materials

Concrete : Ready-mixed concrete
Fc=210kg/cm^2 (4 week compression strength)

Reinforcing bars : under 16mm SD30A Ft=3,000 kg/cm^2
over 19mm SD35 Ft=3,500 kg/cm^2

Structural steel : SS41 F =2,400 kg/cm^2

4-3-4 Utility Plan

(1) Electrical Facilities Plan

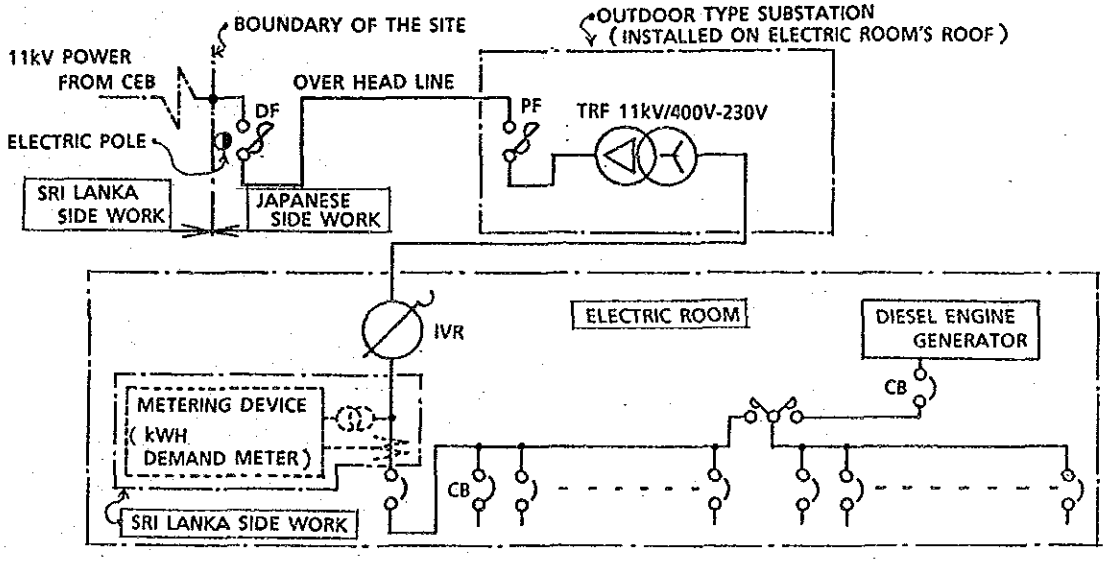
1) Power supply system

The 11kV electric power supplied from CEB will be transformed to 400V-230V at the substation in the project site. The work to install an overhead 11kV power line up to the power receiving point (the boundary between the project site and the Canada Friendship Road) and the metering equipment for electricity charges (to be installed in the

power room) are included in the work to be carried out by the Government of Sri Lanka.

- Received power system 3-phase, 3-wire 50Hz 11kV
- Low-voltage power system 3-phase, 4-wire 50Hz 440V-230V

The power supply situation is unsatisfactory in the area surrounding the project site. The electric power often fails and has wide voltage fluctuations. In light of such a situation, a generator and an induction-type automatic voltage regulator (IVR) will be installed. The generator is to cover the biotron, incubators and growth cabinets which require continued power supply, and the emergency lighting, the fire hydrant pumps and the neutralization tank also need to be covered. A static type automatic voltage regulator (AVR) will be attached to each equipment which requires a more stable and more precise power source. The transformer (outdoor type, capacity: approx. 500kVA) will be installed on the roof of the electric room. The low-voltage main distribution board, the IVR and the generator will be installed in the electric room. Fig.4-6 shows the electric power supply diagram and the scope of work.



DF : DROP FUSE (INSTALLED AT RECEIVING POINT) CB : CIRCUIT BREAKER
PF : POWER FUSE IVR : INDUCTION TYPE AUTOMATIC VOLTAGE REGURATOR
TRF : TRANSFORMER

Fig. 4-6 Electric Power Supply Diagram

2) Socket outlet

The required number of socket outlets for supplying power to small electric appliances and quarantine equipment will be installed in each location. Socket outlets complying with BS standards (15A, three poles of which one is for grounding) will be used. A distribution panel for supplying power to the quarantine appliances and devices will, if necessary, be installed in each inspection room in order to facilitate the maintenance of the power.

3) Lighting fixtures

In principle, fluorescent lamps will be used, and the lighting fixtures will be of the surface mounted type. The figures in Table 4-3 indicate target illumination levels for each occupancy.

Table 4-3 Illumination Levels for Each Occupancy

Occupancy	Illumination Level (Unit: lux)
Office	200~300
Meeting Rm	150~250
Library	200~300
Pathological Inspection/Biological Inspection	300~400
Insectarium Rm	150~250
Fumigation Biotron Rm	150~250
Preparation Rm	200~300

Although few operations will be carried out at night in the facilities, some pieces of equipment are designed to be operated around the clock. As a measure against power failures at night, therefore, emergency lighting to which power is supplied from a generator will be installed.

4) Telephone system

The telephone trunk line (central office line) will be led-in to the site from the Canada Friendship Road. The work to install the trunk line cable up to the MDF in the office room on the ground floor of the administration block is included in the work to be carried out by the Government of Sri Lanka. The number of trunk lines, including those for telephones and facsimile machines, will be 6 to 8. An electronic telephone exchange with a capacity of 10 trunk lines and about 60 extensions will be installed. An extension telephone will be installed in the following rooms; Director's room, Administration office room, Staff rooms, Meeting rooms, Library, Inspection rooms, etc.

5) Public address system

A public address system for general and emergency announcements will be installed. Its main units (amplifier, microphones, etc.) will be installed in the administration office room on the ground floor so that communications through this system may be coordinated in the administration office room.

6) Fire alarm system

Though there is no law applicable to the fire alarm system in Sri Lanka, an automatic fire alarm system will be installed in accordance with the instructions of the Fire Department of Airport & Aviation Services Ltd. In accordance with the Fire Department's advice, NFPA or BS will be adopted as the standards for the fire alarm equipment to be installed.

7) Lightning protection system

A lightning protection system will be installed on the main building and the elevated water tank.

(2) Air-conditioning/Ventilation Plan

In principle, the natural ventilation system shall be adopted. An air-cooled type air conditioner which is relatively easy to operate and maintain will be installed in the rooms where necessary.

1) Design temperature/humidity

① Design outdoor temperature

Dry bulb temperature 37.1°CDB

Relative humidity RH69%

(source: Sri Lanka Meteorological Agency Katunayake Observatory' Records for 1965 to 1980)

② Design indoor temperature

Dry bulb temperature 26°CDB

Relative humidity not specified

2) Air-conditioning system

An air-cooled separate type air-conditioner will be installed in each inspection room which requires air-conditioning due to equipment installed, and also in part of the meeting room and the director's room.

Table 4-4 Rooms with an Air-conditoner

Air-conditioning System	Rooms to be air-conditioned	
Air-cooled separate type air conditioner	• Director's Rm • Deputy Director's Rm • Meeting Rm • Experts' Rm (1), (2) • Virological Inspection Rm • Purification Rm	• Tissue Culture Rm • Insectarium Rm • Instrumental Analysis Rm • Vapor Heat Treatment Rm • Part of Glasshouse

3) Ventilation system

In principle, a ceiling fan will be installed in each of the rooms where no air-conditioner is installed. Also, necessary number of mechanical ventilators for discharging bad smells, heat and the like

will be installed as necessary.

(3) Water Supply and Sanitary Plan

1) Water supply system

As there is no public water pipe laid around the project site, well water will be used as the main water source. Two wells will be prepared, one to cover the main facilities and the other to cover the attached facilities, such as the isolated field and the glasshouse. According to the data on the quality of well water in the surrounding area, the well water is high in iron, ammonia and alkalis. It will be necessary, therefore, to treat the well water (remove iron, for example) to be supplied to facilities through an elevated water tank by gravity. The well water will be pumped up by the use of a deep well pump, and will be sent to a raw water tank via a sand remover unit. Then the well water will be treated with a water treatment device and stored in a treated water tank. The treated water will be pumped up to an elevated water tank, from which the treated water will be supplied to each of the main facilities. For sanitation reasons, the raw water tank and the treated water tank should be installed on the ground. Water will be supplied to the attached facilities such as the isolated field and the glasshouse through a pressure pump unit. The well water, pumped up with a deep well pump, will be stored in an underground water tank through a sand remover unit, and then will be supplied to each of the attached facilities with a pressure pump unit.

2) Drainage System

As there is no public sewer pipe laid around the project site, a waste water treatment facility will be installed within the project site. As the project site and the surrounding area are swampland, it will be difficult to have all the rainwater sink into the ground during the

rainy season. For this reason, part of the water treated within the project site will have to be discharged to the surrounding channel. In this case, however, it will be necessary to comply with the standards for the quality of effluents set by the Sri Lanka Central Environmental Authority (BOD: 30ppm; SS: 50ppm). Therefore, it will be necessary to install a sewerage treatment facility to treat waste water from the main facilities.

On the other hand, waste water from some of the laboratories will have to be neutralized in a neutralization tank. However, only water used for cleaning the appliances used in these laboratories should be neutralized in the neutralization tank. Strong acids and alkalis, organic solvents and heavy metals should be collected and put in a container installed in each of the laboratories. They should never be discharged into the drainage system.

The treated water will be penetrated into the ground through a penetration tank and a penetration pipe. As mentioned earlier, it will be very difficult to have all the rainwater penetrated into the ground during the rainy season. Therefore, overflow pipes should be laid to discharge water into the channel around the project site. Rainwater from the buildings can be discharged into the surrounding channel through a culvert.

3) Sanitary system

Sanitary equipment suited for the local customs will be installed. A water plug will be installed in each lavatory.

4) LP gas system

LP gas will be supplied to the pantry and some laboratories from gas cylinders by gas pipes.

5) Fire extinguishing system

In accordance with the directions of the Fire Department of Airport & Aviation Services Ltd., in principle, indoor fire hydrants and fire extinguishers will be installed. Some of the fire hydrants should be accompanied by an outlet connection for the use of firemen. A siamese connection for supplying water to these hydrants will be installed outdoors. A fire pump will be installed in the pump house. The fire pump will be actuated either with a pressure switch or with a fire alarm.

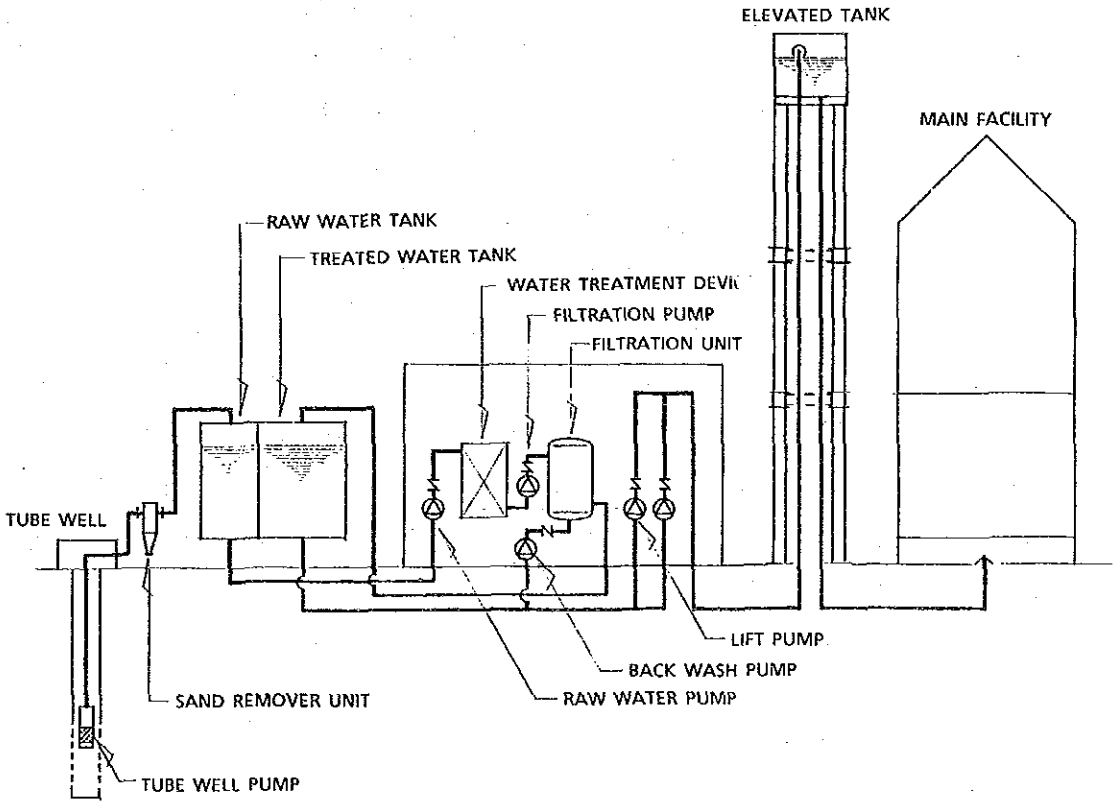


Fig. 4-7 Water Distribution Diagram (for main facilities)

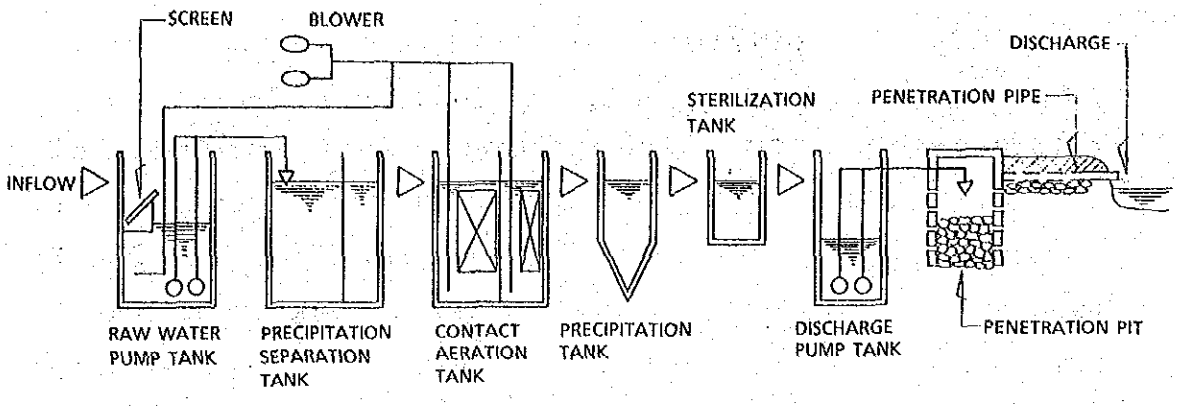


Fig. 4-8 Diagram of Sewerage Treatment Facility

4-3-5 Construction Material Plan

(1) Building Material Plan

Functionally appropriate and durable building materials should be selected for the project. As the planned facilities are very likely to be damaged by briny air, careful attention should be paid to the selection of exterior building materials. Locally available materials should be selected as much as possible from the standpoint of easy maintenance and management.

The following table shows a listing of the building materials selected for the project.

1) Main structural materials

Table 4-5 Main Structural Materials

Component	Materials	Remarks
Column Beams	Reinforced concrete	Rigid and commonly used in Sri Lanka
Walls	Exterior : Reinforced concrete Interior : Brick	Use reinforced concrete for exterior wall to give water resistance. For interior wall brick shall be used considering the easiness of construction and its cost.
Floor slabs	Reinforced concrete	Roof slab shall be of reinforced concrete casted along the roof pitch. Above the slab, hardwood will be placed as the crosspiece for the roofing tiles.

2) Exterior finishing materials

Table 4-6 Exterior Finishing Materials

Component	Materials	Remarks
Roof	Roofing tile	Roofing tile is commonly used. Many kinds are available but flat type roofing tile will be used considering the safety against drop off after its placement.
Exterior wall	Sprayed acryl resin paint	Not commonly used in Sri Lanka, but superior to commonly used exterior paint in durability. Possible to maintain locally.
Doors & Windows	Windows: Colored aluminum sash	Windows shall be made of aluminum considering the needs of air tightness in precise inspection facilities. To increase durability against briny air, aluminum shall be color coated. Insect net of stainless steel 30# shall be installed for every inspection room to avoid invasion of germ insects.
	Doors : Steel sash	To avoid deformation by humidity and rain water, all doors including frames shall be made of steel.

3) Interior Finishing Materials

Table 4-7 Interior Finishing Materials

Room	Floor	Base	Wall	Ceiling
PLANT INSPECTION BLOCK				
Inspection Rm	PVC tile	Vinyl base	Sprayed paint	Sprayed paint
Insectarium Rm	Mosaic tile	Semi-vitreous tile	↑	↑
Staff Rm	PCV tile	Vinyl base	↑	↑
Toilet	Mosaic tile	Semi-vitreous tile	Semi-vitreous tile	↑
Shower Rm	↑	↑	↑	↑
Corridor	Mortar washout	Mortar (ST)	Sprayed acryl-resin paint	↑
PLANT QUARANTINE/TREATMENT BLOCK				
Quarantine Rm	PVC tile	Vinyl base	Sprayed paint	Sprayed paint
Reception	Mortar washout	Mortar (ST)	↑	↑
Fumigation / Biotrom Rm	PVC tile	Vinyl base	↑	↑
Treatment Rm	Mortar (ST) /w hardner	Mortar (ST)	↑	Sprayed paint on exposed concrete
Workshop	↑	↑	↑	↑
ADMINISTRATION BLOCK				
Office	PVC tile	Vinyl base	Sprayed paint	Sprayed paint
Director's Rm	↑	↑	↑	↑
Library, Printing Rm	↑	↑	↑	↑

4-3-6 Equipment Plan

The equipment plan will be determined under the following basic policies which were made from the discussions with authorities concerned in Sri Lanka, and considering the objectives of the project to strengthen practically and technically the plant quarantine services followed by the expansion of import and export of agricultural products.

(1) The equipment required for efficient and proper plant quarantine services and for development of plant quarantine technology will be selected.

(2) The equipment which can be maintained easily will be selected considering the present situation of the maintenance service system in Sri Lanka.

(3) The equipment with small energy consumption will be selected to minimize the maintenance and operation cost.

(4) The equipment which is common among the sections will be jointly used provided it would not interfere with the activities of each section.

(5) The equipment for the improvement of existing airport and seaport stations will be selected considering the functional share between new planned facilities.

Table 4-8 The List of Principal Equipment by Inspection Room

Inspection Rm	Main Equipment	Q'ty	Specification & Remarks
1. Pathological Inspection Rm	(1) Safety cabinet	1	150(W)×40(D)×180(H) Installation Reqd.
	(2) Fume hood	1	150(W)×75(D)×230(H) Installation Reqd.
	(3) Plant growth cabinet	1	2209W)×110(D)×230(H) Installation Reqd
	(4) Biological microscope w/camera (I)	1	8X~1,500X
	(5) Fluorescent microscope	1	8S~1,500X
	(6) Freezing microtome	1	
	(7) Microtome knife sharpener	1	
	(8) Profile projector	1	10X~50X
	(9) Cripper seed separator	1	Electrical, w/sieves 10, 16, 30 mesh & cloth

Inspection Rm	Main Equipment	Q'ty	Specification & Remarks
2. Virological Inspection Rm	(1) Safety cabinet	1	1509W)×40(D)×180(H), Installation work required
	(2) Deep freezer	1	700ℓ, -85°C
	(3) Spectorophotometer, UV-vis. (I)	1	General use
	(4) Freeze dryer	1	4ℓ, -20°C~-80°C
	(5) Fume hood	1	150(W)×75(D)×230(H), Installation work required
	(6) Microplate reader (ELISA set)	1	
	(7) Automatic dispenser	1	
	(8) Sera washer (ELISA set)	1	
	(9) Densitometer	1	
	(10) Controlled environmental chamber	1	270(W)×130(D)×300(H), Installation work required
3. Purification Rm	(1) Ultra centrifuge	1	max. 85,000rpm
	(2) High speed centrifuge	1	max. 20,000rpm
4. Tissue Culture Room	(1) Plant growth cabinet	1	180(W)×130(D)×300(H), Installation work required
	(2) Phytochrome testing equipment	2	100(W)×70(D)×175(H), Installation work required
5. Tissue Culture Preparation Rm	(1) Fume hood	1	150(W)×75(D)×230(H), Installation work required
6. Inactivation Rm	(1) Heat inactivation Apparatus	1	120ℓ, 5°C~85°C
	(2) Safety cabinet	1	150(W)×75(D)×230(H), Installation work required
7. Entomological Inspection Rm	(1) Soft X-ray apparatus	1	Output max.: 60kVp, 5mA
8. Insectarium	(1) Biotron	1	16m3, 15°C~30°C, 60%~80%RH
9. Nematological Inspection Rm	(1) Biological microscope w/camera	1	40X~1,000X, Tricular type
	(2) Microscope w/DIC attachment	1	
10. Treatment Rm	(1) Fume hood	1	150(W)×75(D)×230(H), Installation work required
	(2) Deep freezer	1	700ℓ, -85°C
	(3) Biological microscope w/camera	1	8X~1,500X
11. Instrumental Analysis	(1) Gas chromatograph w/FID	1	
	(2) Spectrophotometer, IR-vis	1	
	(3) Spectrophotometer, UV-vis (II)	1	Biotechnology use
12. Fumigation/ Biotron Rm	(1) Fumigation test system	1	Four small chamber set, cryric resin
	(2) Gas chromatograph w/.FID)	1	
13. Cold Material Storage	(1) Prefabricated cold Rm	2	450(W)×270(D)×250(H), Installation work required
14. General Preparation Rm	(1) Water still	1	10ℓ/h, w/Ion exchanger
	(2) Icemaker	1	140ℓ/day, Cube & crush type
15. Dark Rm	(1) Dark Rm equipment	1	Monochromatic

Inspection Rm	Main Equipment	Q'ty	Specification & Remarks
16. Administration Office	(1) Personal computer	2	128Kb/16Mb
17. Treatment House	(1) Vapor heat treatment equipment	2	1m³
	(2) Vacuum fumigation chamber	1	6m³, FAO, Standard Special grade
	(3) Fumigation Rm	1	30m³, Methylbromide
18. Workshop	(1) Hand tractor w/attachment	1	Two wheel type
19. Soil Sterilization House	(1) Large steam autoclave	1	400ℓ, 135°C, 2kg/cm2
	(2) Steam generator	1	10kgf/cm², 350kg/h, using LPG
20. Garage	(1) Pick up truck	1	2,000cc
	(2) Van-type vehicle	1	1,300cc
21. Incinerator	(1) Incinerator	1	1m³, Burner system
22. Colombo Seaport Quarantine station	(1) Pick up truck	1	2,000cc

4-3-7 Basic Design Plan

(1) The Scale of Facilities

1) Main buildings

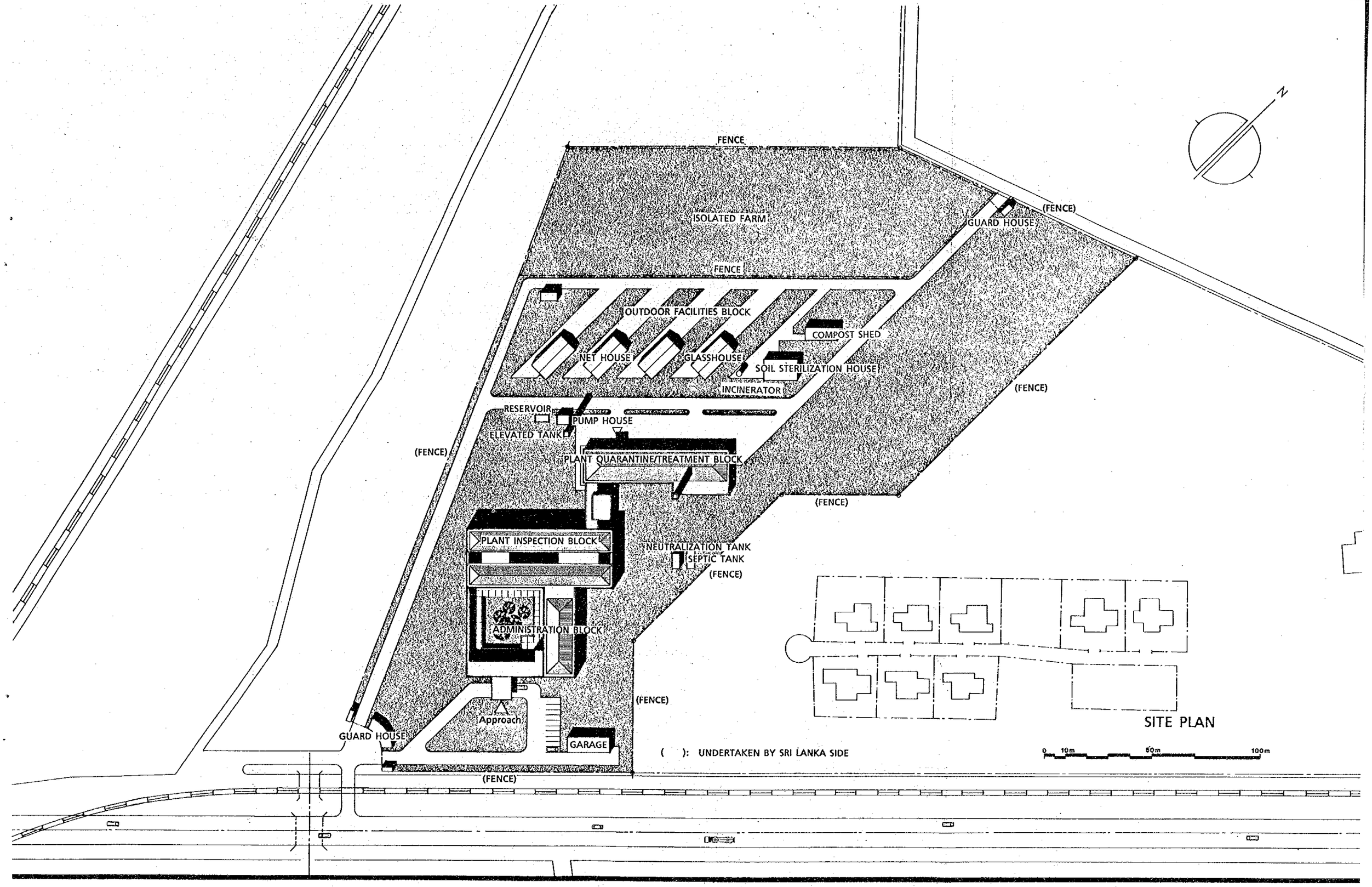
Ground floor	2,952 m²
First floor	1,573 m²
Total	4,525 m²

2) Outdoor Facilities

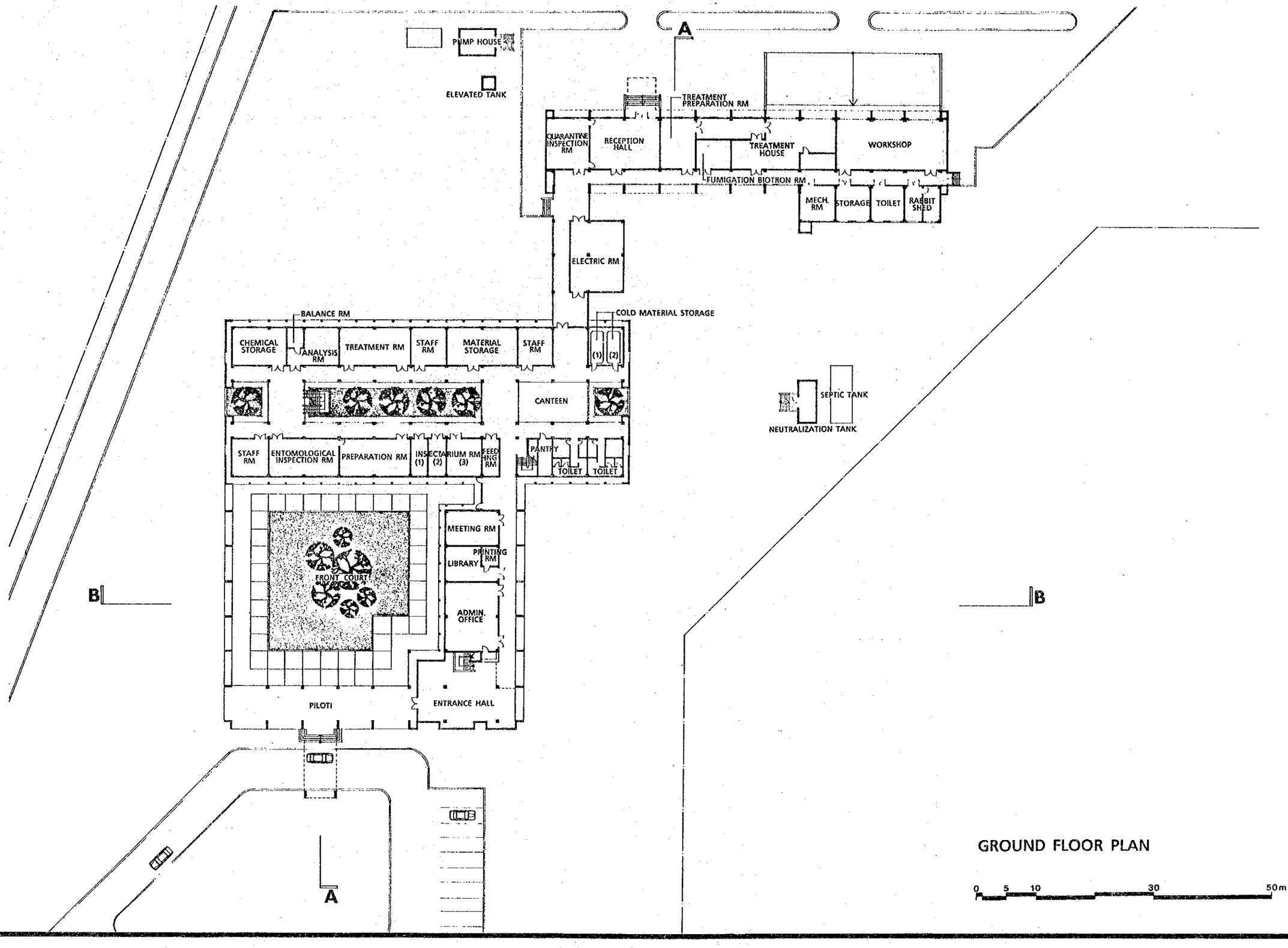
Field related facilities	1,010 m²
Utility related facilities	405 m²
Total	1,415 m²

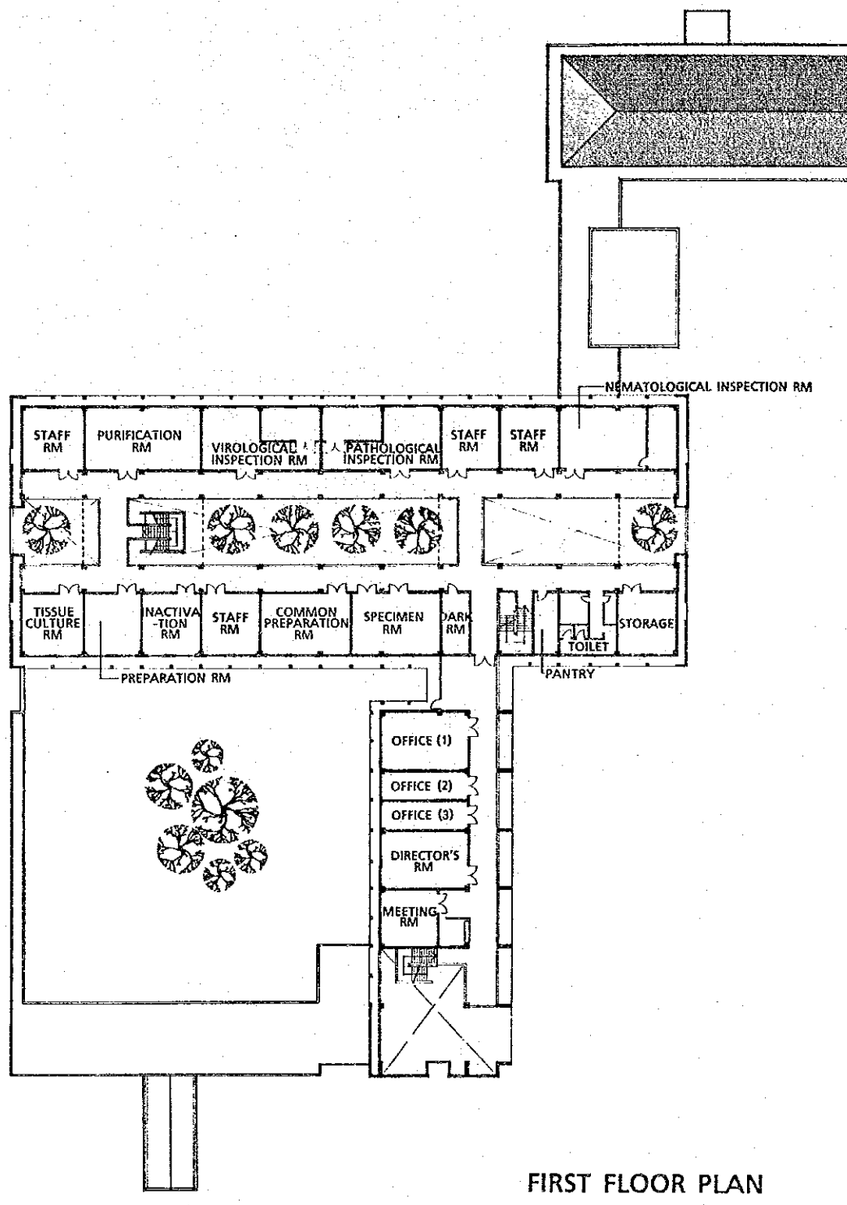
(2) Basic Design Drawings

1. Site Plan
2. Ground Floor Plan
3. First Floor Plan
4. Elevation (1)
5. Elevation (2)
6. Section

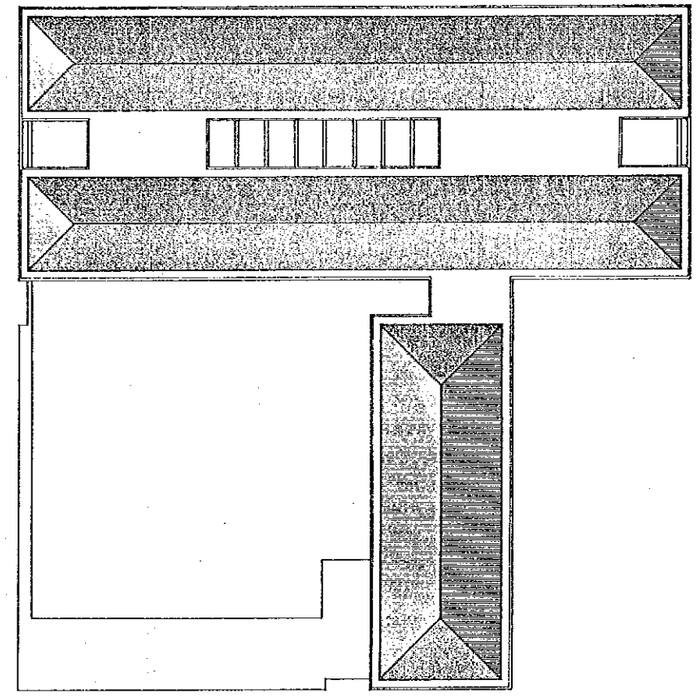

FENCE
ISOLATED FARM
GUARD HOUSE
(FENCE)
FENCE
OUTDOOR FACILITIES BLOCK
COMPOST SHED
NET HOUSE
GLASSHOUSE
SOIL STERILIZATION HOUSE
INCINERATOR
RESERVOIR
PUMP HOUSE
ELEVATED TANK
(FENCE)
PLANT QUARANTINE/TREATMENT BLOCK
(FENCE)
(FENCE)
PLANT INSPECTION BLOCK
NEUTRALIZATION TANK
SEPTIC TANK
(FENCE)
ADMINISTRATION BLOCK
(FENCE)
Approach
GUARD HOUSE
GARAGE
(FENCE)
( ): UNDERTAKEN BY SRI LANKA SIDE
0 10m 50m 100m
N

SITE PLAN


PUMP HOUSE
ELEVATED TANK
A
TREATMENT PREPARATION RM
QUARANTINE INSPECTION RM
RECEPTION HALL
TREATMENT HOUSE
WORKSHOP
FUMIGATION BIOTRON RM
MECH. RM
STORAGE
TOILET
RABBIT SHED
ELECTRIC RM
BALANCE RM
COLD MATERIAL STORAGE
CHEMICAL STORAGE
ANALYSIS RM
TREATMENT RM
STAFF RM
MATERIAL STORAGE
STAFF RM
(1) (2)
CANTEEN
SEPTIC TANK
NEUTRALIZATION TANK
STAFF RM
ENTOMOLOGICAL INSPECTION RM
PREPARATION RM
INSECTARIUM RM (1) (2) (3)
SEEDLINGS RM
PANTRY
TOILET
TOILET
MEETING RM
PRINTING RM
LIBRARY
FRONT COURT
ADMIN. OFFICE
B
B
PILOTI
ENTRANCE HALL
A
GROUND FLOOR PLAN
0 5 10 30 50m

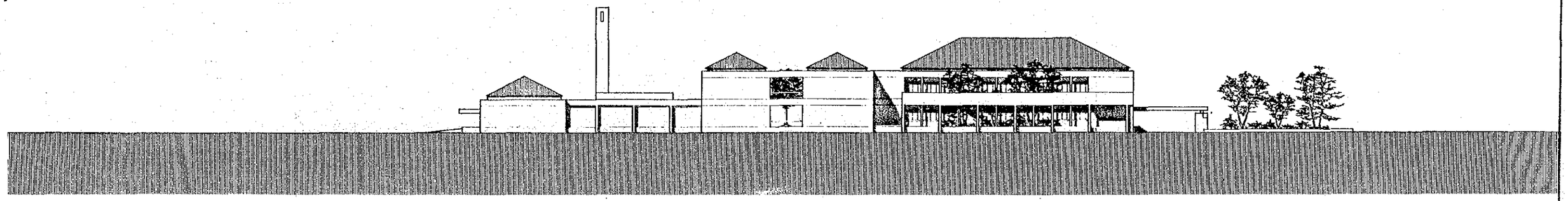


FIRST FLOOR PLAN

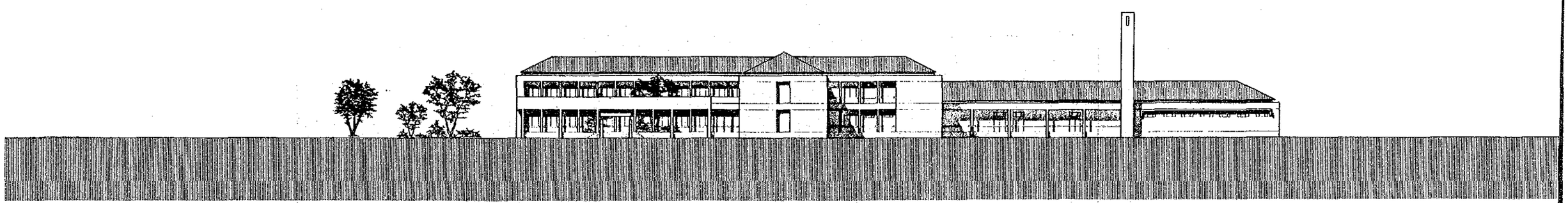


ROOF PLAN

0 5 10 30 50m

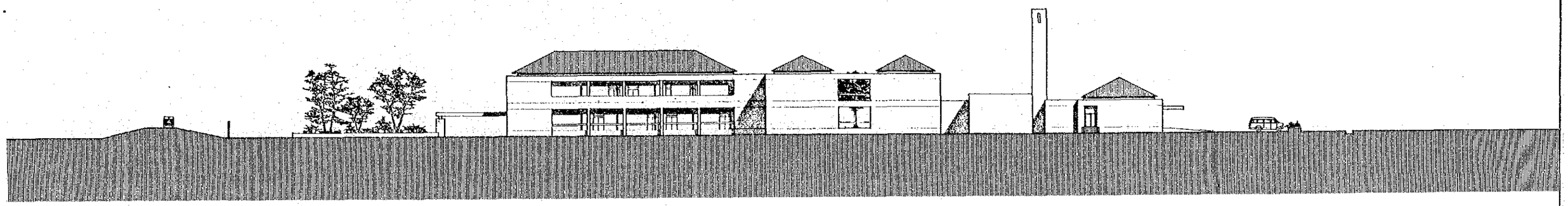


EAST ELEVATION

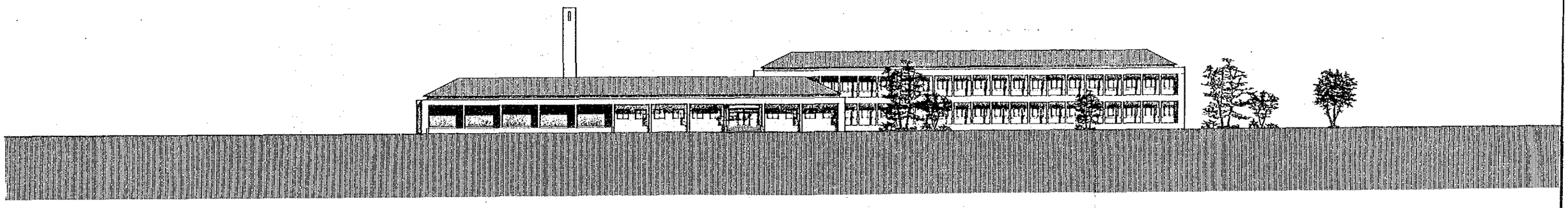


SOUTH ELEVATION

0 5 10 30 50m

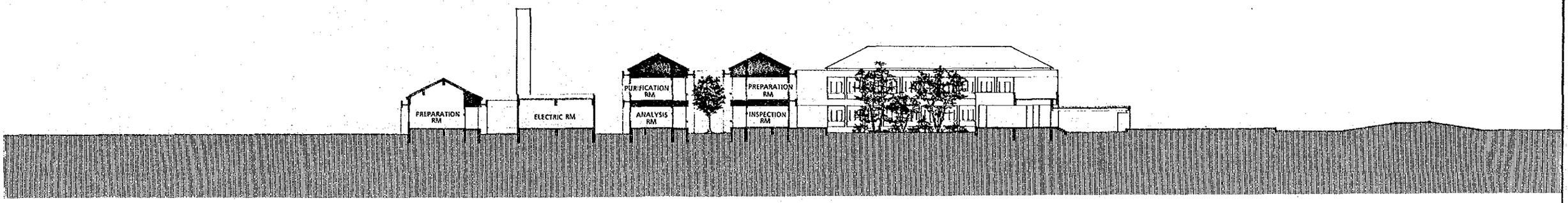


WEST ELEVATION

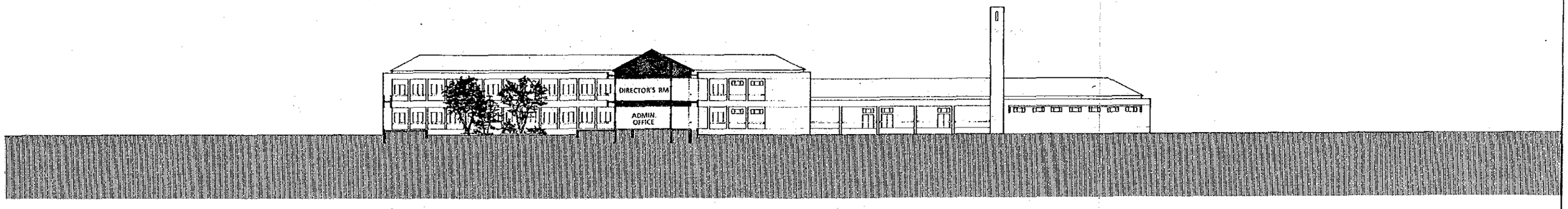


NORTH ELEVATION

0 5 10 30 50m



A-A SECTION



B-B SECTION

0 5 10 30 50m

4-4 Construction Plan

4-4-1 Construction Work Criteria

(1) Project Implementing System

This project is to be implemented by the Department of Agriculture, as the implementing organization, under the control of the Ministry of Agricultural Development and Research.
The director of the Department of Agriculture will be a party to the consultant agreement, the construction contract and the bank arrangement concerning the construction of the planned facilities. The Deputy Director of the Central Agricultural Research Institute, under the control of the Department of Agriculture, will be responsible for the coordination of the project implementation, including consultations on technical aspects of the contents of this project.

The Department of External Resources, under the control of the Ministry of Finance and Planning, will be responsible for all matters related to the grant aid from the Government of Japan. It will carry out all tasks to arrange for financial cooperation between the two governments. The Airport & Aviation Services Ltd. will provide a site for the project, conduct the reclamation work and cooperate with the Ministry of Agricultural Development and Research in site preparation work for the project. The public organizations to take charge of infrastructure will be the Ceylon Electricity Board and Post and Telecommunications.

(2) Consultant for the Project

Immediately after the conclusion of the Exchange of Notes (E/N) on the implementation of the project between the Government of Japan and the Government of Sri Lanka, the Department of Agriculture will be required to conclude a consultant agreement with a Japanese consultant firm and obtain the verification from the Government of Japan. After the conclusion of

such agreement, the consultant will prepare detailed design documents based on the basic design study report and carry out necessary tender and construction supervision work.

(3) Contractors

Judging from the total project cost of the buildings and equipment, the building construction work and the equipment procurement/installation work should be contracted out separately. The contractors for both works will be selected from qualified Japanese firms through an open tender. The Department of Agriculture, in principle, will conclude a construction contract and an equipment procurement/installation contract with the lowest tenderer in each category, and then obtain the verification from the Government of Japan. The selected contractors will be required to complete their respective works and deliver the facilities and the equipment to the Government of Sri Lanka by the date specified in the contract.

4-4-2 Situation of the Construction Industry in Sri Lanka and Points to be noted in Construction

(1) Situation of the Construction Industry in Sri Lanka

1) Local consultants

In Sri Lanka, particularly in Colombo City, there are a number of consultant firms with 10 to 20 staff. Many of the staff of these consultant firms were educated in Great Britain or Australia, and therefore excel in working out detailed design drawings and supervising construction work. They also have experience of taking charge of preparation of detailed design drawings in financial aid programs by foreign countries other than Japan. However, they are judged not to be so reliable in terms of the ability to control the

progress of construction work. It will be difficult, therefore, to ask them to work out detailed design drawings for a project which does not allow ample time for design work.

2) Local contractors

The National Technical Institute and the Building Department do both the design and construction of most of the large-scale construction works contracted out by the Government of Sri Lanka. On the other hand, many of the private contractors are small and participate in these public construction works and those contracted out by foreign-affiliated companies merely as subcontractors only to recruit local construction workers. As such, the local private contractors are unable to contract for an entire construction work. Due to the shortage of technicians and skilled workers, these contractors lack the ability to control quality, progress and materials.

When utilizing the services of local private contractors under this project, the Japanese contractor will be required to place orders with a number of local contractors, according to the type and size of the work concerned, and at the same time to dispatch Japanese engineers to Sri Lanka to take charge of quality control as occasion demands.

3) Locally available construction materials

In Sir Lanka, general construction materials are either manufactured locally or imported. Therefore, in principle, it is possible to procure them locally. However, some of them are of poor quality and are supplied in limited quantities. It should also be noted that there are limited types, patterns and colors for a certain product. In the case of this project which requires prompt delivery of necessary quantities of products of high quality, it will be essential to procure some necessary construction materials from Japan or third countries as occasion demands.

(2) Points to note in Construction

Judging from the condition of the project site and the local construction industry, the Japanese contractor should note the following points.

1. The project site is located in an area which is subject to height restrictions under the local air navigation law. It should be noted that restrictions will also be imposed on the height of the machinery for use in the temporary work. It will be necessary to have prior consultations with the Airport & Aviation Services Ltd. concerning the temporary work planned.

2. As the project site is to be accessed crossing a railway track during the construction work, satisfactory safety measures should be taken in conjunction with the transportation of machinery and materials to the project site.

3. As the project site was prepared by reclaiming swampland, its ground may be soft at first. It will be necessary, therefore, to have a clear grasp of the actual condition of the ground and to pay careful attention to the maintenance and inspection of the temporary roads and scaffolding.

4. There is a shortage of technicians and skilled workers as well as tools and utensils in Sri Lanka. For this reason, it will be essential to dispatch Japanese engineers, as occasion demands, to give technical guidance to the local construction workers.

5. The Government of Sri Lanka will be required to take prompt action for tax exemption and customs clearance of the construction machinery and materials imported into the country.

4-4-3 Construction Supervision Plan

(1) Construction Supervision

1) Contents of services

In accordance with the procedures of Japanese grant aid programs, the Japanese consultant firm will conclude a consultant agreement with the implementing organization of the Government of Sri Lanka.
After concluding the agreement, the consultant will work out detailed design documents and supervise the construction work in compliance with the provisions of the consultant agreement. Construction supervision is aimed at ensuring that the construction work is being carried out in accordance with the design documents and providing direction, technical advice and coordination throughout the term of services from a fair point of view in order to ensure the proper implementation and quality of the construction work. The construction supervision service include the following.

① Assistance in tendering

The consultant shall prepare the documents necessary for tendering the construction and the equipment procurement/installation work, and assist the Client in carrying out tasks related to the public announcement of invitation to tender, acceptance of applications, prequalification, distribution of documents to the tenderer, acceptance of tender, evaluation of the tender result, and awarding the contract to the successful tenderer.

② Direction, advice and coordination to contractor

The consultant shall examine the progress and the scheme of construction, the construction machinery/material procurement plan

and the equipment procurement/installation plan, and give the contractor direction, advice or coordination.

③ Examination and approval of working and production drawings

The consultant shall examine and approve the working drawings, production drawings and other relevant documents submitted by the contractor.

④ Confirmation and approval of construction machinery/materials and equipment

The consultant shall confirm the consistency of the construction machinery/materials and equipment between those which the contractor proposes to procure and those in the contract documents, and approve their adoption.

⑤ Plant inspection

The consultant shall be present at plant inspections of the building components and equipment to ensure their quality and performance.

⑥ Reporting on progress of the construction work

The consultant shall grasp the actual conditions of the construction site and progress, and report to both Governments.

⑦ Completion inspection and test operations

The consultant shall inspect the facilities constructed and the equipment installed, and make a test run of each piece of equipment, in order to ascertain that all the facilities and equipment are in compliance with the provisions of the contract documents, and shall give the Sri Lankan side the Inspection

Certificate. The main advanced analytical instruments, in particular, shall be installed and adjusted by the manufacturer's engineers and their test runs shall be made with standard samples. The consultant shall ascertain that the results of the test runs are in compliance with the provisions of the contract documents.

⑧ Training in operation of the equipment

Some pieces of equipment installed under this project, such as the vapor heat treatment equipment, will require considerable operating skills as well as good knowledge of their maintenance and management. For this reason, it will be necessary to have the Sri Lankan engineers in charge receive on-site training in proper equipment operation and troubleshooting techniques during the installation/adjustment/test-run period. The consultant shall give direction and advice concerning the training program.

2) Construction supervision system

Judging from the scale of the project, it is advisable that, in carrying out the aforementioned tasks, the consultant dispatch an architect/engineer to Sri Lanka throughout the term of works. The consultant shall also dispatch the necessary number of engineers to the site as needed for inspection, direction and coordination, and at the same time establish a communication and backup system in Japan, which shall be managed by an engineer in charge. The engineer in charge of such a system shall report to the Japanese officials in charge on the progress of the works, payment procedures, completion of the construction of the facilities and installation of the equipment, and any other relevant matters. Fig. 4-9 gives an outline of the proposed construction supervision system and the departments to be involved.

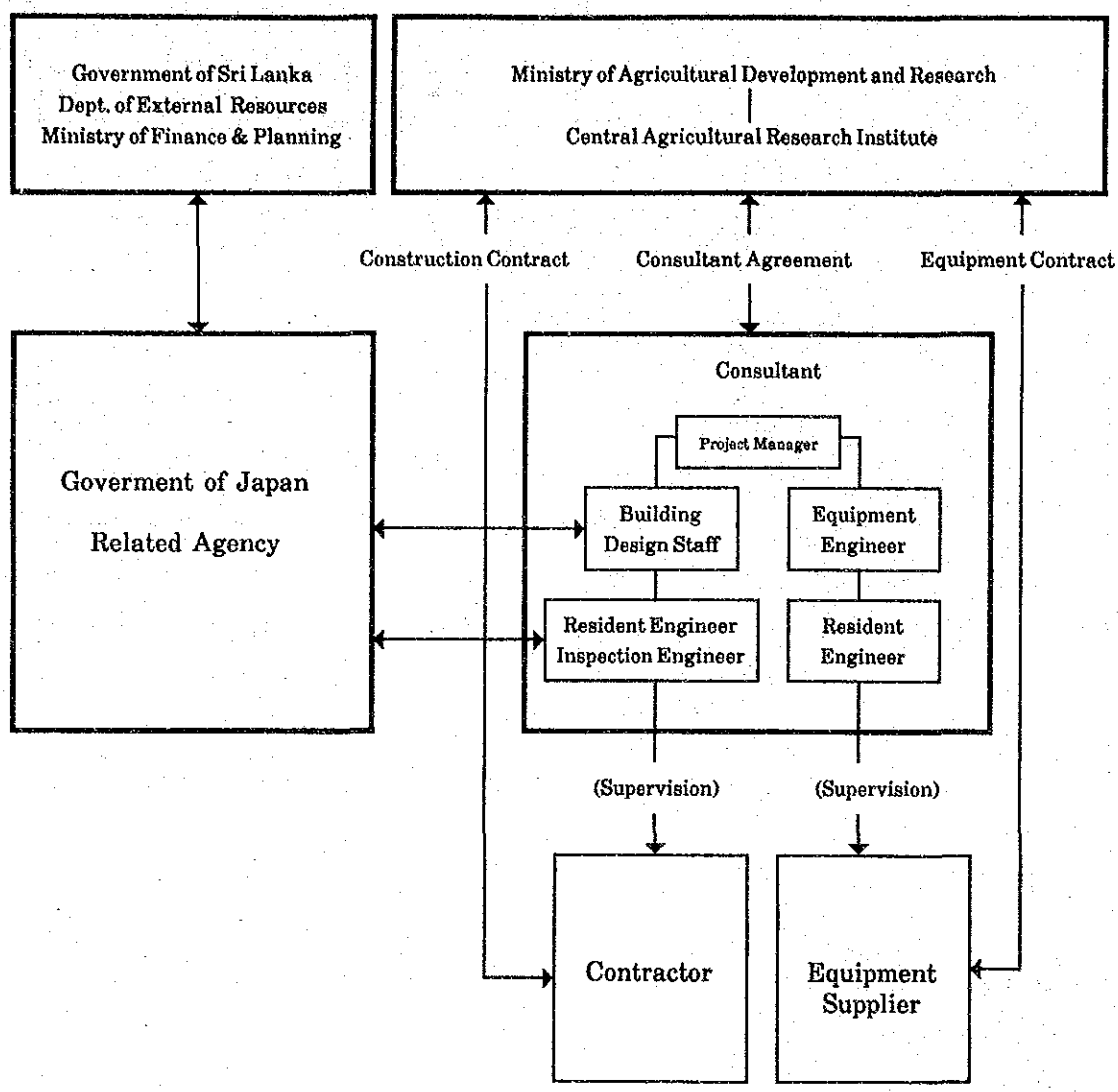


Fig. 4-9 Construction Supervision System

(2) Supervisors from the Contractor

The following table shows the necessary number of on-site and spot supervisors by type of work, which was calculated on the basis of the scale, contents and duration of this project.

Table 4-9 Supervisors from the Contractor

Works	Supervisor	Number Dispatched	Type of Dispatch	
			On-site	Spot
Building	Project Manager	1	○	
	Architectural Engineer	1	○	
	Architectural Engineer	1	○	
	Mechanical & Electrical Engineer	2	○	
	Administration	1	○	
	Waterproofing	1		○
	Doors & Windows	1		○
	Interior Finishings	2		○
	Electrical (Generator, Telephone exchange)	2		○
	Sanitary (Water treatment, Septic tank)	2		○
Equipment	Inspection Equipment	1		○
	General Scientific Equipment	1		○
	Analysis Precision Equipment	1		○
	Vapor Heat Treatment Unit	1		○
	Fumigation	4		○
	Walk-in Refrigerator	2		○
	Biotron	2		○
	Ultra Centrifuge	1		○
	Farm Machines	1		○

4-4-4 Appliance/Material Procurement Plan

(1) Appliance/Material Procurement Criteria

When procuring the appliances and materials for use in the construction of the facilities, the contractor should note the following points.

1) Local procurement

To facilitate the repair and management work after completion of the facilities, the appliances and materials used for the construction of

the facilities should be procured locally wherever possible. In this case, each appliance or material should be ordered after confirming its current supply in order to evade delay in the construction work due to shortfalls in supply of these appliances and materials.

2) Imported appliances and materials

Those appliances and materials which are considered poor in quality or in short supply should be imported from Japan or third countries. In this case, the contractor will be required to keep in close contact with the Sri Lankan officials of the implementing organization of the project concerning their importation and customs clearance, and to ensure that all the necessary procedures are followed without delay.

3) Unit prices of appliances and materials

The unit price for the importation of an appliance or material (including the packing, transportation and insurance costs) should be compared with that for its local procurement. When the unit price for its local procurement is judged to be lower than or nearly equal to that for its importation, that will be one of the factors for the local procurement.

(2) Appliance/Material Procurement Plan

The main appliances and materials procurement plan for the construction work will be as follows.

Table 4-10 Materials Procurement

Works	Appliance/Material	Procurement			Remarks
		Local	Japan	Others	
Architectural Work	Cement	○			Unstable in supply but including imported cement, possible to procure locally.
	Sand	○			River sand available
	Gravel	○			Crushed stones available
	Reinforcing bar		○		Imported Re-bar available, but expensive.
	Form (Plywood)		○		Not produced locally
	Brick	○			For partition wall
	Concrete block	○			For partition wall
	Terrazzo tile	○			For floor finishing, not many varieties
	Ceramic tile	○			Produced locally, not many varieties
	Glass	○			Produced locally
	Roof tile	○			Commonly used for roof material, also poor in quality
	Timber			○	Short supply, also poor in quality
	Calcium silicated Board		○		Not produced locally
	Doors & Windows (Metal)		○		Not produced locally
	Doors & Windows (Wood)			○	Bad quality
	hardwares		○		Not produced locally
	Paint	○			Easy maintenance
Mechanical Work	Pump		○		Bad quality
	Fan		○		Not produced locally
	Air-conditioner		○		Not produced locally
	Apparatus for septic and neutrilization tank		○		Not produced locally
	Water treatment apparatus		○		Not produced locally
	Sanitary fittings		○		Not produced locally, imported ones available but expensive
	PVC pipe		○		No joints available, also poor quality
	Galvanized steel pipe		○		Imported ones available but hard to find its joints.
Electrical Work	Distribution panel		○		Not produced locally
	Lighting fixtures		○		Bad quality, small variety
	Telephone exchange		○		Not produced locally
	Paging system		○		Not produced locally
	Fire alarm system		○		Not produced locally
	Electric wire/cable		○		Bad quality, small quantity
	Wiring pipe		○		No joints available, also poor quality

(3) Quarantine Equipment Procurement Plan

In principle, the equipment for use in plant quarantine will be procured in Japan, with nothing from a third country. It is desirable, however, that the following pieces of equipment be procured in Sri Lanka for the reasons cited below.

1. Maintenance service system is established and possible to supply the consumable parts.
   - Copiers
   - Office computers
   - Word processors

2. Availability of appropriate products with reasonable prices
   - Planting pots for examination plants

There are many pieces of equipment for use in plant quarantine which are vulnerable to shocks, humidity and high temperature, so close attention should be paid to their packing and transportation. For those pieces of equipment, a strictly moisture proof packing method will be employed so that the equipment may withstand its transportation in a tropical zone.

4-4-5 Project Implementation Schedule

When the Exchange of Notes concerning the implementation of the project is concluded between the Government of Japan and the Government of Sri Lanka, the construction and equipment procurement/installation work will be implemented with the following procedures.

(1) Detailed Design Services

The consultant shall prepare the design documents such as detailed design drawings, specifications and tender documents based on the contents of the basic design study report after the conclusion of the consultant agreement. The consultant shall also obtain approval on the above-

mentioned documents from the Sri Lankan side after consultation with them. The time required for completing the procedure is estimated at three months.

(2) Tendering

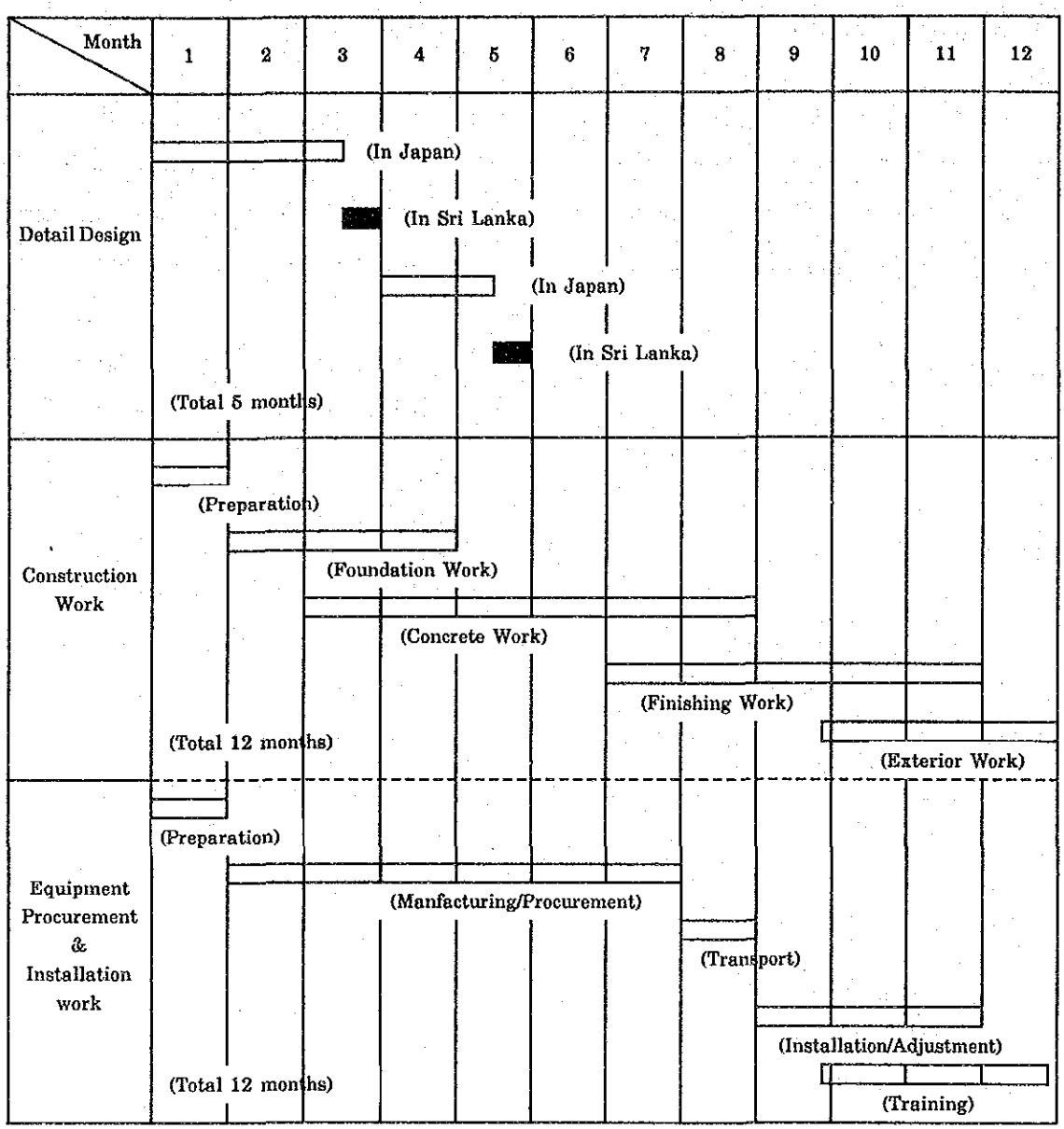
The contractors to take charge of the construction work and the equipment procurement/installation work will be selected separately by tender. The tender work includes tender announcement, prequalification, reception of tenders, evaluation of the tenders, designation of the contractors and conclusion of the contracts. The time required for completing this procedure is estimated at about two months.

(3) Construction Work and Equipment Procurement/Installment Work

Judging from the contents and scale of the work and the actual situation of the local construction industry, it will take 12 months to complete the entire project, including the equipment procurement/installation work, provided the procurement of building appliances and materials and the customs clearance of imported articles proceed smoothly.

The overall implementation schedule from the conclusion of the Exchange of Notes to the completion of the project by considering the above-mentioned factors is as shown in Table 4-11.

Table 4-11 Implementation Schedule



4-4-6 Estimated Project Costs borne by Sri Lankan Side

(1) Scope of Work

This project is to be implemented through close cooperation between the Government of Japan and the Government of Sri Lanka within the framework of grant aid from the Government of Japan. It is reasonable for the Governments of the two countries to share the project between them as follows.

1) The work to be done by the Government of Japan

① Facilities

- Construction of the buildings described in this basic design study report
- Electrical, mechanical and sanitary installations

② Equipment

- Equipment procurement work
- Equipment installation work

③ Infrastructure

- Substation
- Water supply and drainage work within the premises
- Telephone exchange system

④ Outdoor structures

- Roads and parking lots within the premises
- Septic tanks
- Outdoor lighting

⑥ Other work related to the above work

- Transportation of equipment, appliances and materials from Japan to Sri Lanka
- Inland transportation of imported equipment, appliances and materials from ports of disembarkation to the project site

2) The work to be done by the Government of Sri Lanka

① Site and outdoor structures

- Securing the site for the project
- Removing existing structures, trees and so on from the project site and reclamation of site
- Construction of drainage channel around the project site and bridges to cross the channel to the site
- Construction of access roads to the project site
- Planting and construction of outdoor structures including fence, gate and a regulatory pond etc.

② Infrastructure

- Supply of electricity up to the site
- Installation of telephone line up to the telephone exchange

③ Preparatory work

- Provision of sites for temporary office, workshops and material storage places
- Installation of temporary electricity supply and telephones

④ Fixtures and furniture

- Fixtures, curtains, furniture, etc. other than those supplied by the Government of Japan

⑥ Procedural work and its expenses borne by the Sri Lankan side

- Banking arrangement expenses
- Tax exemption procedure expenses
- Prompt action related to customs clearance and inland transportation
- Necessary measures for exempting the Japanese nationals involved in the implementation of the project from customs duties, domestic taxes and other fiscal levies in accordance with the verified agreement
- Arrangement to expedite the acquisition of visas, customs clearance, and any other formalities that may be necessary for the entry of Japanese nationals involved in the implementation of the project
- Maintenance and management expenses for ensuring that the facilities constructed and the equipment installed are operated properly and effectively
- Expenses for the construction-related procedures

(2) Estimated Costs to be borne by the Government of Sri Lanka

1) Site preparation work

- Land reclamation and site preparation work (completed by the Airport & Aviation Services Ltd.)	10,000,000 Rs
- Construction of access road between trunk road and the site	500,000 Rs

2) Infrastructure work

- Installation of electricity supply for the site	210,000 Rs
- Installation of telephone lines to the PBX	500,000 Rs

3) Building construction work

- Subgate on airport side	150,000 Rs

4) Outdoor structure construction work

- Preparation of surface soil on the site for the isolated farm	1,500,000 Rs
- Gates	450,000 Rs
- Planting	1,700,000 Rs
- Fence	4,200,000 Rs

5) Furniture & fittings

- Curtains	700,000 Rs
Total	19,910,000 Rs

It will be necessary to include in the total costs the following as part of the expenses to cover fees and taxes.

- Banking arrangement fee : 0.025 percent of the amount set forth in the E/N
- Import duties : about 20 percent on average of CIF prices

It is desirable that the Government of Sri Lanka prepare the budget for this project and conduct the construction with proper timing so that the entire project can be implemented smoothly and the facilities constructed may be utilized effectively.

CHAPTER 5 PROJECT EVALUATION AND CONCLUSION

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(1) Project Evaluation

The implementation of this project is expected to produce the following effects.

1) Reinforcement of the country's plant quarantine system

In Sri Lanka, precise inspection of plant quarantine-related operations are now carried out mainly by the Plant Quarantine Division of the Central Agricultural Research Institute(CARI). And plant quarantine administration is conducted by the Department of Agriculture. However, the facilities of both the Plant Quarantine Division, CARI and the Department of Agriculture are located in Peradenia, which is about 120km or about a three hours' car ride from Colombo City where Colombo Seaport and Katunayake Airport plant quarantine stations are located. At the two plant quarantine stations, more than 90 percent of the plants exported from and imported into Sri Lanka are handled. Furthermore, the plant quarantine equipment installed in the Plant Quarantine Division, CARI and the two plant quarantine stations are not satisfactory, qualitatively or quantitatively, which has been hindering the country's plant quarantine operations.

One of the objectives of this project is to establish the new plant quarantine facilities on the premises of the Katunayake Airport and concentrate the following three main functions of the country's plant quarantine system in one place.

1. centralized plant quarantine administration,
2. precise inspection of exported and imported plants,
3. research and development of new quarantine techniques.

To reinforce the equipment used at Colombo Seaport and Katuyanake Airport plant quarantine stations is the other objective of the project. Therefore, this project is expected to contribute to the reinforcement of the country's plant quarantine system and, at the same time, efficiency in individual plant quarantine operation will be enhanced.

2) Improvement of quarantine ability of inspector by training

The training for inspectors who are working at airport and seaport quarantine stations and for newcomers shall be done at this planned facility. Though the number of trainees are small, the equipment and information related to plant quarantine will be concentrated in this facility, so trainees can effectively acquire the practical knowledge and technology needed for their work. Therefore, the ability of quarantine inspectors as well as the accuracy of primary quarantine will be expected to be improved.

When plant quarantine is efficiently implemented after the implementation of the project, not only the above direct effects, but also the following secondary effects can be expected.

① Promotion of stable agricultural production by prevention of pests

In the past, pests/pathogens invaded Sri Lanka a number of times. As seen in the case of invasion of "coffee rust fungus", such invasions caused a lot of damage to the country's agricultural production. In the light of the bitter experiences in the past, the Government of Sri Lanka is now actively implementing policy measures to reinforce the country's plant quarantine system by means of designating certain pests/pathogens which have a high possibility of invasion. However, the fact is that the capacity of the country's plant quarantine stations lags behind the recent increase in imports of agricultural products. Consequently, it can not be said that sufficient quarantine

services are well enforced.

If this project is implemented and subsequently the country's plant quarantine system is considerably reinforced, it will greatly help prevent invasion of pests/pathogens, which in turn will promote stable agricultural production.

② Promotion of Exports of Agricultural Products

Efficient quarantine of export agricultural products will result in further increases in exports of agricultural products. Equipment for use in disinfestation of export agricultural products is included in this project. If the use of the equipment results in an improvement in the treatment techniques of the country, it will become possible for the country to export new kinds of agricultural products. Furthermore, the use of the equipment will make it possible to maintain a certain level of exports of agricultural products.

As is clear from the above, this project will greatly contribute to the promotion of exports of agricultural products in Sri Lanka, as well as to the acquisition of foreign exchange.

③ Contribution to safe importation of superior seeds and seedlings

In Sri Lanka, seeds and seedlings of potatoes, vegetables, etc. are in short supply, and therefore considerable quantities are imported. As for such agricultural products as rubber, coconut, sugar cane and rice, whose production Sri Lanka can expect to increase, it is necessary to import superior seeds, seedlings and germ cells from foreign countries for the purpose of improving their productivity. However, importation of these seeds and seedlings is accompanied by a great risk of pests/pathogens being imported into the country. In this connection, if implementation of the project enables an efficient quarantine of imported seeds and seedlings, it will result in safe introduction of superior seeds and seedlings.

(2) Appropriateness of the Implementation of the Project

1) Operation system

The facilities are to be operated with a total staff number of 46; 26 technical staff for the quarantine and inspection divisions and 20 staff for the administration division. Technical staff will consist mainly of experts from the Central Agricultural Research Institute, experts from the Department of Agriculture and inspectors from airport and seaport plant quarantine stations. Qualified experts with wide professional experience and knowledge will be assigned to the heads of the six technical sections, which are to be the core of this project. This means that the quarantine and inspection divisions are to be provided with technical staff having basic knowledge, so that the facilities and equipment will be managed smoothly.

2) Budgetary appropriations

As the procedure for the Sri Lankan side, the implementation of the project will be approved in a Cabinet Meeting in 1990, and the budgetary appropriations for this project will be included in the annual budgets of the Ministry of Agricultural Research and Development in the fiscal 1991 and after. The land reclamation and preparation work for the project site which Airport & Aviation Services Ltd. contracted with 10 million Rs (which was disbursed from the fiscal 1990 budget of the Ministry) has already been completed.

The budgeted total facility/equipment maintenance and management cost for the first year is 2,860,000 Rs, of which 1,010,000 Rs is for personnel expenses and 1,850,000 Rs is for facility/equipment operation and maintenance expenses. There will be no problem with the personnel expenses because they will be budgeted after the project is approved in a Cabinet meeting. As for the operation and maintenance expenses, which represent 0.4 percent of the Department of

Agriculture's annual budget, it will be possible to include them in the department's annual budget judging from those for other similar facilities which operate under the jurisdiction of the Department.

3) Maintenance and Management

This project is designed to make it easy to maintain and manage the facilities. Highly durable building materials will be used in the construction of the facilities and priority will be given to the use of locally available materials. On the other hand, utmost emphasis is placed on the availability of manufacturers' local maintenance services in the selection and procurement of the equipment. In addition, the facilities are designed to make effective use of natural lighting and ventilation to save energy costs. Thus, it is concluded that maintenance and management of both the facilities and the equipment will be easy.

Furthermore, the Sri Lankan side intends to secure one staff member for building maintenance and one for maintenance of equipment within the administration division. Thus, there will be no problem with the planned facility/equipment maintenance system.

As is clear from the above, there will be no problem with the operation, budget and maintenance/management of the facilities.

(3) Conclusion

If Sri Lanka's plant quarantine system is reinforced and the plant quarantine operations in the country become more effective and efficient through the implementation of the project, pests/pathogens will be prevented from invading the country and the agricultural production will become stabilized, which in turn will result in expansion in the exports of agricultural products as well as to the growth of its agriculture-led economy. In particular, increases in exports of agricultural products

will greatly contribute to the expansion in employment, promotion of local industries and acquisition of foreign exchange.

As this project is expected to have far-reaching positive effects and at the same time contribute to the socio-economic development in the country, it is considered reasonable to implement this project with grant aid from the Government of Japan. Furthermore, it can be said that there will be no problem for operation and management of the facilities in terms of personnel recruitment and funding which the Sri Lankan side will implement.

(4) Recommendations

The following recommendations are made to ensure quick implementation of the project and smooth and effective operation of the facilities, which are the most important preconditions for the realization of the expected effects of the project.

1) Implementation of the Project

① As this project is to be implemented within the framework of the grant aid program of the Government of Japan, there are time limitations in implementation of the project. It must be completed before the expiration of the term shown on the Exchange of Notes or the end of the fiscal year of the Government of Japan. For this reason, prompt action is required in certain necessary procedures, such as conclusion of contracts for consultant services, and for construction and equipment procurement work.

② It will be necessary for the Government of Sri Lanka to secure the funds necessary for the procedures, such as customs clearance, tax exemption and transportation for the smooth implementation of the construction and equipment work.

③ In the case of this project, the Department of Agriculture, which will be the implementing organization of the project, is located in Peradeniya, while the project site is located in Colombo City. It is desirable to provide an implementation office of the Sri Lankan side for the project in Colombo City through the period of the design stage and the construction stage.

2) Operation, Maintenance and Management

① In order to operate the facilities effectively, it will be essential for the Sri Lankan side to secure the necessary number of staff as set forth in the personnel plan. It will also be necessary to enlarge the staff numbers as the workload increases.

② Shortage of the maintenance and management expenses would greatly affect not only the operation of the facilities and equipment but also the plant quarantine operations at the facilities. Budgetary appropriations for the maintenance and management of the facilities and equipment should be planned carefully.

3) Technical Cooperation of the Government of Japan

① The Government of Sri Lanka is in need of a transfer of technology and experience from Japan through the implementation of project, and they hope to obtain technical cooperation from the Government of Japan. In order to support the promotion of the plant quarantine technology in Sri Lanka, it is strongly desired to implement project-type technical cooperation by the Government of Japan in conjunction with this project.

② The Government of Sri Lanka is desirous of dispatching personnel to Japan, who will be involved in the facilities, for education and training purposes. In this connection, it is desirable that the Government of Japan promptly implement training programs for

them to support the Government of Sri Lanka in developing human resources who will serve as the Sri Lankan counterparts in the project.