5-5 Structural Design

5-5-1 Basic Policy for the Structural Design

1) The foundation of the buildings will make use of pilings since geological conditions are so poor (See Appendix III-1 for results of soil investigation). A layer of fine sand about 16 m below the surface of the ground will serve to support the piles so that 20 m long concrete support piles should be prepared.

2) Frames will be made of reinforced concrete, but for the purpose of ensuring a spacious interior and to assure sufficient protection in the rainy season, the roofs will be of the gabled truss variety. With the exception of the bearing walls, all other walls will be made of concrete blocks and bricks.

3) In accordance with the design standards of the Architectural institute of Japan, the allowable stress design method will be used for structural calculations. The allowable stress for structural materials will be determined in accordance with both Thai and Japanese standards, and after giving due consideration to the grade and quality of local work.

4) Provided no problems arise, local construction methods and structural materials will be employed.

5-5-2 Design Loads

Design loads will be determined in conformity to the Bye-Laws of the Bangkok Metropolis (1979) and Re-control of the Construction of Building (1979).

(1) Dead Loads (T/m^3)

Reinforced concrete	2.4
Structural steel	7.85
Concrete block, brick	1.9

(2) Live Loads (kg/m^2)

Roof (general)	50
Roofs and eaves (concrete)	100
Toilets, bathrooms	150
Dormitory bedrooms	200
Offices	250
Halls, staircases, corridors and conference rooms	300
Canteen/auditorium	400
Practical training rooms, library, storage rooms	500

Places where large loads are expected will be calculated separately. For example, large-size machineries, water tank, etc.

(3) Wind Loads (kg/m^2)

less than 10 m high	50
10 m to 20 m high	80

(4) Earthquake Loads

Since there is no record of a large earthquake ever occuring in Thailand, there are no standards for earthquake loads. Therefore, earthquake loads will not be considered here.

5-5-3 Main Structural Materials

The following is a list of the principal structural materials required.

- Reinforcing steel : deformed bar SD30 (JIS standard) or its equivalent
- Concrete : Fc = 210 kg/cm^2 (4 weeks strength)
- Cement : ordinary Portland cement (ASTM standard)
- Steel materials : SS41 (JIS standard) or its equivalent
- Piles : PC pile

5-6 Mechanical and Plumbing Design

5-6-1 Air-conditioning and Ventilation

The facilities do not call for a central air conditioning system. Instead, package-type cooling units will be installed in two or three principal rooms. Ventilation will rely primarily on natural forces, i.e. the wind, except where ventilation is compulsory such as in the kitchen, toilets and workshops. Mechanical means of ventilation will consist of simple devices such as fans attached to the exterior wall.

5-6-2 Water Supply Facilities

Since all of the buildings to be constructed in this Project will be flat and separated as to functions, such methods as gravity tanks, pressure tanks and/or pump running are considered appropriate for the supply of water.

The gravity tanks method by elevated water tank is the suitable means of supplying water to this Project from the standpoints of amounts of water, water pressure and ease of maintenance. Therefore, a receiving tank (about 100 m^3) capable of storing one-day's worth of water should be installed outdoors, and a suction pump used to pump water up to the elevated water tank (about 15 m^3). After this, gravity will be relied on to supply water to each of the buildings. Piping will employ the loop piping method to ensure a stable flow of water to all buildings. A stand-by or backup suction pump should be installed in case of emergencies. (This should be at the cost of the Thai Government.)

Judging from the water quality survey of deep wells (200 m deep) near the site, quality of water is so inferior because of containing plenty of chloride, iron and mangan that water treatment should be carried out before use. Plus the material used in piping should be the hard polivinyl chloride lined steel pipe.

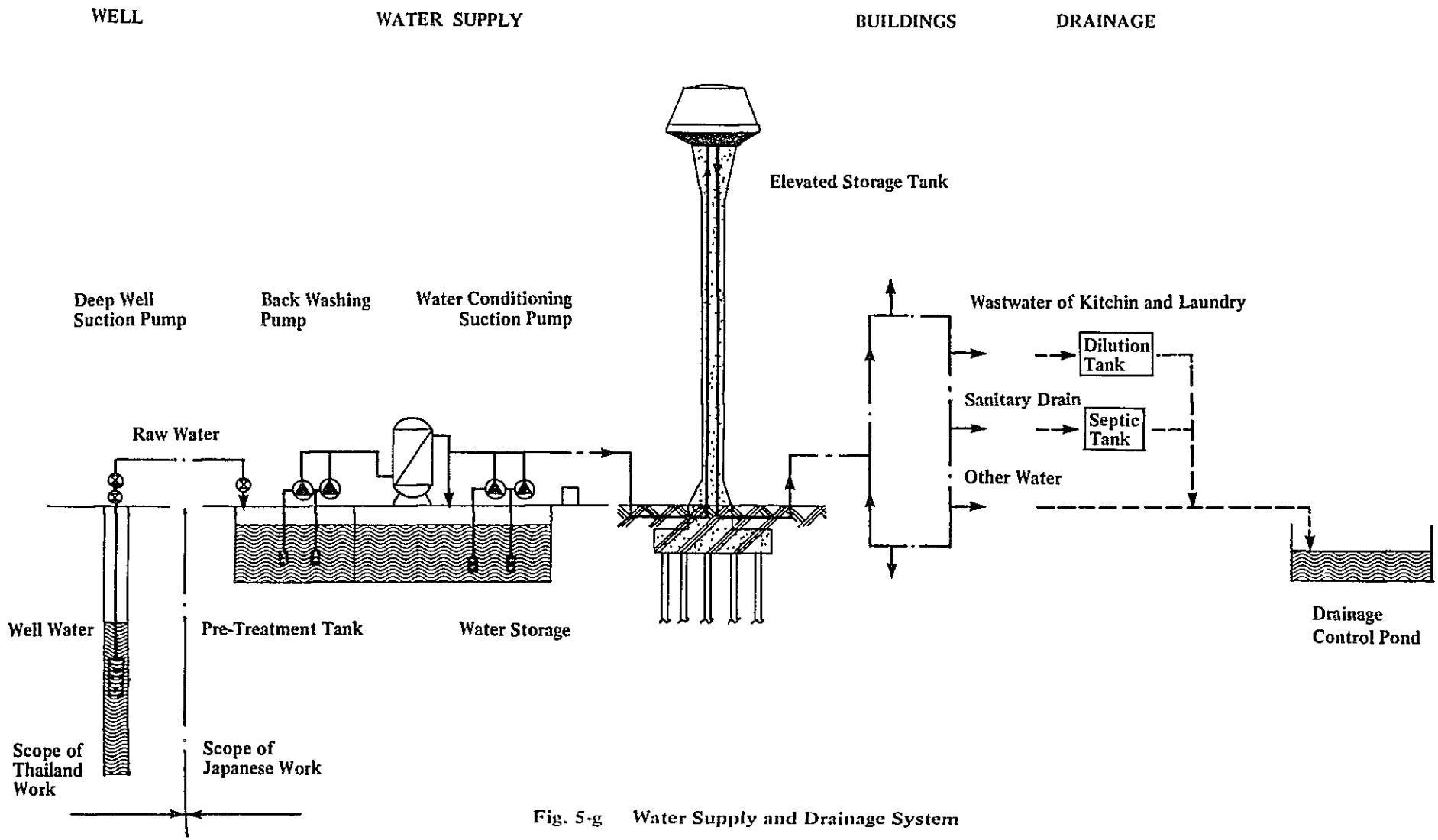


Fig. 5-g Water Supply and Drainage System

5-6-3 Drainage Facilities

The drainage plan calls for three systems, one for sewage, waste water and rian water.

(1) Sewage

Sewage from toilets will go to septic tanks before being discharged. Therefore, it is desirable to design the soil pipe to be as short as possible and install septic tanks at each buildings. Piping material used inside the buildings will be cast iron pipe, and that used outdoors will be hard polivinyl chloride pipe. In Thailand, there is a standard regulating sewage treatment tanks. It stipulates an individual aeration treatment method which consists of a settling tank, aeration tank and disinfecting tank. Although the structure of this system differs from the Japanese separation catalysis aeration method, functionally they are the same.

(2) Waste Water

Waste water from each building will be gathered in the dilution tank through sump pits, then discharged into the control pond encircling the site. Drainage from the control pond will carried primarily by the forces of nature. Pipe material used inside the buildings will be galvanized steel pipe, and that used outdoors will be hard polivinyl chloride pipe. (High inpact polivinyl chloride pipe)

(3) Rain Water

The draining of rain water from the buildings and grounds will be done via the creek constructed for that purpose. During the rainy season, large amounts of rain are expected. Therefore, the control pond should be used to channel excess water into the creek in front of the site naturally.

5-6-4 Sanitary Ware

Sanitary ware will be installed in all toilet and shower rooms. Thai-style water closet will be used in most toilets, with a number of

western-style water closet being installed primarily for use by people confined to wheel chairs, and also for general use.

5-6-5 Gas Supply Facilities

LP gas will be supplied to the kitchen, workshops and hot-water supply room. Gas cylinders will be installed separated from those rooms where gas is used, connected to the buildings by the gas pipe.

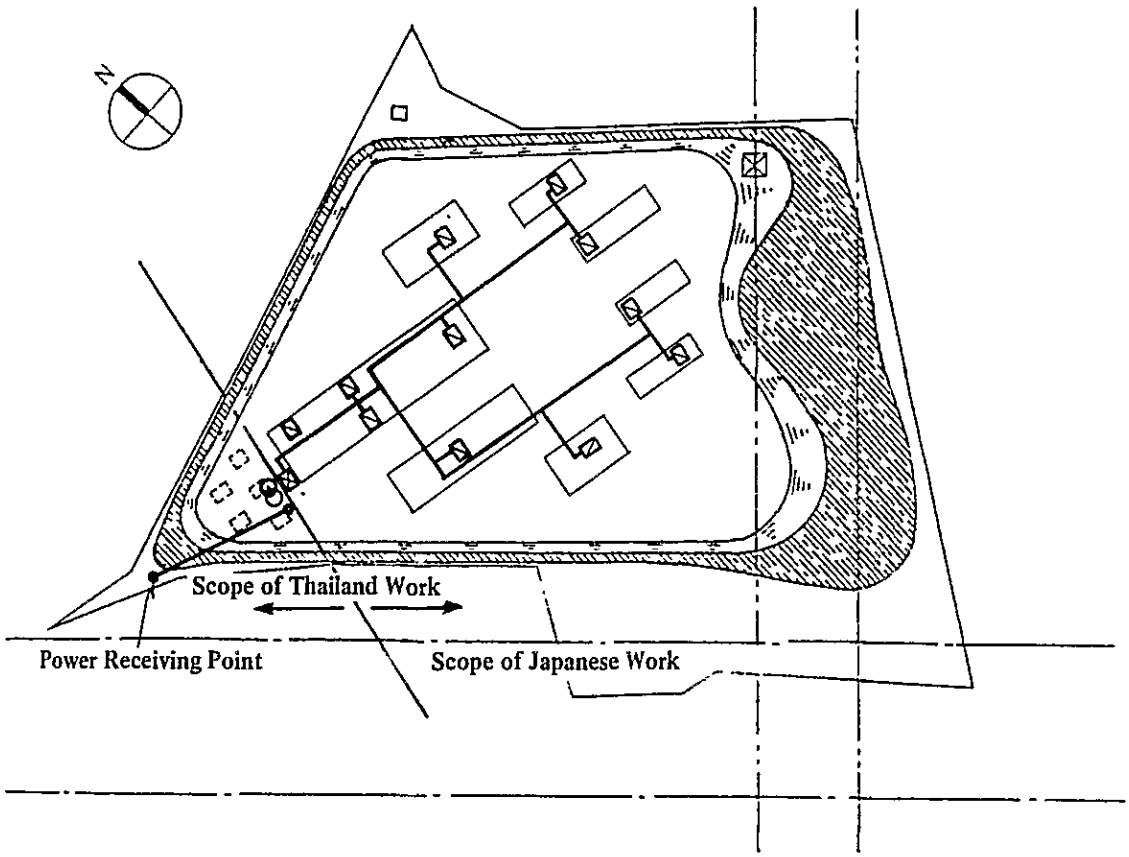
5-6-6 Fire Extinguishing Facilities

Fire extinguishers will be installed in accordance with Thai regulations governing their location and capacities.

5-7 Electrical Design

5-7-1 Power Supply

Power will be supplied by the Thai Government to a transformers located on poles outside the distribution rooms of each building. (See Fig. 5-h)



● Concrete Post for Power Receiving (Thai)

Transformer (Thai)

Switchboard (Japan)

Panelboard (Japan)

Fig. 5-h Power Receiving and Trunk Line

Power cables will connect these transformers to the distribution panels. The voltage for electric power will be 3φ3W 380 V, and for lamps 3φ4W 380/220 V. Frequency will be 50 Hz.

The loads for each type of equipment can be estimated as follows:

• Lamps and receptacles	150 KVA
• Air conditioners and ventilation equipment	75 KVA
• Water supply and drainage equipment	75 KVA
• Training equipment	100 KVA
Total	400 KVA

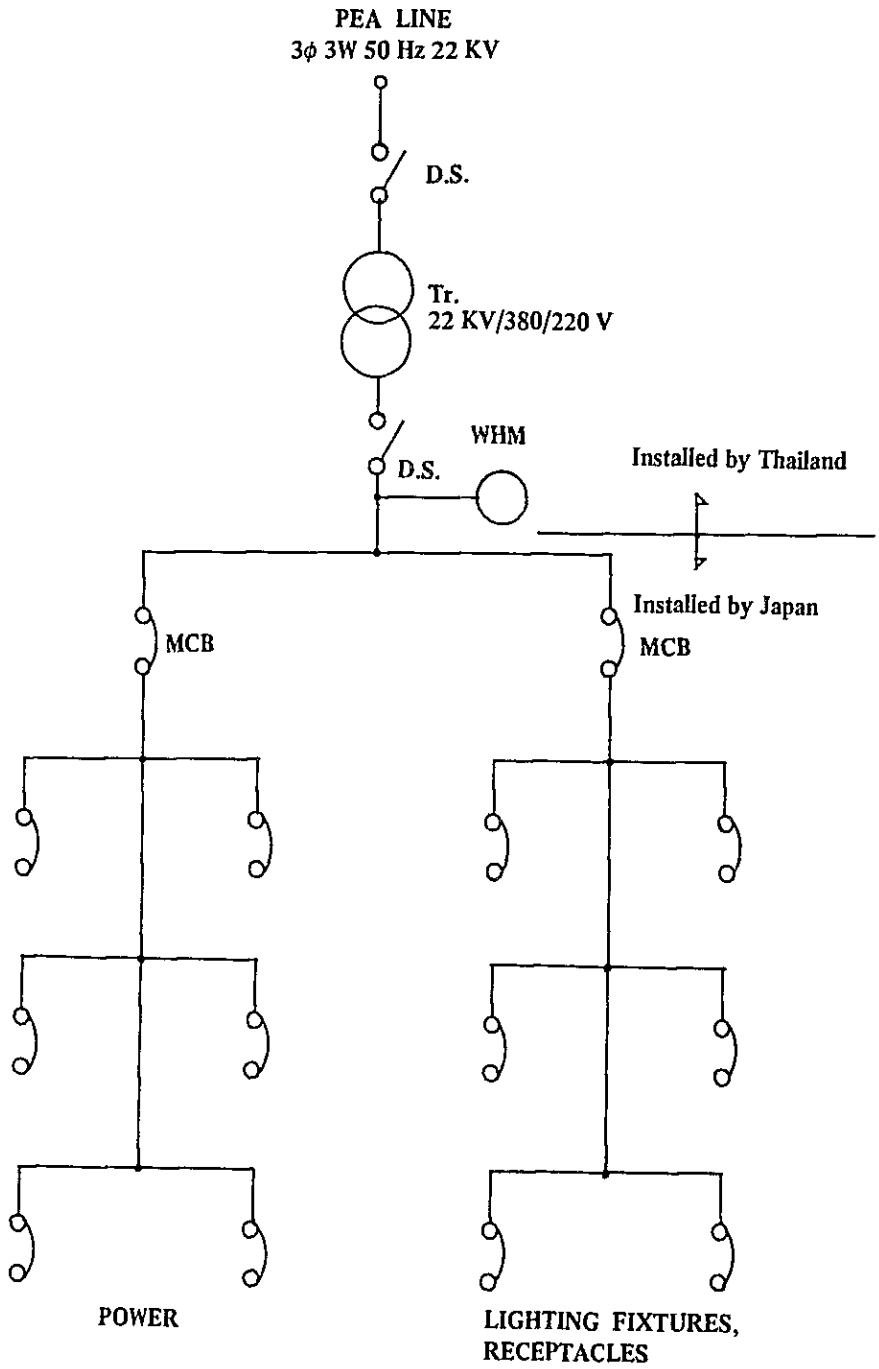


Fig. 5-i Distribution Facility, Single Line Wiring Diagram

5-7-2 Trunk Line

Low voltage trunk lines will be laid from the main distribution panel to the lamp distribution panels, electric power control panels and training equipment power panels to be installed in all necessary buildings. Thus trunk lines will consist of metal wires and cable racks.

5-7-3 Electric Power

Power will be distributed to the air conditioning units, ventilation fans, ceiling fans and pumps and practical training equipment. Wiring will be required. Small capacity equipment such as fans will use single phase 220 V and other equipment will use three phase 380 V.

In addition, low voltage condensers will be installed at each load to improve the power coefficient.

5-7-4 Lamps and Receptacles

1) Natural lighting will most certainly be a big part of the architectural design policy.
2) Fluorescent lamps will be the major artificial source of lighting, but incandescent lamps and mercury-vapor lamps will also be installed as needed.
3) Average illuminations for main rooms are listed below:

Offices	300 lux
Practical training rooms	300 lux
Conference rooms	200 lux
Halls	50 ∿ 100 lux

4) Receptacles for office equipment will be of the ordinary type, but earthing terminals for training equipment will have to be installed in certain cases. Voltage will be primarily single phase 220 V.
5) Lightings and receptacles for dormitories will be drawn up based mainly on flourescent lamp.

5-7-5 Telephones

The Thai Government will provide lines leading into the terminal box. (See Fig. 5-j) There will be a total of 5 incoming lines and about 20 extensions. The telephone exchange is planned to be of the compact button type. Further, public coin telephones will be installed in the reception area, halls and dormitories.

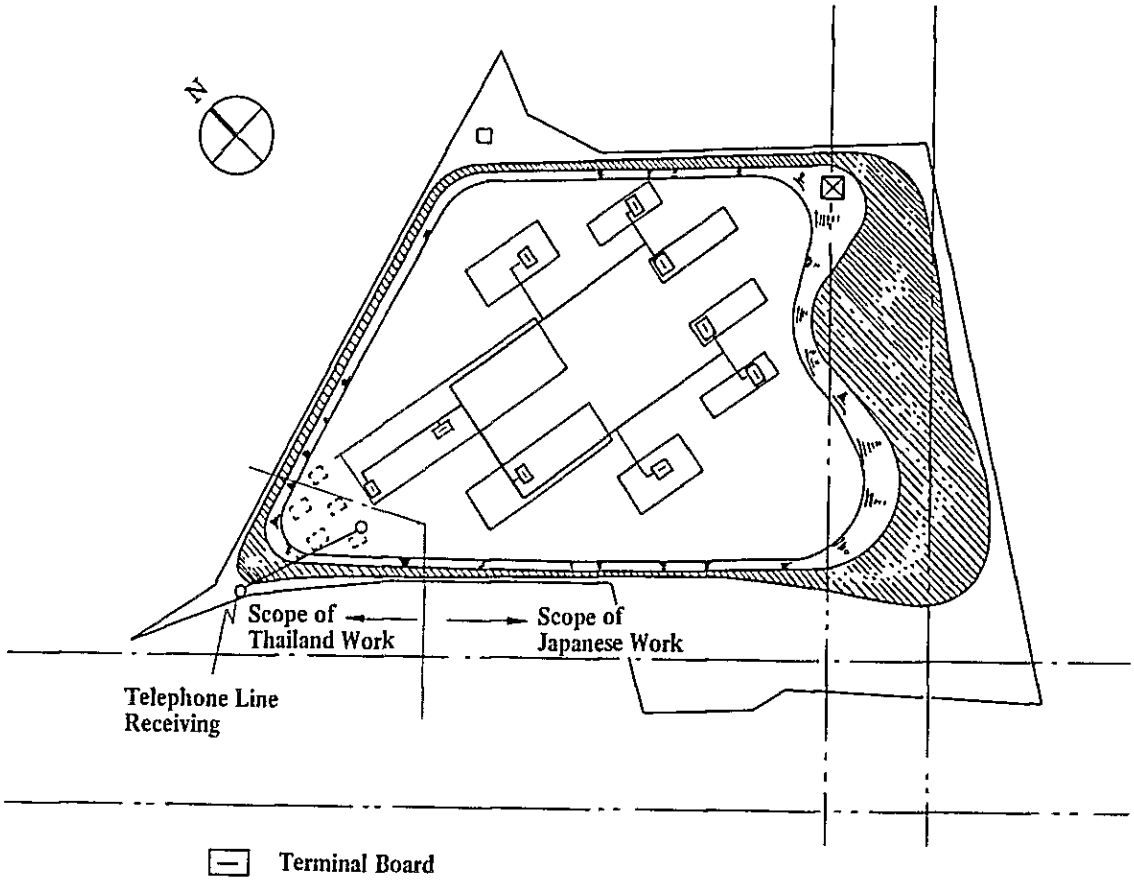


Fig. 5-j Telephone Line Receiving and System

5-7-6 Announcement

Speech amplifiers and microphones will be placed in the main office of Administration Building. And speakers will be installed in the main rooms, the corridors and common areas of each building as well as outdoors to realize a general broadcasting system that extends throughout the premises. Separate amplifiers and microphones will be installed in the Canteen/Auditorium to enable loud-speaker anouncement.

5-7-7 TV Master Antenna

Necessary arrangements for setting up TV master antennas be made to make television viewing possible at the Canteen/Auditorium, Conference rooms and recreation rooms. Additionally, TV antennas will also be necessary for the TV and radio repair rooms.

5-7-8 CCTV (Closed Circuit TV) Monitor

CCTV monitors will be placed at the workshops in the Work prepairation/Training Bldg to make monitoring possible from the CCTV observation room.

5-7-9 Automatic Heat Detectors

Heat detectors should be installed in individual bedrooms, inner corridors and halls to guard against fires. Transmitters and alarms will be located in two places inside each building, and a receiver installed in the office. Heat detector signals from each Dormitory will also be directed to the office receiver and to the sub-receiver in the janitor's room.

5-8 Major Construction Materials Plan

5-8-1 Exterior Finishing Materials

(1 Baht = 10.5 Yen)

	Materials	Material Performance					Work efficiency	Appearance	Procurement	Economical efficiency B/m²	Selection
		Weather endurance	Water resistance	Water-proof	Thermal resistance	Fire-proof					
Roof	1. Color slate	○	○	○	×	○	○	△	○	120	○
	2. Slate	○	○	○	×	○	○	△	○	110	
	3. Clay roof tile	○	○	○	△	○	△	○	△	300	
	4. Asphalt single	△	○	○	×	×	×	△	×	300	
	5. Corrugated zinc plate	×	△	○	×	△	△	△	△	60	
Exterior	1. Exposed RC & CB	×	×	×	○	○	○	×	○	-	
	2. RC & CB with paint	△	△	△	○	○	○	△	○	45	
	3. RC & CB with Mastic	○	○	○	○	○	○	△	△	250	○
	4. RC & CB with ceramic tile	○	○	○	○	○	△	○	○	800	
	5. Slate	○	○	○	×	○	△	×	○	800	

Denotes ○: Better, △: Average, ×: Worse

1) Roof materials should be light and, at the same time, should be economical but good in appearance. Therefore, color slate, which is the common material in Thailand, will be adopted.

2) Regarding exterior wall, much importance should be given to the appearance and work efficiency. In this connection, Mastic which is not too expensive will be selected. Mastic is usually applied directly to the concrete or the concrete block surface.

5-8-2 Interior Finishing Materials

(1 Baht = 10.5 Yen)

	Material	Material Performance										
		Water resistance	Sound-proof	Sound absorption	Wearproof	Anti-impact strength	Fire resistance	Work efficiency	Appearance	Procurement	Economical efficiency B/m²	Selection
Floor	1. Mortar	△		×	×	△	○	○	×	○	100	○
	2. Terrazzo	○		×	○	○	○	○	△	○	450	○
	3. Vinyle tile	○		×	△	○	△	△	○	○	150	○
	4. Ceramic tile	○		×	○	△	○	×	○	○	400	
	5. Wooden tile	×		△	×	×	○	×	△	○	400	
Wall	1. Exposed RC & CB	×	○	×	△	△	○	○	×	○	-	
	2. RC & CB with paint	△	○	×	×	△	○	○	△	○	40	○
	3. Gyp. board with paint	×	△	×	×	×	△	△	△	○	40	○
	4. Gyp. board with cloth	×	△	△	×	×	△	×	○	△	150	
	5. Slate	○	△	×	○	×	○	○	×	○	80	
Ceiling	1. No ceiling							○	×		-	○
	2. Gyp. board with paint	△	△	△	×	×	○	○	△	○	40	
	3. Decorated gyp. board	×	△	○	×	×	○	○	○	○	120	○
	4. Rock wool acoustic tile	×	△	○	×	×	○	○	○	○	150	
	5. Slate	○	△	×	○	×	○	○	×	○	80	

Denotes ○: Better, △: Average, ×: Worse

1) As for the interior finishing materials, Terrazzo tile will be the major material to be used except for the floor of the training buildings which will be mortar.

2) Paint will be directly applied to the concrete or the concrete block surface except for the walls of the administration building which will be gypsum board with paint finish.

3) There will be no ceilings constructed in the training buildings. Rest of the buildings will be furnished by decorated gypsum boards.

5-8-3 Windows and Doors

Aluminum sash louvered windows will be primarily used.

Doors facing outside will be Aluminum doors and those used inside will be wooden doors.

5-9 Training Equipment

5-9-1 Planning Policy

1) The materials and equipment included in this planning consist of the training equipment necessary for medical and vocational rehabilitations of the disabled workers.

2) The training equipment will be similar in quality to that used in various vocational training schools and labour markets in Thailand.

3) In choosing this equipment, consultations should be hold with technical cooperation programs with priority given to those having close connections with the building construction.

4) Training equipment should not be too difficult to operate and should be easy to maintain and inspect.

5-9-2 Outline of Training Equipment

(1) Equipment Common to the Administration and Other Departments:

- Micro bus
- Video recorder
- Projector for slide
- Tape recorder (cassetted type)
- Video camera
- Monitor TV
- Screen
- Others

(2) Functional Training Section

The following kinds of equipment will be installed in the Functional Training Section:

Health Care

- Stethoscope
- Breathing capacity meter
- Blood pressure meter
- Sterilizer
- Others
- Pinch meter
- Perception examination set
- Pulse meter
- Examination bed

Physical Therapy

- Parallel bard
- Shoulder wheel
- Ergometer (Exercise bicycle)
- Exercise stairs
- Paraffin bath
- Electrical hotpack
- Wheel chair
- Wrist machine
- Overhead frame set
- Rowing machine
- Treadmill
- Micro-wave therapy apparatus
- Whirl pool bath
- Others

Occupational Therapy

- Weaving machine
- Metal work tool set
- Others
- Leather work tool set
- Wood work tool set

Orthotic & Prosthetic

- Modeling work table
- Band saw
- Carving machine
- Sewing machine for leather
- Drilling machine
- Sanding machine
- Sewing machine for cloth
- Tool set & others

(3) Vocational Evaluation and Guidance Section

Following kinds of equipment will be provided to the Vocational Evaluation and Guidance Section:

- Topping tester
- Others
- Rope work test board

(4) Work Preparation Section

The following is the list of equipment provided to the Work Preparation Section:

Machine Work

- Lathe
- Bench drilling machine
- Milling machine
- Contour machine

- Tool & cutter grinder
- Hack sawing machine
- Portable electric drill
- Cast iron surface plate
- Carbide bite grinder
- Electric bench grinder
- Work table
- Tool & others

Assembly Work

- Portable electric drill
- Electric driver
- Work table
- Roller conveyer
- Tool & others

Metal Work

- Alternating current arc welder (300 A, 200 A, 150 A)
- Screen (for protection)
- Bench drilling machine
- Portable electric drill
- Disc grinder
- Work table
- Electric floor grinder (Duplex)
- Screw press
- Portable electric sander
- Electric nibbler
- Tool & others

Wood Work

- Automatic wood planer
- Electric router
- Portable electric drill
- Compressor
- Work table
- Electric hand planer
- Wood press
- Spray gun
- Exhausting apparatus
- Tool & others

Clerical Work

- Electric typewriter
- Copy machine
- Check writer
- Stapler
- Cutter
- Others
- Manual typewriter
- Electric calculater
- Numbering machine
- Puncher
- Work table

(5) Vocational Training Section

The following equipment will be provided to the Vocational Training Section:

Home Electric Appliances Repair Work

- Transister circuit training device
- AM circuit training device
- Amplification circuit training device
- Pulse circuit training device
- Color TV receiver training device
- Universal bridge
- Transister curve tracer
- Pattern generator
- Sweep generator
- Automatic voltage regulator (slide type)
- DC stabilizer
- Oscilloscope
- Bench drilling machine
- Bench grinding machine
- Working bench
- Measuring instruments
- Tools
- Others

Dressmaking

- Industrial sewing machine
- Over-lock sewing machine
- Button hole machine
- Button sewer machine
- Professional sewing machine
- Steam iron
- Electric iron
- Cutting table
- Ironing table
- Work table
- Mirror
- Tool
- Tailor's dummy
- Ironing table with vacuum
- Others

5-10 Basic Design

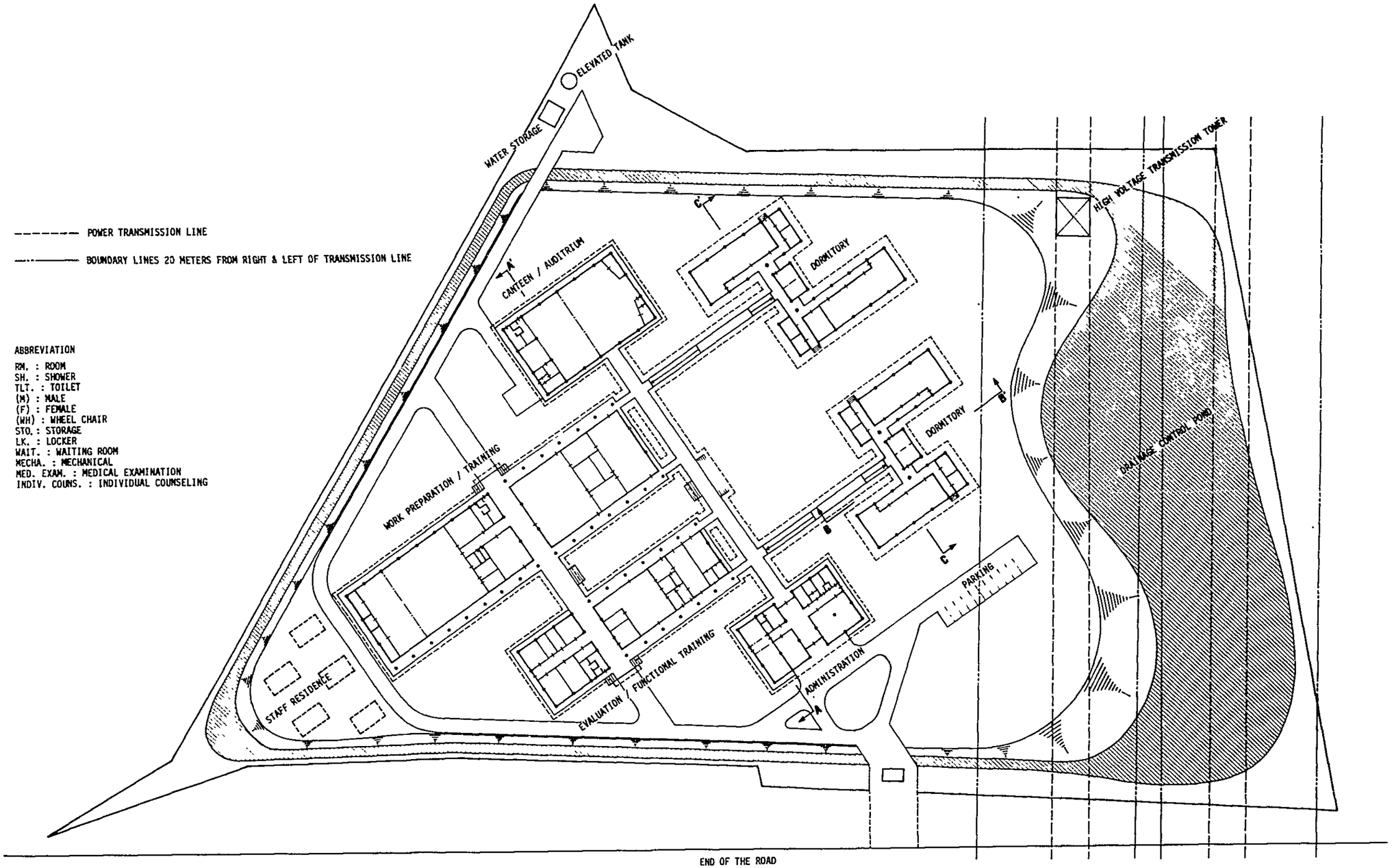
5-10-1 Floor Area of Each Building

Area / Building	Area covered in the floor area	Area not covered in the floor area
Administration	540 m^2	144 m^2
Evaluation & Functional Training	1,080	243
Work Preparation & Vocational Training	2,160	351
Canteen/Auditorium	756	180
Dormitories (total of four bldgs.)	1,431	0
Common Passage	665	0
Total	6,632 m^2	918 m^2

Note: Balcony area is not covered in the floor area.

5-10-2 Drawings of Basic Design

- Continued on following pages -



SITE PLAN

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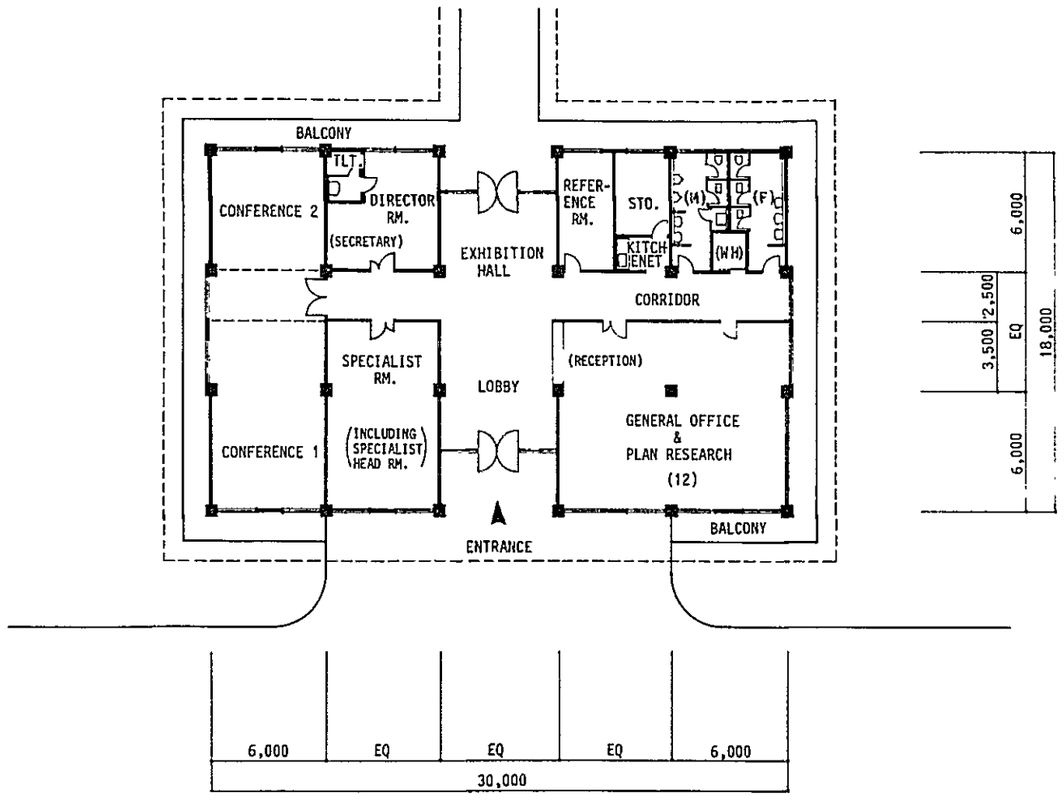

ADMINISTRATION PLAN

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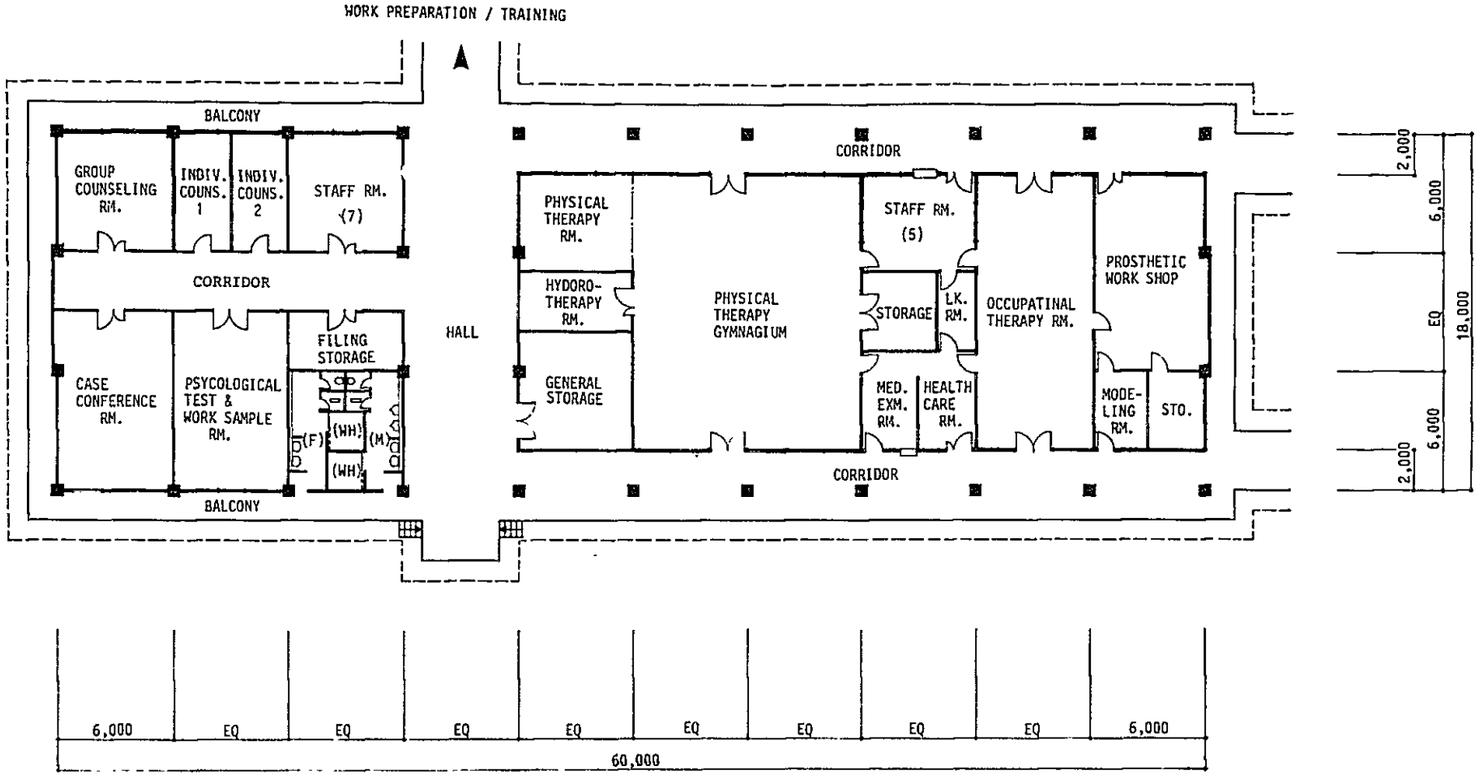

EVALUATION/FUNCTIONAL TRAINING PLAN

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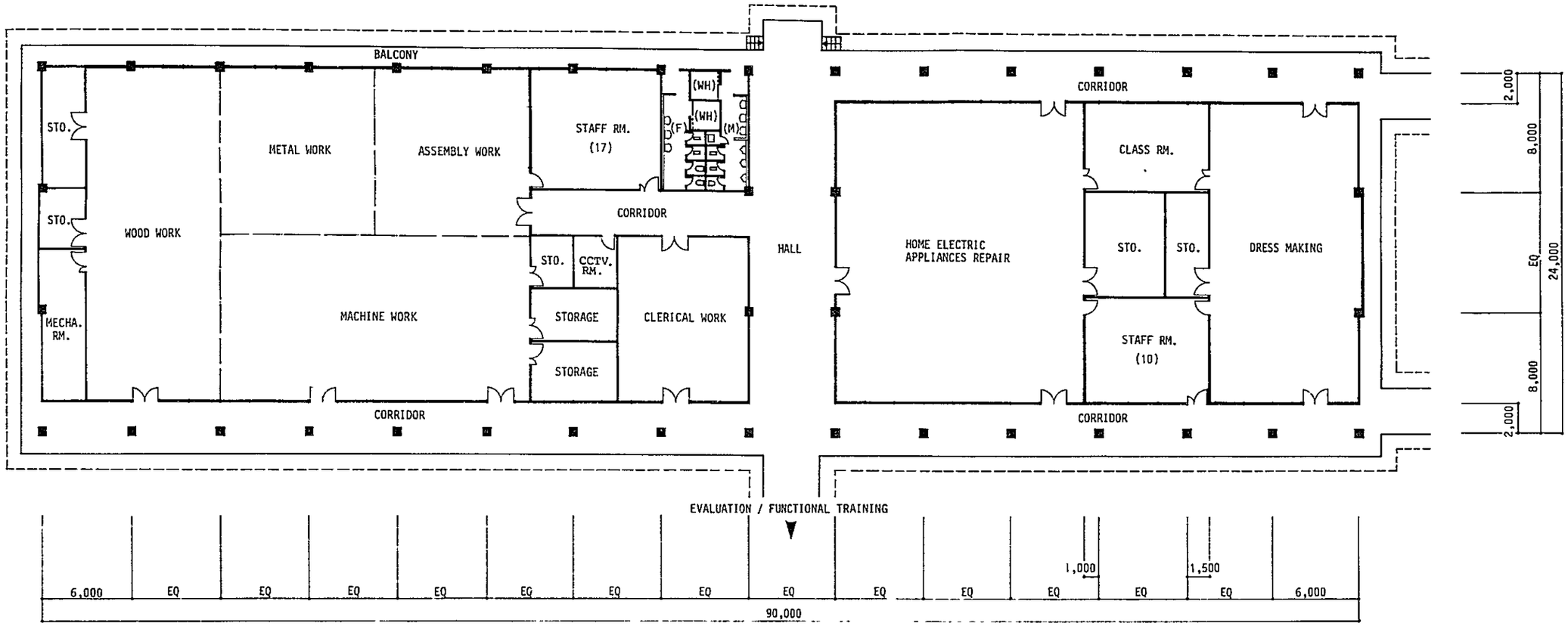

WORK PREPARATION / TRAINING PLAN

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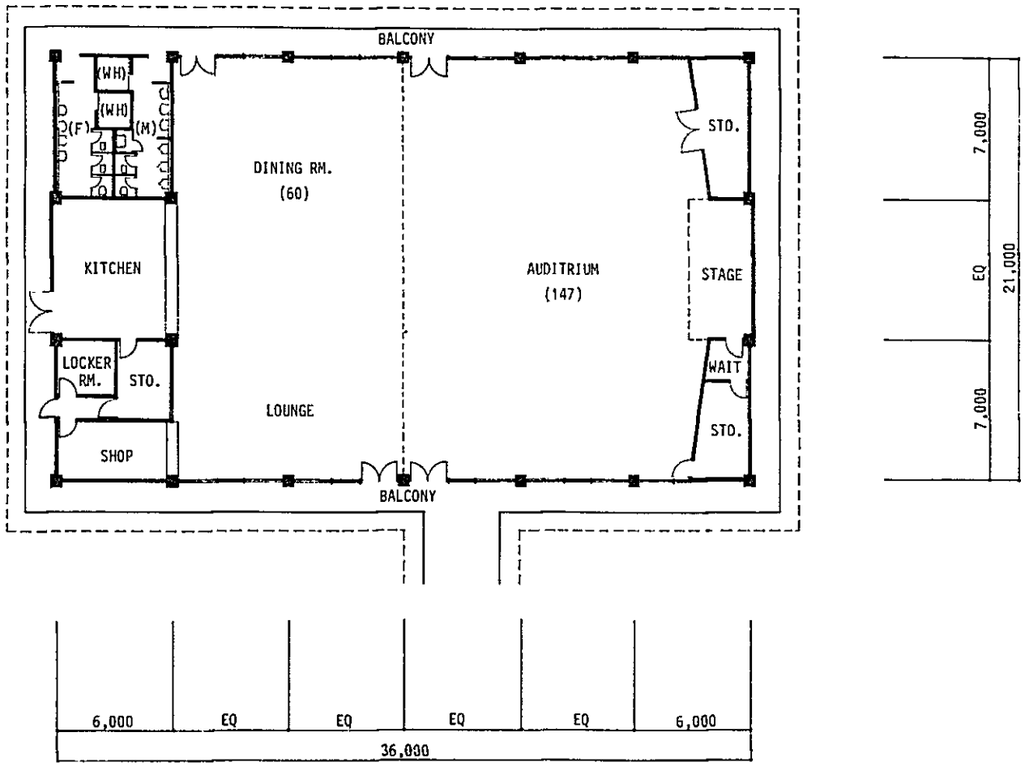

CANTEEN / AUDITRIUM PLAN

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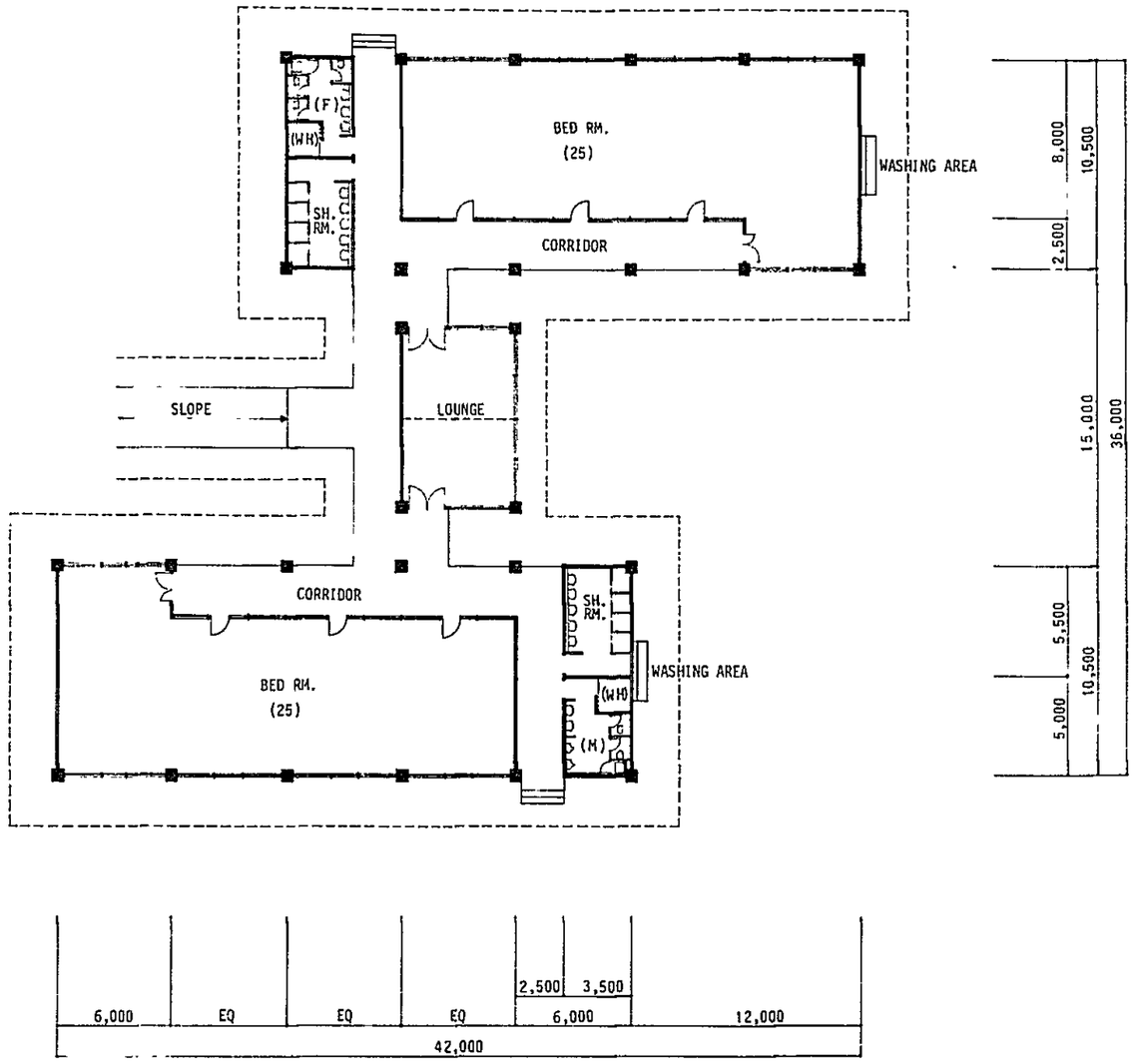

DORMITORY PLAN

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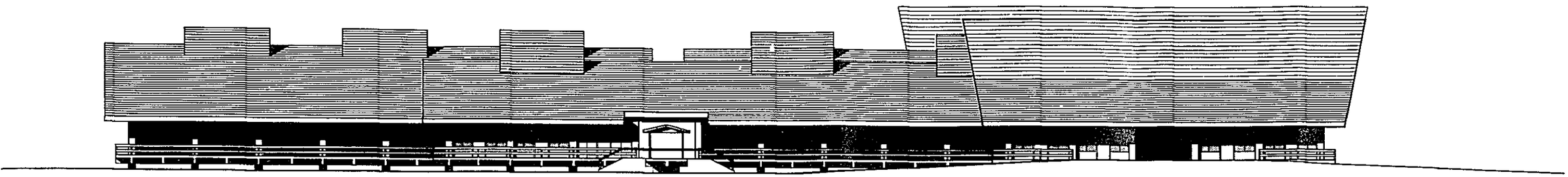
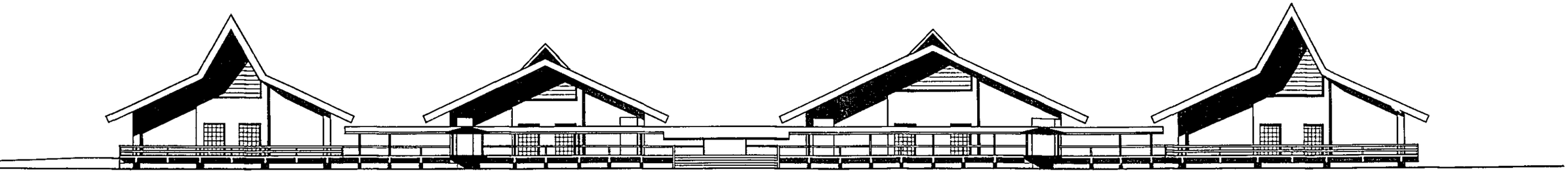


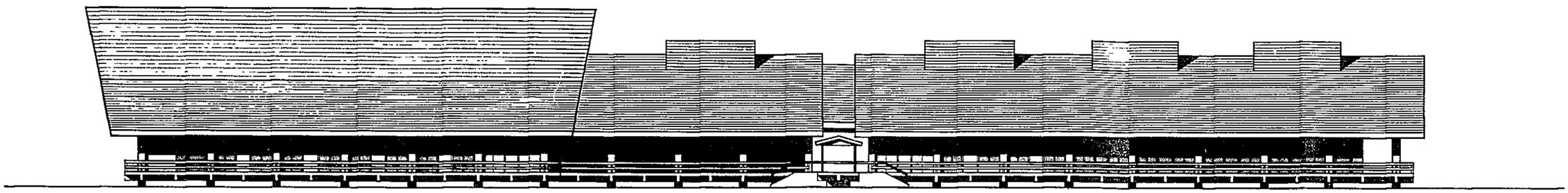
SOUTH ELEVATION



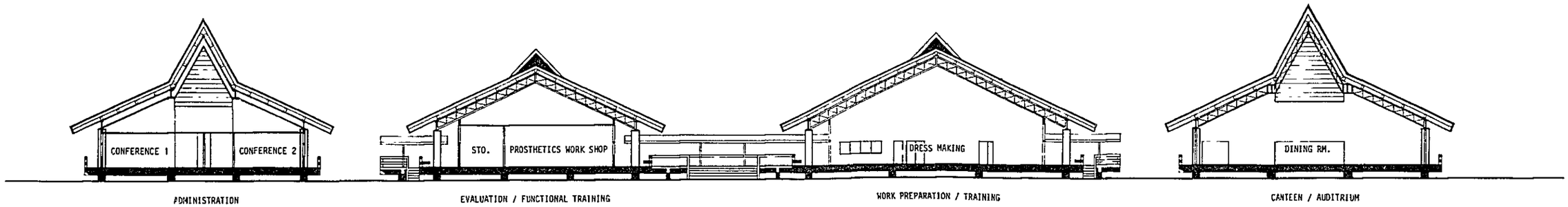
EAST ELEVATION

ADMINISTRATION, EVALUATION/FUNCTIONAL TRAINING,
WORK PREPARATION/TRAINING, CANTEEN/AUDITRIUM ELEVATIONS

S,1:300 0 1 5 10 20m



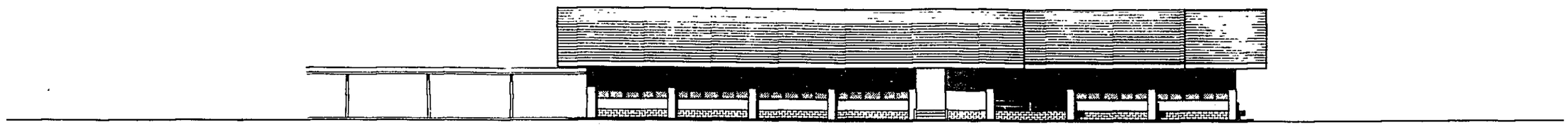
NORTH ELEVATION



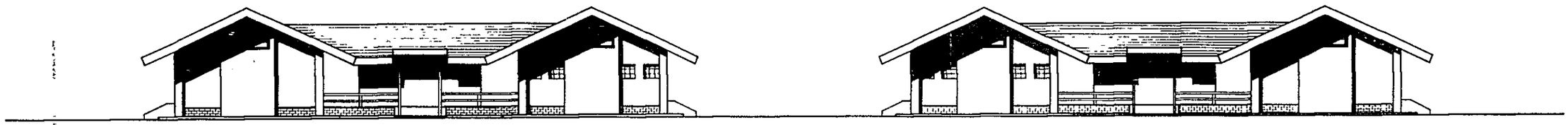
A-A' SECTION

ADMINISTRATION, EVALUATION/FUNCTIONAL TRAINING, WORK PREPARATION/TRAINING, CANTEEN/AUDITRIUM ELEVATION & SECTION

S,1:300 0 1 5 10 20m



SOUTH ELEVATION



WEST ELEVATION

DORMITORY ELEVATIONS

S,1:300 0 1 5 10 20m

B-B' SECTION

C-C' SECTION

DORMITORY SECTIONS

S ,1:300 0 1 5 10 20m

5-11 Rough Cost Estimate

The rough cost estimation of the IRC included in the scope of Thai portion is as shown in following.

Site renovation	11,400,000 Baht
Electricity supply related	570,000
Telephone supply related	1,235,000
Digging of a well and installation of suction pump	475,000
Land scaping, fence and gate	1,425,000
General furniture	665,000
Total	15,770,000 Baht

Calculation conditions for cost estimation

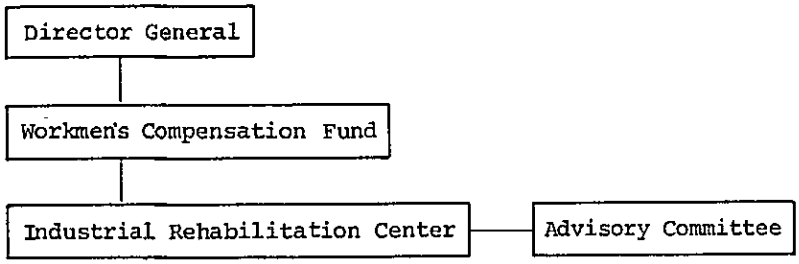
Construction term	12 months
International exchange rate	1 US dollar = 22.8 Baht
Date of cost estimation	July, 1983

CHAPTER 6 PROJECT EXECUTION SYSTEM

CHAPTER 6 PROJECT EXECUTION SYSTEM

6-1 Executing Authorities

Executing authority of the Project in Thailand is the Ministry of Interior, the Department of Labour. Basic items will be decided by the Department of Labour, then by the rights of the Director General of the Department of Labour, those will be enforced. The Project Team is organized as shown below with the Director General at top and will control the overall operation of the Project. Industrial Rehabilitation Management Advisory Committee will make advice in regard with the establishment and management of the Project.



Note: Advisory Commitee consists of following members.

1) Representative from W.C.F.
2) Representative from W.I.S.D
3) Representative from Employer
4) Representative from Worker
5) Representative from Ministry of Public Health
6) Representative from Department of Public Welfare
7) Representative from Council of Social Welfare of Thailand
8) Representative from Hospital
9) Representative from Private Hospital Association

The Department of Labour, Ministry of Interior, will be responsible for this task and will cover expenses for management and maintenance of the IRC under the Workmen's Compensation Fund.

6-2 Construction Scheme

In regard to the execution of the construction work of the IRC, no apparent problems can be observed in the construction technologies, materials and labour which might disturb the execution of the work.

Also, the construction work will not create noise pollution, since there are only a few private houses scattered in the fields around the planned construction site as mentioned in the former Chapters.

However, one thing necessary to be taken into consideration is the safety of piling and excavation work and other such work using heavy construction machines. Since the ponds and the creek within the site will be reclaimed and the total land will be filled-up up to 2.3 m above the original ground level (the costs for these work are borne by the Thai Government), the ground condition in the rainy season (May through October) will get loose and will be extremely dangerous to carry out those work. Therefore, it is considered better to avoid construction work with heavy machines during the rainy season as much as possible.

In Thailand, half of the year is the rainy season and the work efficiency during this season will naturally decline. In this connection, construction period allocated for this Project is 12 months.

6-3 Scope of Construction

The following is a list and figure of the responsibilities of the Japanese and the Thai governments concerning the construction work involved in establishing the IRC.

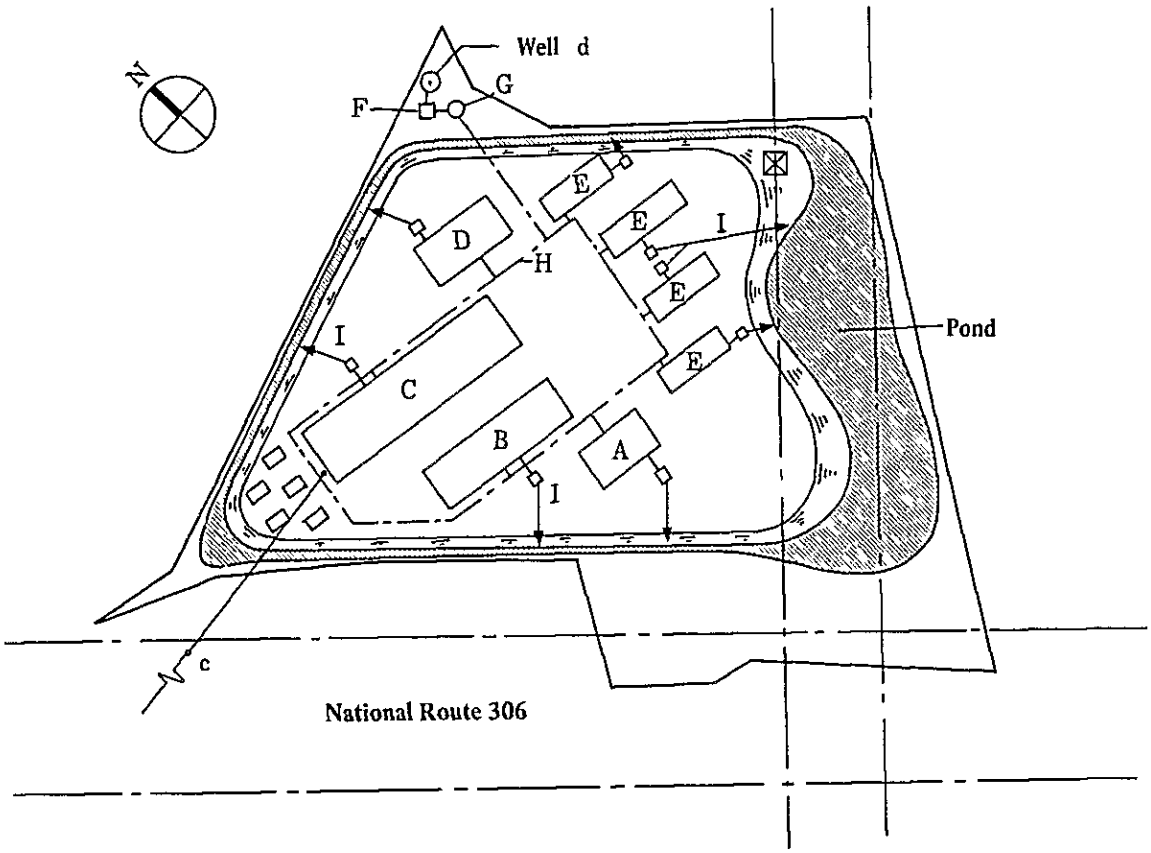


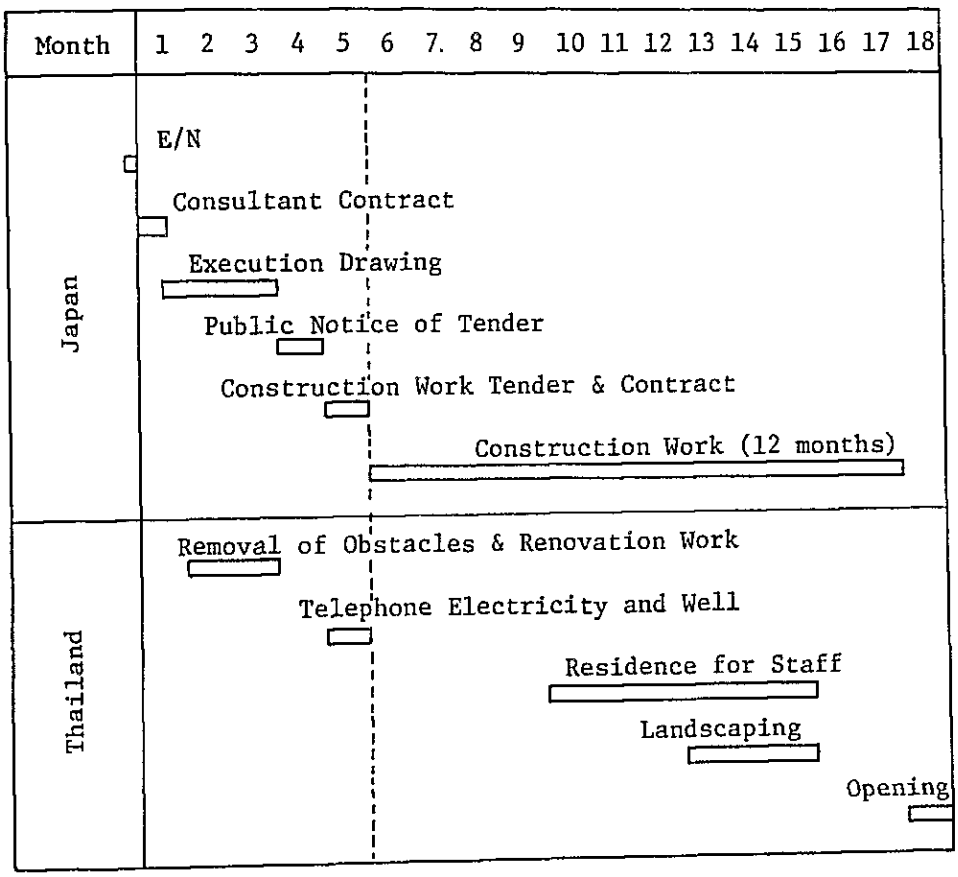
Fig. 6-a Scope of Work

Japanese Government Responsibilities	Thai Government Responsibilities
1. Construction Work	1. Construction Work
A. Administration Bldg.	a. Removal of obstacles within the site (including transfer of poles)
B. Vocational Evaluation & Functional Training Bldg.	b. Site renovation and leveling
C. Work Preparation & Training Bldg.	c. Electricity and telephone supply connections
D. Canteen/Auditorium	d. Digging of a well and installation of a suction pump and its connections
E. Client Dormitories (4 Bldgs.)	e. Furniture & Equipment
F. Elevated Water Tank	f. Landscaping, fence and gate construction
G. Septic Tanks	g. Recreational facilities
H. Laying of On-site Water Pipes	h. Residences for Staff Members
I. Laying of On-site Drainage Pipes	i. Janitor & Guard Houses
J. Road and a Parking Lot within the site	
K. Training Equipment	
2. Design	2. Creation of Necessary Measures & Procedures
A. Design and Drawing	a. Procedures for exemptions from taxes and surcharges; Permission to enter and reside in the country; and Internal transportation procedures.
B. Supervision of construction work	b. Organization of an execution committee for the Project
	c. Management and maintenance of the Facility

6-4 Overall Work Schedule

The construction schedule shown below is prepared in accordance with the usual steps taken with Grant Aid Cooperation agreements undertaken by the Japanese Government. Needless to say, Thai construction schedules should be made in accordance with the Japanese schedule for the smooth execution of the construction work.

Table of Overall Work Schedule



The consultant will give technical advice to Thailand in order to execute the construction work under its responsibilities.

6-5 Management and Maintenance Plan

After the completion of the IRC, the Department of Labour, Ministry of Interior of Thailand will manage and maintain the facilities. For the time being, the following responsibilities are deemed necessary in this regard:

6-5-1 Personnel

The number of managing staff members deemed necessary to run the IRC is as specified in Fig. 3-6 in Chapter 3, Basic Scheme of the Project.

6-5-2 Maintenance

In order to maintain the facilities in good condition, proper handling and maintenance are required. If the buildings are left unattended, deterioration will be rapid, causing various problems. Since building materials and fixed appliances will be subject to damage year by year, periodic maintenance and continuous attention will be of the utmost importance.

(1) Buildings

Building maintenance is normally performed on a daily basis and involves cleaning and repairing of worn and damaged structures. The buildings scheduled to be constructed under this Project will probably not require structural repair work. Thus maintenance will mainly involve the minor repair or remodeling of the interior. Daily building maintenance requires careful handling and frequent cleaning. Having enough personnel to carry out simple repairs on a regular basis is also very important.

(2) Mechanical and Electrical Equipment

Maintenance control is very important for the effective utilization of the various equipment. Electrical, mechanical and sanitary engineers should be available to carry out daily check-ups and repair failure. Depending on the service life of each piece

of equipment, exchange or repair on a periodic basis will be required.

Average service lives of major construction materials are given in the following for reference.

• Distribution panels	15 years
• Fluorescent lamp (tube type)	5000 to 10000 hours
• Bulbs	1000 to 2000 hours
• Telephone exchange	15 years
• Announcement equipment	15 years
• Pumps	15 years
• Air-conditioning equipment	13 years

(3) Training Equipment

In order to maintain the efficient use of training equipment, it is important that Workshop Instructors and Vocational Training Instructors have a thorough knowledge of how to properly operate and handle this equipment. At the same time, it will be vital to have a maintenance engineer under exclusive contract with the Center. Maintenance personnel should be instructed to carry out daily, preventive maintenance check up rather than wait for prolem to occur before taking action. This kind of attentive care will enable the IRC to operate in good condition all the time.

6-5-3 Estimate of Running Cost

Overall operation and maintenance expenditure of the IRC a year after its completion is estimated as follows:

Personnel expenses			2,117,610 baht/year
Others	Running cost	2,529,000	3,899,800
	Repair cost	1,094,800	
	Maintenance cost	276,000	
Total			6,017,410 baht/year

Besides, total expenditure estimation made by the Department of Labour for the first year of the IRC is 2,117,610 baht for personnel expenses, and 4,868,600 baht for other expenses, the total of which are 6,986,210 baht. The total amount is already submitted to the government for the budget of first year running cost (See Appendix II-2).

(1) Personnel Expenses

The personnel expenses covers the salary of 81 staff members As shown in Fig. 3-b, Organization Chart in Chapter 3. Refer to Appendix II-2-3 for Personnel Expenses.

(2) Running Costs

Electricity	1,917,000 baht/year
Gas (for daily life, LP)	312,000 baht/year
Chemicals (for well water)	222,000 baht/year
Equipment Maintenance	78,000 baht/year
Total	2,529,000 baht/year

(3) Repair Costs

The repair costs will be greatly different from year to year. For example, the buildings will require only 2 baht/m^2 and mechanical and electrical equipment 10 baht/m^2 a year up to five years from its completion. However, after then, expenditure will increase rapidly year by year. Here, the estimates are given at an annual average forcasting the 30-years span:

Building	50 baht/m^2
Mechanical and electrical equip.	100 baht/m^2

Therefore, (50 + 100) x 6,632 m^2 = 994,800.

Further, the repair costs for the training equipment provided, of course greatly depend on the ways being used, will be roughly assumed 2% of the total cost of the training equipment to be required repairiing.

5,000,000 baht x 0.02 = 100,000 baht/year

Therefore, the total of the repair cost will be:

1,094,800 baht/year

(4) Maintenance Costs

The maintenance costs will be calculated by maintenance personnel cost.

Engineer

6,000 baht/person.month x 3 persons x 12 months = 2.6,000 baht/year

Cleaning & others

2,500 baht/person.month x 2 persons x 12 months = 60,000 baht/year

---

Total 276,000 baht/year

(5) Calculation Conditions of Running Cost Estimation

. Total floor area	6,632 m^2
. International exchange rate	1 US dollar = 240 Yen = 22.8 Baht
. Date of cost estimation	July, 1983

* Calculation grounds of item (2) Running Costs should be referred to Appendix II-2-4.

6-6 Procurement

Selections of the construction materials are made in consideration that major construction materials would be procured in Thailand as much as possible so as to make the maintenance work convenient after the completion of the Center.

Table of Procurement

	Procurement in Japan	Procurement in Thailand
Building	. Toilet handrails for use by physically handicapped persons	. Piles . Steel framed and reinforcing bars . Cement, concrete . Aluminum and steel sashed . Glass . Paint . Roofing material . Ceramic tile
Air-conditioning Sanitary Ware	. Water treatment equipment . Vinyl lined steep pipe	. Elevated water tank . Septic tank . Cast iron pipes . Galvanized pipes . Sanitary equipment . Fire extinguishers . Package-type air-conditioning units . Vinyl drainage pipes
Electrical	. Announcement equipment . CCTV equipment . Telephone exchange . Automatic Fire Detectors . Wiring equipment	. Power cables 1 Lighting apparatus . Distribution panels . TV master antenna . Conduit pipe

The reasons why some construction materials have to be procured from Japan are explained in the following.

1) Vinyl Lined Steel Pipes: There is no manufacturing companies of these items in Thailand.

2) Telephone Exchange, Announcement, CCTV and Automatic Fire Detection Equipment: There is no manufacturing companies of these items in Thailand.

3) Wiring Equipment: Most of them in Thai markers are imported products from other country and most of them are Japanese made. Therefore, wiring equipment shall be procured in Japan.

4) Other materials to be procured in Japan are more expensive in Thailand than in Japan.

CHAPTER 7 PROJECT EVALUATION

CHAPTER 7 PROJECT EVALUATION

This Project aims at an improvement of workers' welfare, therefore, the advantages brought about through the execution of this Project can not be evaluated only by the economic analysis. Thus, the evaluation of the appropriateness of the Project here will be made by making clear the necessity and the effectiveness of the Project.

In return of the industrialization promoted especially in the manufacturing industry, the number of industrial accidents are also increasing accordingly. In view of this situation, countermeasures designed to return disabled workers to their previous work places as early as possible has become extremely important from the standpoints of workers' welfare and the maintenance of sufficiently large labour force within the country.

However, vocational rehabilitation center of this sort does not exist in Thailand at the moment, therefore, it is a big issue now for the Government of Thailand at the moment, therefore, it is a big issue now for the Government of Thailand to take up and solve the situation as quickly as possible.

Thailand has been working hard to strengthen the measures of preventing industrial accidents, but it is quite impossible to eliminate the causes of accidents completely. Consequently, the Government of Thailand established Workmen's Compensation Fund in order to restore disabled workers. However, the Fund covers for maximum ten years of compensation for injuries, but would not provide any assistance after that. This condition is creating many disabled workers not being able to return to the social activities.

The problem the Government of Thailand is facing now can not be solved only by the system of Workmen's Compensation Fund any more. The Project of IRC, therefore, aims at providing services to those disabled workers enabling them to make use of their potential abilities and guide them to vocational independence in the society. In this regard,

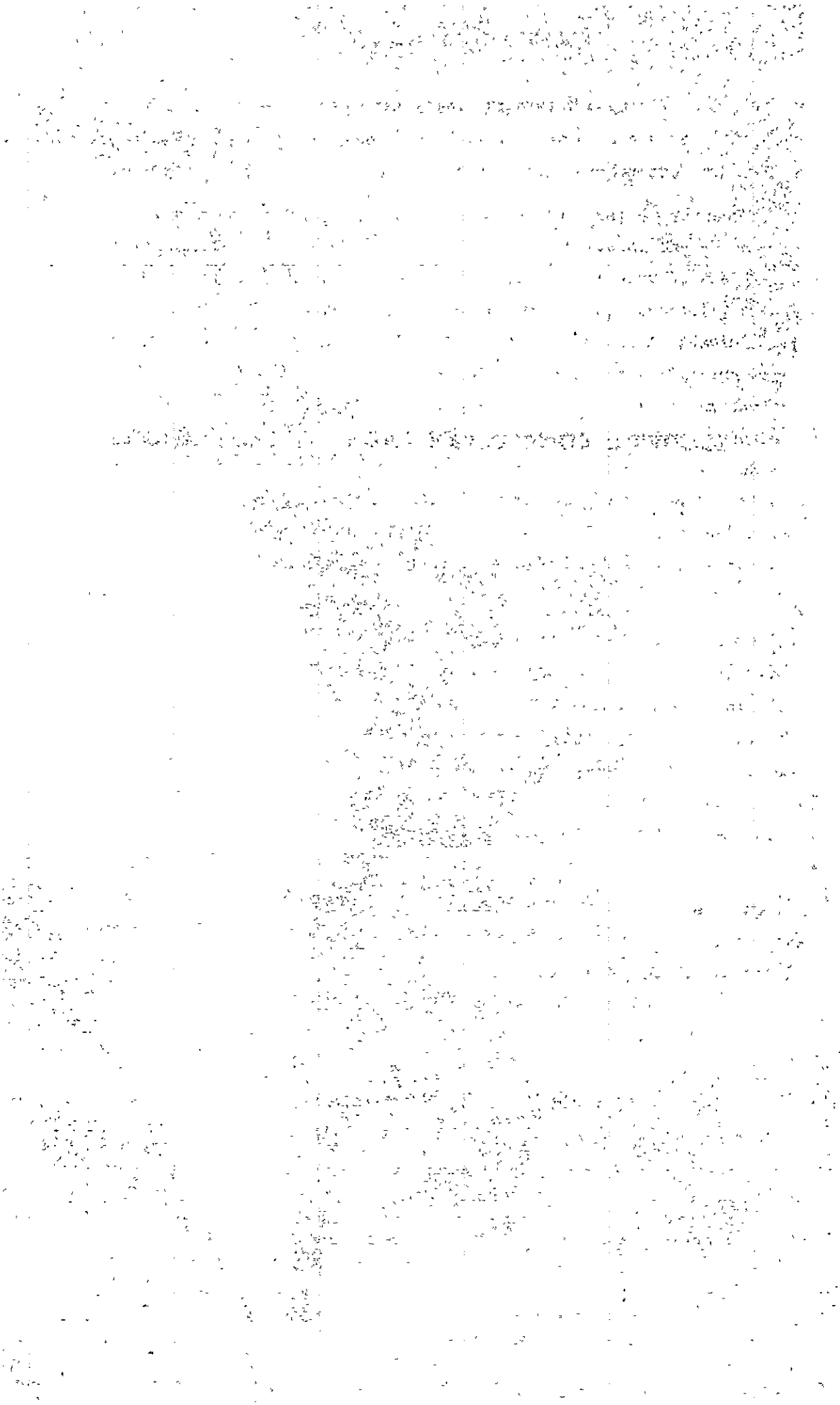
the Project is deemed very important which will certainly bring light to the problems the Government of Thailand has encountered. Also, the necessity of early commencement of the Project can be confirmed.

The Basic Design Study Team made clear the Thai Government's requests through the field survey conducted in Thailand, then based on the Basic Scheme of the Project as described in Chapter 3, the Team has drawn up the Basic Design. Consideration was given especially to reduce the maintenance costs of the facilities as economical as possible in the drawing. For example: Natural ventilation and natural lighting were effectively utilized to minimize dependence on electric power facilities, thus reducing overall maintenance/control costs. Construction technology and materials and the labour conditions of Thailand were considered to produce a design which is both simple in construction and economical. Construction materials, etc. will be procured within Thailand as much as possible to be able to maintain and control after completion of the Project.

In consideration of the above findings, the facilities provided will have sufficient functions to achieve the sought after objectives and will certainly become the nucleus facility playing the leading role to promote vocational independence of the disabled workers. Also, the realization of this Project will stimulate the construction plannings of similar industrial rehabilitation related facilities and will create the opportunity to promote the reform of existing labour and social security structure of Thailand.

Furthermore, the burden to be placed on Thailand for the completion, the management and maintenance of this Center are not so overestimated comparing to the contributions to Thailand, therefore, this Project is considered appropriate in view of the results expected.

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS



CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The Study Team has devised an appropriate draft of the Basic Design for the Industrial Rehabilitation Center (IRC) based on conditions in Thailand and Thai Government request, and the results of investigations and analyses of various problems that will be encountered in the Project as indicated in Chapter 2 to 7. The facilities outlined in the Basic Design Study are indispensable for the improvement of vocational rehabilitation efforts in Thailand, and the realization of the IRC will certainly bring about good results.

In this connection, we would like to make the recommendations listed below. If the promotion of the Project and management of the facilities are carried out in accordance with these recommendations, the Project will be heighten its effect more, and furthermore it will possess sufficient appropriateness and effectiveness to be implemented as a Grant Aid Program of the Japanese Government. Therefore, both Governments should start taking necessary measures for the realization of the Project as soon as possible.

Recommendations

The construction plan for the IRC will only achieve the objectives set forth in the provisions of the Grant Aid when smooth operation and maintenance of the IRC are realized by Thailand following its completion. In this connection, the following recommendations are made to government-related agencies in both Japan and Thailand for the early commencement of work and the effective management of the IRC to achieve the sought after objectives.

(1) Recommendations Regarding Effective Management and Maintenance

1) Taking into consideration actual rehabilitation work aimed at disabled persons in Thailand, there is a concern that more emphasis will be put on medical rehabilitation than vocational rehabilitation initially. Therefore, selection of the clients should be

made very carefully as indicated in Item 3-1-2. Qualifications for IRC clients in order to emphasis the effective operation of the IRC.

2) A system of cooperation between the IRC and other related Thai facilities should be established and encouraged to ensure the effective operation of the Project.

3) Amendments to Thai Laws dealing with the utilization of the Workmen's Compensation Fund should be pushed through to assure that the costs of running the IRC will be guaranteed.

4) The Thai Government should also make efforts to reduce to the minimum the economical burden borne by the clients. It should also offer small fixed charge to clients as well as grant subsidies to those starting their own businesses.

(2) Recommendations Concerning Required Technical Cooperation

Since the Project will aim at achieving good coordination between and among its functional training, work preparation and vocational training as well as its evaluation and guidance under a system of consistency rehabilitation, this Project reflects a new field of endeaver for Thailand. Cooperation concerning technical knowledge related to medical rehabilitation, vocational evaluation, guidance, training and operation of the Center will be required in order to organically operate after the completion of the IRC.

APPENDIX I

APPENDIX I

I-1 Survey for Basic Design Study (May 23 ~ June 11, 1983)

I-1-1 Members of Team

Name	Position	Staff Member of
Shoji SHIGA	Team Leader	Vocational Training Bureau, Ministry of Labour
Ryosuke MATUSI	Technical Cooperation Planner	National Association for Employment of the Handicaped
Yoshiyuki SHIKAMA	Project Coordinator	J.I.C.A. Grand Aid Division
Kasuzki ITO	Architect/Acting Leader	Kisaburo Ito Architects & Engineers Inc.
Kazuo TSUNETOMI	Architectural Designer	- Ditto -
Hideo MATSUDA	Mechanical/Plumbing Engineer	- Ditto -
Akio OHYA	Electrical Engineer	- Ditto -
Masafumi KURIHARA	Equipment Planner	- Ditto -

I-1-2 Diary

May 23 Mon.	Departure for Bangkok: Mr. Shiga, Team Leader, Mr. Matsui, Mr. Ito, Mr. Tsunetomi and Mr. Matsuda Leaving Narita (16:10) --- Arrival at Bangkok (20:20)
24 Tue.	Courtesy call at the Embassy of Japan Courtesy call on Mr. Vijit, Director General of D.O.L. and Mr. Kasem, Deputy Director General of D.T.E.C.
25 Wed.	Project site inspection (Bangpoon, Phathum-Thani) Visit to Phra Pradaeng Vocational Training Center for Disabled Workers Arrival at Bangkok: Mr. Shikama, Coordinator

26 Thu.	National Holiday Innerteam meeting
27 Fri.	Visit to N.I.S.D. and construction sites of Youth Center and Foreign Trade Training Institute Discussion with staff members of D.O.L.
28 Sat.	Innerteam meeting
29 Sun	Arrival at Bangkok: Mr. Kurihara and Mr. Ohya
30 Mon.	Discussion with staff members of D.O.L. (Mr. Shiga and Mr. Matsui) Visit to Sa Kaeo Vocational Training Center (Mr. Shikama, Mr. Ito, Mr. Tsunetomi, Mr. Matsuda, Mr. Kurihara and Mr. Ohya)
31 Tue.	Discussion with staff members of D.O.L. (Mr. Shiga and Mr. Matsui) Visit to War Veterans' Hospital and Nonthaburi Sheltered Factory Project site inspection
June 1 Wed.	Arrangement for details of the Minutes of Discussions at D.O.L. Visit to private factories (automobile, machinery and printing) Innerteam meeting
2 Thu.	Signing the Minutes of Discussions Innerteam meeting
3 Fri.	Progress reporting to the embassy of Japan and J.I.C.A. office Discussion with staff members of D.O.L. Innerteam meeting
4 Sat.	Return home: Mr. Shiga, Team Leader and Mr. Matsui, Departure at Bangkok (9:35) Visit to small factories in Bangkok

5 Sun	Innerteam meeting Departure from Bangkok: Mr. Shikama
6 Mon.	Visit to Maha Sarakam Nurse College (Mr. Ito and Mr. Ohya) Discussion with staff members of D.O.L.
7 Tue.	Visit to K.I.S.D. and Health Science Center Khon-Kaen University (Mr. Ito and Mr. Ohya) Visit to the construction site of Sukhothai Broadcasting University, Japanese Chamber of Commerce and Industry in Bangkok and JETRO Bangkok Office (Mr. Tsunetomi and Mr. Kurihara) Visit to P.G.A.T. and R.I.D. for data collection (Mr. Matsuda)
8 Wed.	Discussion with staff members of D.O.L. (Mr. Ito, Mr. Tsunetomi and Mr. Kurihara) Visit to P.E.A., T.O.T., and P.W.A. for data collection (Mr. Matsuda and Mr. Ohya)
9 Thu.	Discussion with staff members of D.O.L. Innerteam meeting (Data analysis and arrangement)
10 Fri.	Final discussion with staff members of D.O.L. Progress reporting to the Embassy of Japan and JICA office
11 Sat.	Return home Departure from Bangkok (9:35) --- Arrival at Narita (19:35)

I-1-3 Copy of the Minutes of Discussion

MINUTES OF DISCUSSION

ON

THE ESTABLISHMENT PROJECT FOR THE

INDUSTRIAL REHABILITATION CENTER

IN

THE KINGDOM OF THAILAND

In response to the request made by the Government of the Kingdom of Thailand for the Establishment Project for the Industrial Rehabilitation Center in Bangpoon, Prathum-Tani Province (hereinafter referred to as "the Project") , the Government of Japan, through Japan International Cooperation Agency (JICA) , has dispatched a Basic Design Study Team headed by Mr.Shoji SHIGA, Vocational Training Bureau, Ministry of Labour (hereinafter referred to as "the Team") to conduct the Basic Design Study on the Project from May 23rd to June 11th, 1983.

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

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

Bangkok, June 2nd, 1983

Shoji SHIGA
Team Leader

Vijit SANGTONG
Director General
DOL

ATTACHMENTS

1. The objective of the Project is to provide necessary buildings, facilities and equipment for establishment of the Industrial Rehabilitation Center in Bangpoon, Prathum-Tani Province.
2. The proposed site of the Project has been acquired by the Government of Thailand (hereinafter refered to as "the Project Site") as attached in Annex 1.
3. To operate the Center activities effectively, the Technical Cooparation Project is expected to be implemented in the field of the Vocational Rehabilitation services as well as the remedial medical Rehabilitation services (mainly functional training).
4. The Japanese Study Team will convey to the Government of Japan the desire of the Government of Thailand that the former takes necessary measures to co-operate in implementing the Project and provides the training facilities and other items as listed in Annex II within the scope of Japanese economic cooperation in grant form.
5. The Government of Thailand has understood Japan's Grant Aid system explained by the Team which includes a principle of use of a Japanese consultant firm and a Japanese general constructor for implementation of the project.
6. The Government of Thailand will take necessary measures as listed in Annex III on condition that the Grant Assistant by the Government of Japan is extended to the Project.

Annex I

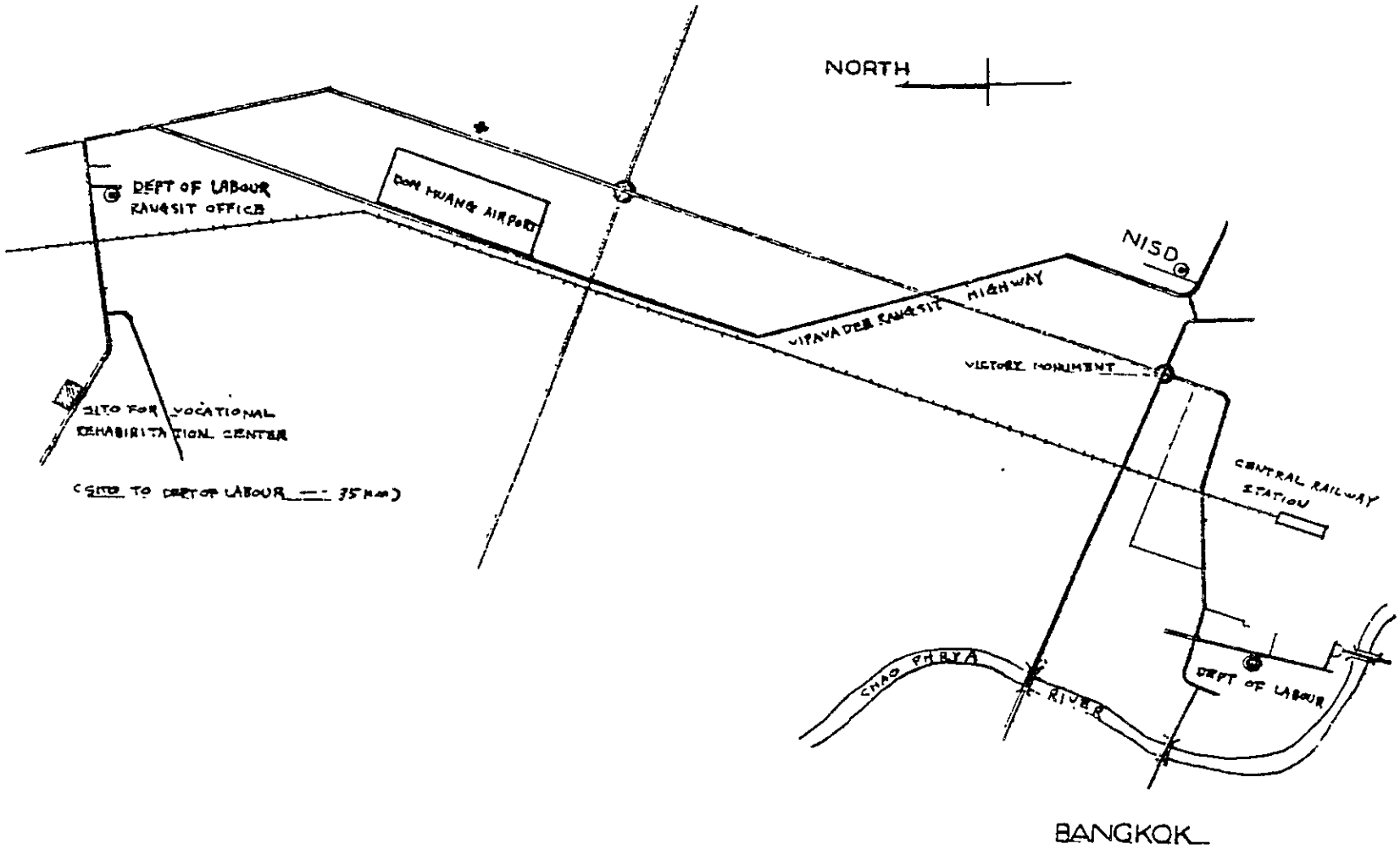
Dear Mr.Vijit Sangtong

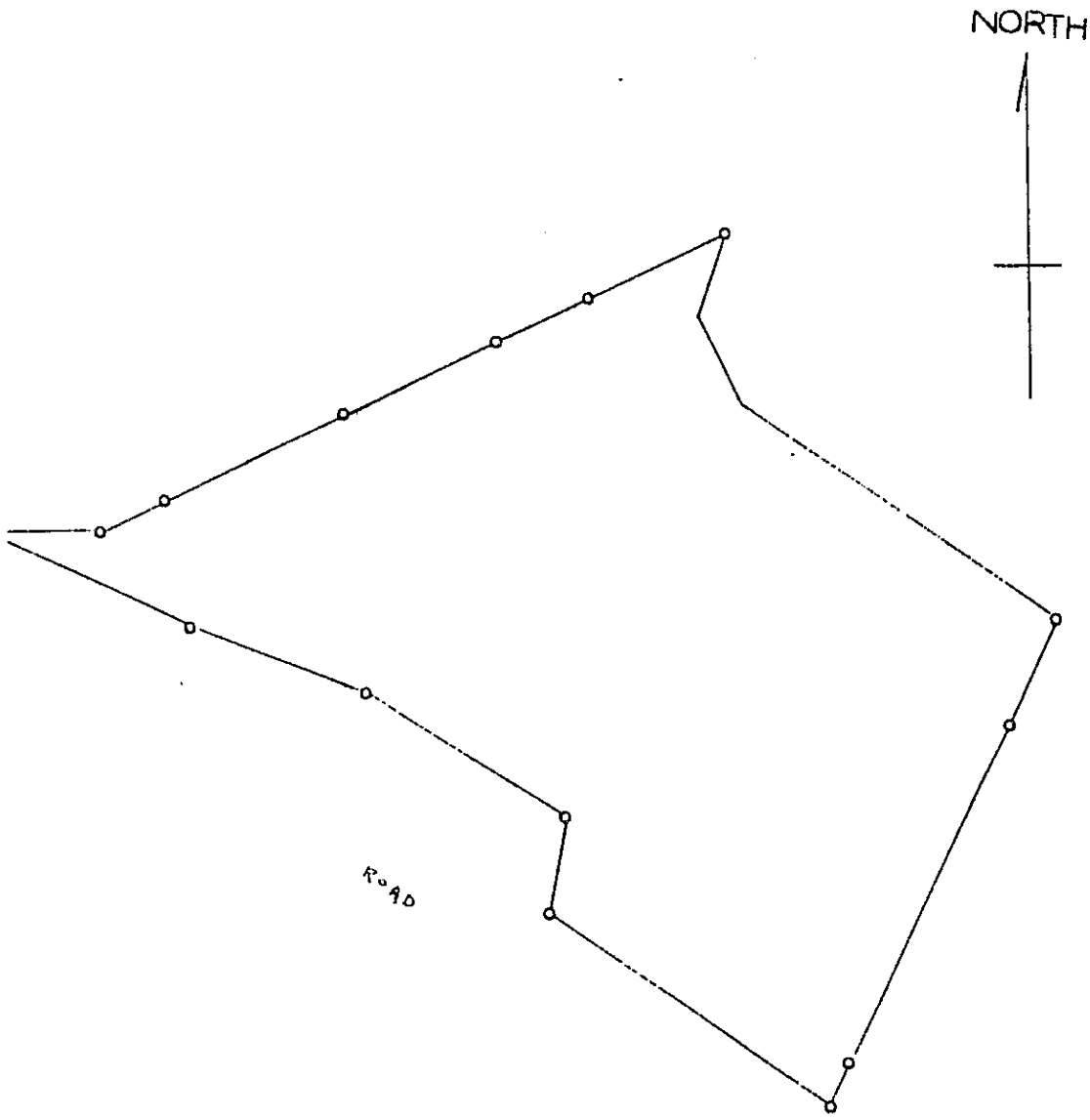
With reference to the DT's Note Verabale No.MF0405/2361 dated April, 1 1982 answering the reguest from the DOL to make use of the land at Bangpoon , Maung District Prathum-Thani Province which is presently owned by the Office of Accelerated Rural Development for the construction of the Industrial Rehabilitation Center for Disabled workers.

I would like to inform you that now the land is ready to be transfersed to the DOL by the approval of Ministry of Finance

With Best regards.

Viroj Laohapan
Director General
Department of Treasury


NORTH
DEPT OF LABOUR
RANGSIT OFFICE
DON MUANG AIRPORT
NISD
PHAHONYOTHIN RANGSIT HIGHWAY
VICTORY MONUMENT
SITE FOR VOCATIONAL
REHABILITATION CENTER
(SITE TO DEPT OF LABOUR ——: 35 KM)
CENTRAL RAILWAY
STATION
CHAO PHRYA
RIVER
DEPT OF LABOUR
BANGKOK


NORTH
Road

ที่ กค.๐๔๐๕/ 3727

8130

กรกฎาคม 2526

เรื่อง อนุญาตให้ใช้ที่ราชพัสดุ

เรียน อธิบดีกรมแรงงาน

อ้างถึง หนังสือกรมธนารักษ์ ด่วนมากที่ กค.๐๔๐๕/๒๒๓๐ ลงวันที่ ๑ เมษายน ๒๕๒๖

ตามหนังสือที่อ้างถึง แจ้งให้ทราบว่ากรมธนารักษ์ได้ตรวจสอบทะเบียนที่ราชพัสดุแปลงหมายเลขที่ ปท.๑๐๔ (๒๒๑๔) ตำบลบางพูน อำเภอเมือง จังหวัดปทุมธานี ที่กรมแรงงานขอใช้เป็นสถานที่ก่อสร้างศูนย์ฟื้นฟูสมรรถภาพลูกจ้างที่พิการเนื่องจากการทำงานแล้ว ปรากฏว่ามีเนื้อที่ ๒๓ ไร่ ๓ งาน ๔๕ ตารางวา และมีสิ่งปลูกสร้างของสำนักงานเร่งรัดพัฒนาชนบทปลูกอยู่บนที่ดินแปลงนี้ รวม ๒๒ หลัง มิใช่ที่ว่างแต่อย่างใด จึงได้สอบถามไปทางจังหวัดปทุมธานี ผลเป็นประการใดจะเรียนมาให้ทราบต่อไป นั้น

บัดนี้ จังหวัดปทุมธานีชี้แจงว่า ได้ตรวจสอบที่ราชพัสดุแปลงดังกล่าวแล้ว ปรากฏว่า ทะเบียนที่ราชพัสดุคลาดเคลื่อน บนที่ดินแปลงนี้ไม่มีสิ่งปลูกสร้างแต่อย่างใด กรมธนารักษ์พิจารณาแล้ว อนุญาตให้กรมแรงงานใช้ที่ราชพัสดุแปลงหมายเลขที่ ปท.๑๐๔ (๒๒๑๔) เนื้อที่ ๒๓ ไร่ ๓ งาน ๔๕ ตารางวา เพื่อก่อสร้างศูนย์ฟื้นฟูสมรรถภาพลูกจ้างที่พิการเนื่องจากการทำงานได้ โดยมีเงื่อนไขว่า จะนำไปใช้ประโยชน์อย่างอื่นมิได้ เมื่อเลิกใช้แล้ว หรือมิได้เข้าใช้ประโยชน์ดังกล่าวภายในเวลา ๓ ปี นับแต่วันที่ลงในหนังสือนี้ ต้องส่งคืนกรมธนารักษ์ทันที และเมื่อได้เข้าใช้ประโยชน์ในที่ราชพัสดุแล้วจะต้องปฏิบัติตามกฎกระทรวงดังต่อไปนี้

๑. เมื่อปลูกสร้างอาคารในที่ราชพัสดุจะต้องแจ้งให้จังหวัดปทุมธานีทราบ เพื่อจะได้ดำเนินการขึ้นทะเบียนที่ราชพัสดุต่อไป

๒. จะต้องดูแลและบำรุงรักษาที่ราชพัสดุที่อยู่ในความปกครองหรือใช้ประโยชน์เสมือนวิญญูชนจะพึงสงวนทรัพย์สินของตนเอง

๓. เมื่อเลิกใช้ประโยชน์ในที่ราชพัสดุหรือประสงค์จะใช้ประโยชน์ในทางราชการอย่างอื่น ให้ส่งคืนที่ราชพัสดุหรือทำความตกลงกับกรมธนารักษ์ใหม่แล้วแต่กรณี

๔. เมื่อจะรื้อถอนสิ่งปลูกสร้างในที่ราชพัสดุจะต้องขออนุญาตต่อจังหวัดปทุมธานีก่อน เว้นแต่ได้ปลูกสร้างมาแล้วไม่น้อยกว่า ๒๕ ปี หรือชำรุดจนใช้การไม่ได้ หรือเกี่ยวกับราชการลับทางทหาร หรือรื้อถอนเพื่อปลูกสร้างอาคารใหม่ทดแทนตามที่ได้รับงบประมาณ

/. จะต้องแจ้งให้ -

จะต้องแจ้งให้จังหวัดปทุมธานีทราบทันทีเมื่อได้ทำการรื้อถอนสิ่งปลูกสร้างในที่ราชพัสดุดังกล่าวแล้ว

จึงเรียนมาเพื่อโปรดทราบ ทั้งนี้ ได้แจ้งให้สำนักงานเร่งรัดพัฒนาชนบทและจังหวัดปทุมธานีทราบด้วยแล้ว.

ขอแสดงความนับถืออย่างสูง

(นาย[illegible] [illegible])

(อธิบดีกรมธนารักษ์)

กองที่ราชพัสดุ

โทร. [illegible]

Annex II

Items required by the Government of Thailand whose cost will be borne by the Government of Japan.

1) Construction of Industrial Rehabilitation Center facilities

a. Administration Dept,

b. Functional Training Dept.

c. Vocational Evaluation & Guidance Dept.

d. Work Preparation Workshop

e. Vocational Training Workshop

f. Dormitory

g. Canteen

2) Equipment (as a priority order)

a 1. Functional Training Units

a 2. Vocational Eveluation Units

a 3. Work Preparation Training Units

a 4. Vocational Training Units

a 5. Audio Visual Units

a 6. Micro-bus (capacity 27 persons)

b 7. Photo copy machine for Training Programme

b 8. Auto-printing machine

b 9. Sports equipment for Training

Annex III

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

1. To provide necessary data for basic design such as water quality analysis, land survey and condition of sub-soil, by and of June 1983
2. To carry out site preparation such as clearing, leveling and access road before commencement of construction works.
3. To provide facilities for distribution of electricity, water supply, drainage, telephone lines and other incidental facilities to the proposed site.
4. To ensure prompt unloading, tax exemption, customs clearance at ports of disembarkation in Thailand and prompt internal transportation therein of the products purchased under the grant.
5. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Thailand with respect to the supply of the products and services under the verified contracts.
6. To accord Japanese national whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into Thailand and stay therein for the performance of their work.
7. To maintain and use properly and effectively that the facilities constructed and equipment purchased under the grant.
8. To undertakes incidental civil works such as gardening, fencing, gates, guard house, garage, and exterior lighting.
9. To furnish general furniture in the Center

I-2 Confirmation of Basic Design Study (August 16 ~ August 25, 1983)

I-2-1 Members of Team

Name	Position	Staff Member of
Shusaku YASUI	Team Leader	Employment Security Bureau, Ministry of Labour
Yoshiyuki SHIKAMA	Project Coordinator	J.I.C.A. Grand Aid Division
Kazuaki ITO	Architect	Kisaburo Ito Architects & Engineers Inc.
Masafumi KURIHARA	Equipment Planner	- Ditto -

I-2-2 Diary

Aug. 16 Tue.	Departure for Bangkok Leaving Narita (16:10) --- Arrival at Bangkok (20:20)
17 Wed.	Courtesy call at the Embassy of Japan and D.O.L. for submitting the draft final report Innerteam meeting
18 Thu.	Courtesy call on Mr. Vijit, Director General of D.O.L. Explanation on the Basic Design Study at D.O.L. Visit to Phra Pradaeng Vocational Rehabilitation Center
19 Fri.	Inspection of the Project Site Visit to Nonthaburi Sheltered Factory and factories of constructions materials (Roofing materials, Piles and Ready-mixed concrete) Discussion with staff members of D.O.L.
20 Sat.	Innerteam meeting

21 Sun	Innerteam meeting
22 Mon.	Meeting for question and answer on the draft final report at D.O.L.
23 Tue.	Innerteam meeting Discussion with staff members of D.O.L. and signing the Minutes of Discussions
24 Wed.	Progress reporting to the Embassy of Japan and J.I.C.A. office Discussion with and greetings of return to the staff members of D.O.L.
25 Thu.	Return home Departure from Bangkok (9:35) --- Arrival at Narita (19:50)

I-2-3 Copy of the Minutes of Discussion

MINUTES OF DISCUSSION

ON

THE ESTABLISHMENT PROJECT FOR THE

INDUSTRIAL REHABILITATION CENTER

IN

THE KINGDOM OF THAILAND

At the request of the Government of the Kingdom of Thailand (GOT) for a grant capital aid on the Establishment Project for the Industrial Rehabilitation Center (IRC) in Bangpoon, Prathum-Tani Province, the Government of Japan (GOJ) sent a Mission to carry out the Basic Design Study (the study) on the IRC Project through the Japan International Cooperation Agency (JICA) from 23rd May to 11th June, 1983.

The Mission carried out a field survey and held a series of discussion with concerned authorities of the GOT.

As a result of these surveys and discussions, JICA prepared and submitted a Draft Final Report on the Study and dispatched a Mission to explain and discuss on this Report from 16th August to 25th August, 1983.

Both parties had a series of discussion on the Report and have agreed to recommend to their respective Governments and Authorities concerned to examine the major point of understanding reached between them, attached herewith, toward the realization of the Project.

Bangkok, August 24th, 1983

安井 義作

Syusaku YASUI
Leader of the JICA
Mission

Vijit Sangtong

Vijit SANGTONG
Director General
DOL

MAJOR POINTS OF UNDERSTANDING

BASIC DESIGN

1. The Thai side has agreed with the basic design proposed in the Draft Final Report.

2. The Final Report (10 copies in English) on the Project will be submitted to the GOT by end of October, 1983

3. Both sides confirmed that the Thai side understood the Grant Aid Programme to be extended by the GOJ, especially arrangement to be taken up by the Thai side.

I-3 List of the Thai Officials Concerned

1. Department of Labour (D.O.L)

Mr. Vijit Sangtong	Director General
Mr. Chalin Amondharm	Deputy Director General
Mrs. Amporn Tunenanond	Office of Workmen's Compensation Fund
Mr. Rong Charoensiri	Director of Labour Protection Division
Mr. Vicha Theera-anuwat	Institute for Skill Development
Mr. Rachentra Nidhiprabha	- Ditto -
Miss Daungkamol Changriem	Office of Workmen's Compensation Fund
Mrs. Jiraporn Kesornsucharit	- Ditto -
Miss Punnee Rumroeytham	- Ditto -
Miss Benjawan Laohatongtip	- Ditto -

2. Department of Technical and Economic Cooperation (D.T.E.C)

Mr. Sutin Susila	Colombo Plan Sub-Division

3. Sa Kaeo

Mr. Kla Tomtrakool	Nonformal Education Department Ministry of Education

4. Phra Pradaeng Vocational Rehabilitation Center

Mr. Sompit Sapmeechai	Acting Director

5. The War Veterans Organization of Thailand

Dr. Yeukeng Chin	Head Doctor of Medicine
Dr. Suwan Somanus	
Dr. Wises Tantiocpankul	
Lt. Sa-ngasee Chantarct	Chief Nurse

6. Khon Kaen. The Institute for Skill Development (K.I.S.D)

Mr. Watana Thonggamgaew	Director

7. Maha Sarakam Nurse College Centre

Mrs. Boonprkong Batrapatana	Director
Mrs. Piyamon Sommai	Canteen
Mrs. Maliwan Yamsopa	Administration Officer

8. Health Science Centre Khon-Kaen University Thailand

Mr. Suchart Areemitra	Director
Mr. Sumon Sakonchai	Assistants
Mr. Chanarong Aranyanard	

9. Electricity Generating Authority of Thailand (E.G.A)

Mr. Krison	Head Office
Mr. Sonpong Kaoboppa	Rangsit Substation

10. Provincial Electricity Authority (P.E.A)

Mr. Jirasak Supsang

11. Telephone Organizations of Thailand (T.O.T)

Mr. Panya Pumrumgiat	Registration Inspection Section
	Paholyotin-Telephone Office

12. Provincial Waterworks Authority (P.W.A)

Mr. Wanchai Ghooprasert	Chief, Planning Division

13. Royal Irrigation Department

Mr. Sunthorn Rungrongtaanin	Operation and Maintenance Division

APPENDIX II

APPENDIX II

II-1 Statistics Concerned

II-1-1 Employment Trends by Industry

(X 1000, %)

Items	Population						Annual Increase Rate	
	1960		1970		1980			
	Number	Ratio	Number	Ratio	Number	Ratio	1960-1970	1970-1980
Total Population	26,392	-	34,397	-	47,282	-	2.7	3.2
Total Labour Force	-	-	-	-	22,728	-	-	-
Total Employment	13,772	100.0	16,652	100.0	22,524	100.0	1.9	3.1
Agricalterro and Forestry	11,334	82.3	13,202	79.3	15,943	70.8	1.5	1.9
Mining and Quarry	30	0.2	87	0.5	37	0.2	11.4	▲8.3
Manufacturing Industry	471	3.4	683	4.1	1,789	7.9	3.8	10.1
Construction Industry	69	0.5	181	1.1	436	1.9	10.2	9.2
Power, Gas and Water Services	16	0.1	25	0.2	60	0.3	5.0	9.0
Commerce	780	5.7	876	5.3	1,916	8.5	1.2	8.1
Transportation and Communication	166	1.2	268	1.6	456	2.0	4.9	5.4
Services	655	4.8	1,184	7.1	1,887	8.4	6.1	4.8
Others	252	1.8	146	0.9	1	0.0	-	-

* Referred to data from the census in 1960 and 1970 and the labour census (July - September, 1980) provided by the Statistics Bureau, Prime Minister's Office

II-1-2 Degree of Disabilities and Types of Injuries (1974 ~ 1982)

Year	Total	Temporary	Permanent Partial	Permanent Total	Dead
1974	3,200	2,704	401	-	95
1975	4,605	3,937	535	1	132
1976	10,136	9,141	854	3	138
1977	16,537	15,073	1,260	6	198
1978	20,135	18,697	1,219	9	210
1979	24,370	22,962	1,104	8	296
1980	25,334	23,836	1,191	13	294
1981	27,723	26,124	1,275	10	314
1982	29,510	24,115	1,094	13	255

* Referred to data provided by the Workmen's Compensation Fund Office, Department of Labour

II-1-3 Degree of Disabilities and Types of Injuries

Part of Disability \ Degree of Disability		Slight			Medium			Serious			Total			
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Hand	Lost				2		2	14	3	17	16	3	19	88
	Disabled	4	1	5	32	9	41	12	11	23	48	21	69	22.0%
Finger	Lost	13	4	17	21	13	34	15	9	24	49	26	75	218
	Disabled	59	20	79	37	11	48	10	6	16	106	37	143	54.5%
Arm	Lost							4		4	4		4	31
	Disabled	2	1	3	9	6	15	7	2	9	18	9	27	7.8%
Leg		6	1	7	4		4	6	1	7	16	2	18	4.5%
Foot		4	2	6	3	1	4	1		1	8	3	11	2.8%
Head								1		1	1		1	0.1%
Eye					3	3	6	11	4	15	14	7	21	5.3%
Others					6		6	6		6	12		12	3.0%
Total		88	29	117	117	43	160	87	36	123	292	108	400	100%
				29.3%			40.0%			30.7%			100%	

II-1-4 Age of Disabled Workers

Age	Disabled		non Disabled	
	Number	Ratio	Number(X1000)	Ratio
Under 20	95	23.8%	4,680	21.3%
21 - 30	211	52.8	6,550	29.7
31 - 40	51	12.8	5,140	23.3
Over 41	43	10.6	5,670	25.7
Total	400	100.0	22,040	100.0

Note: 1. Numbers of the non-disabled persons are referred to the data in 1977 by D.O.L.

2. Numbers of the non-disabled exclude the population of less than 15 years old and more than 60 years old.

II-1-5 Educational Degree of Disabled Workers

	Disabled		Non Disabled	
	Number	Raio	Number(X1000)	Ratio
Preschool	5	1.2%	1,960	12.3%
Primary School (4 - 5 years)	331	82.8	12,640	79.1
Vocational School	64	16.0	10	0.1
Others	0	-	1,360	8.5
Total	400	100.0	15,970	100.0

Note: 1. Numbers of non-disabled persons are referred to the data in 1977 by D.O.L.

2. Numbers of the non-disabled include only those of workers.

II-1-6 Disabled Workers Ability to Return to Work by Degree and Types of Injuries

		Slight				Medium				Serious				Total			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Hand	Lost						2		2	4	3	10	17	4	5	10	19
	Injured	4	1		5	24	9	8	41	11	4	8	23	39	14	16	69
Finger	Lost	14	2	1	17	18	8	8	34	15	5	4	24	47	15	13	75
	Injured	76	3		79	36	7	5	48	10	2	4	16	122	12	9	143
Arm	Lost										1	3	4		1	3	4
	Injured	2	1		3	8	2	5	15	3	3	3	9	13	6	8	27
Leg		6		1	7	1		3	4		3	4	7	7	3	8	18
Foot		6			6	3	1		4	1			1	10	1		11
Head												1	1			1	1
Eye						4	1	1	6	5	3	7	15	9	4	8	21
Others						3	1	2	6	1		5	6	4	1	7	12
Total	Number	108	7	2	117	97	31	32	160	50	24	49	123	255	62	83	400
	Ratio	92.3	6.0	1.7	100	60.6	19.4	20.0	100	40.7	19.5	39.8	100	63.8	15.4	20.8	100

A: Same Occupation B: Different Occupation

C: Without Occupation D: Total

II-2 Budget Related to the Industrial Rehabilitation Center Project

II-2-1 BUDGET FOR PREPARATION OF THE CONSTRUCTION (1982/1983)

(Requested for 1984)*

1. Set up Cost

1.1	Telephone System	฿ 200,000
1.2	Electricity (Outside the site)	1,200,000
1.3	Water Supply (Outside the site)	3,000,000
1.4	Drainage	1,000,000
1.5	Fence	986,000

2. Houses for officers

P.C. LEVEL	UNIT	COST
5 - 66	1	310,000
3 - 4	20	4,500,000
1 - 2	10	2,910,000
General workers	8	624,000

Total Expenses 14,730,000

* budget year starts from October 1983 - September 1984

II-2-2 GOVERNMENT BUDGET FOR THE VOCATIONAL REHABILITATION CENTER (1983/1984)

(already requested to the Budget Bureau)

1. Land: Level up cost ฿ 12,240,000

(requested from special fund of 1983)

2. Salaries (for the preparation stage)* ฿ 126,675

POSITION m	NUMBER	P.C. LEVEL**	MONTHLY SALARY	DURATION (MOS.)	TOTAL SALARY
Administrative Officer	1	7	฿ 8,475	3	฿ 25,425
Labour officer	2	4	3,745	3	22,470
Statistician	2	3	2,765	3	8,295
Social worker	2	4	3,745	3	22,470
Psychologist	2	3	2,765	3	16,590
Doctor	1	5	4,945	3	14,835
Vocational Instructor	2	3	2,765	3	16,590
Total	11				฿126,675

3. Wages for employees

Position	Number	P.C. level	Monthly wage	Duration	Total wage
Vocational Instructor	5	-	3,745	3	฿ 56,175

Total Expenses = ฿12,422,850

* the figures are prepared for 3 - month period started from July - September 1984 before the construction is completed

** P.C. = Position Classification by the Civil Service Commission

II-2-3 BUDGET FOR ANNUAL OPERATING EXPENSES

(October 1984 - September 1985)

1. SALARIES AND WAGES

SALARIES

POSITION	NUMBER	P.C. LEVEL	DURATION (MOS.)	MONTHLY SALARY	TOTAL SALARY
Center Director	1	7	12	฿ 8,475	฿ 101,700
Chief of General Administration Office	1	4	9	3,745	33,705
General Administrative Officer	1	3	9	2,765	24,885
Accountant	1	3	9	2,765	24,885
Finance Accounting Officer	1	2	9	2,205	19,845
	1	1	9	1,950	17,550
General Officer	1	2	9	2,205	19,845
	1	1	9	1,950	17,550
Typist	2	1	9	1,950	35,100
Chief of Research-Planning	1	4	12	3,745	44,940
Statistician	2	3	12	2,765	66,360
Statistical Officer	2	2	9	2,205	39,690
Chief of Vocational-Assessment	1	4	12	3,745	44,940
Social Worker	2	3	9	2,765	49,770
Psychologist	2	3	12	2,765	49,770
Labour Officer	2	2	9	2,205	39,690
Chief of Medical Rehabilitation	1	4	12	3,745	44,940
Doctor	1	5	12	4,945	59,340
Physiotherapist	2	3	9	2,765	49,770

POSITION	NUMBER	P.C. LEVEL	DURATION (MOS.)	MONTHLY SALARY	TOTAL SALARY
Occupational Therapist	2	3	9	2,765	44,730
Nurse	2	2	9	2,485	44,730
Nurse Aid	3	1	9	1,950	52,650
Chief of Vocational Rehabilitation	1	4	12	3,745	44,940
Vocational Instructor	2	3	12	2,765	66,360
	4	3	9	2,765	99,540
Assistant Instructor	10	2	9	2,485	223,650
Total	50				฿ 662,235
WAGES					
Vocational Instructor	5	-	9	3,745	168,525
	5	-	12	3,745	224,700
Housekeeper	2	-	9	2,485	44,730
Chef	2	-	9	1,470	26,460
Labourer	4	-	9	1,255	45,180
Driver	3	-	9	1,470	39,690
Gardener	4	-	9	1,255	45,180
Guard	6	-	9	1,255	67,770
TOTAL SALARIES AND WAGES	31				2,117,610

2. OTHER EXPENSES = ฿ 4,868,600

II-2-4 Calculation Ground of the Running Cost

(1) Power Rate

a) Basic Rate: Unit rate 95 B/KW

400 KVA (Capacity of Transformer) x 0.7 (Demand Co-efficient) x 95 B x 12 (Month) = 319,200 B/year

b) Consumption Rate: 1.52 B/kWH

(Demand Co-efficient)

1.52 B/KW-hr x (400 KW x 0.5 (Demand Co-efficient) x 8 hrs + 400 x 0.2 (Demand Co-efficient) x 16) x 365 days = 1,597,824

Total a) + b) 1,917,000 B/year

(2) Propane Gas Rate

a) Gas consumption in the kitchen:

5000 m^2 x 0.0018 $m^3/hr.m^2$ x 5 hrs x 365 days = 16,425 m^3/year

b) Gas consumption in the training rooms and others:

5000 m^2 x 0.0015 $m^3/hr.m^2$ x 7 hrs x (365 - 52) = 16,433 m^3/year

Total (16,425 + 16,433) x 9.5 B = 312,151 B/year

(3) Expenses of medicine for drinking water

Material	Consumption/year	Content	Unit Price
Nacl	4648 ℓ	18 ℓ	770 Baht
PAC	584 ℓ	18 ℓ	670 Baht
NAOH	6 kg	1 kg	20 Baht

$$770\ B \times \frac{4648}{18} \times 670\ B \times \frac{584}{18} + 20\ B \times 6$$

$$= 199{,}430 + 22{,}110 + 120 = 221{,}660 \ :\rightarrow \ \underline{222{,}000\ B/year}$$

(4) Maintenance expenses of equipment

1) Personnel expenses for injection of medicine:

It is required to supply medicine and check remaining quantity of chlorine every three days.

(365 days ÷ 3) x 160 B = 19,520 B/year

2) Maintenance charge of the septic tanks:

Sterilization of tanks, Water quality control,
Check of aeration fan

MA576 Type 5.76 m^3 x 4 units x 620 B/m^3 = 14,285 B/year
MA1126 Type 11.26 m^3 x 2 units x 720 B/m^3 = 16,215 B/year
Cleaning expenses
(23 m^3 + 22.5 m^3) x 70 B/m^3 = 3,185 B/year

Total 34,000 B/year

3) Maintenance charge of the telephone exchange:

Maintenance of the telephone exchange will be contracted with its dealer.
One maintenance inspection per month will cost 18,000 B/year.

4) Maintenance charge of the automatic fire alarm system:

Two times of maintenance inspection per year will cost 4,000 B.

5) Maintenance charge of other low voltage electrical installation such as braodcasitng system, CCTV and so on:

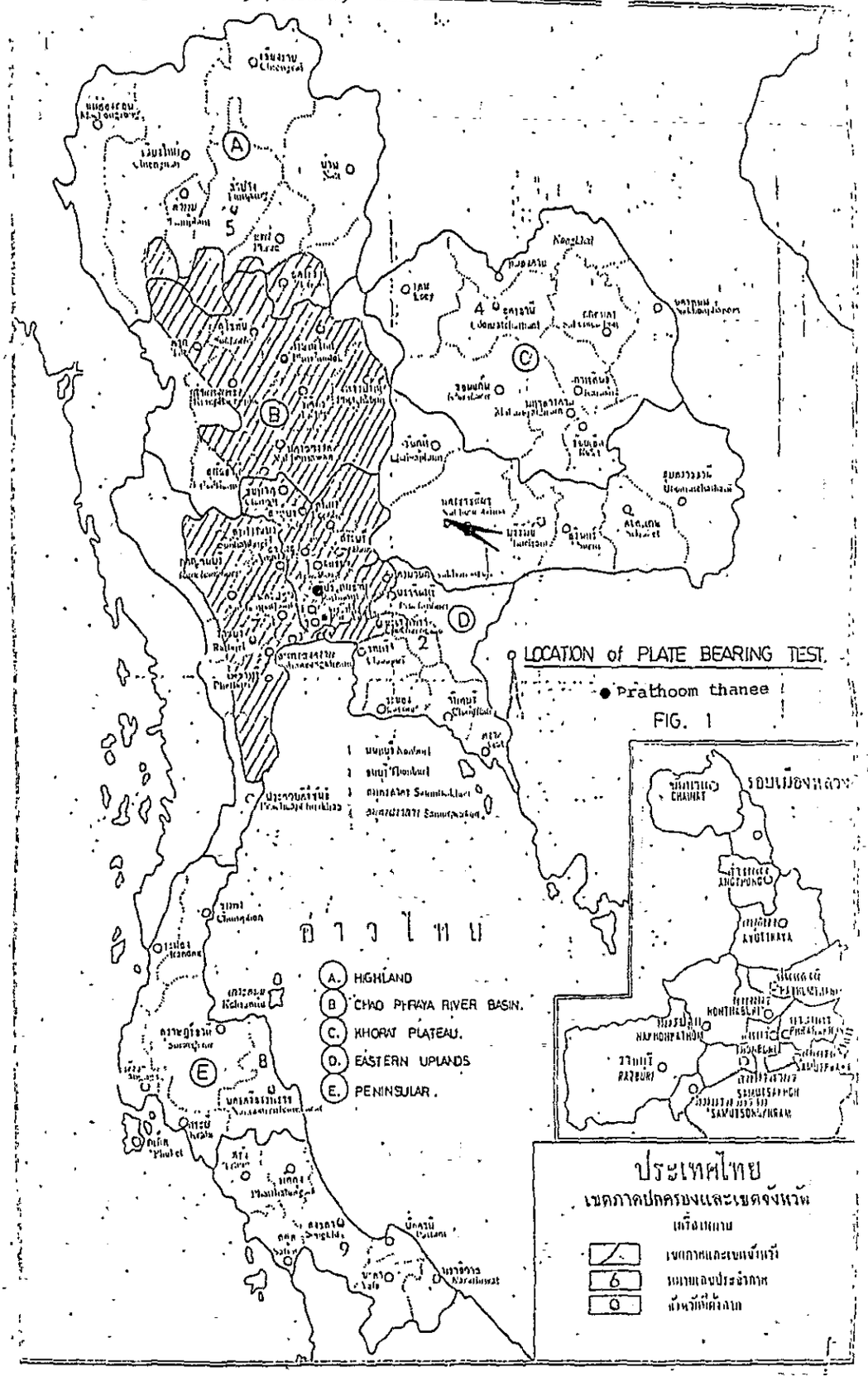
Two times of maintenance inspection will cost 2,000 B/year.

Total a) + b) + c) + d) = <u>78,000 B/year</u>

APPENDIX III

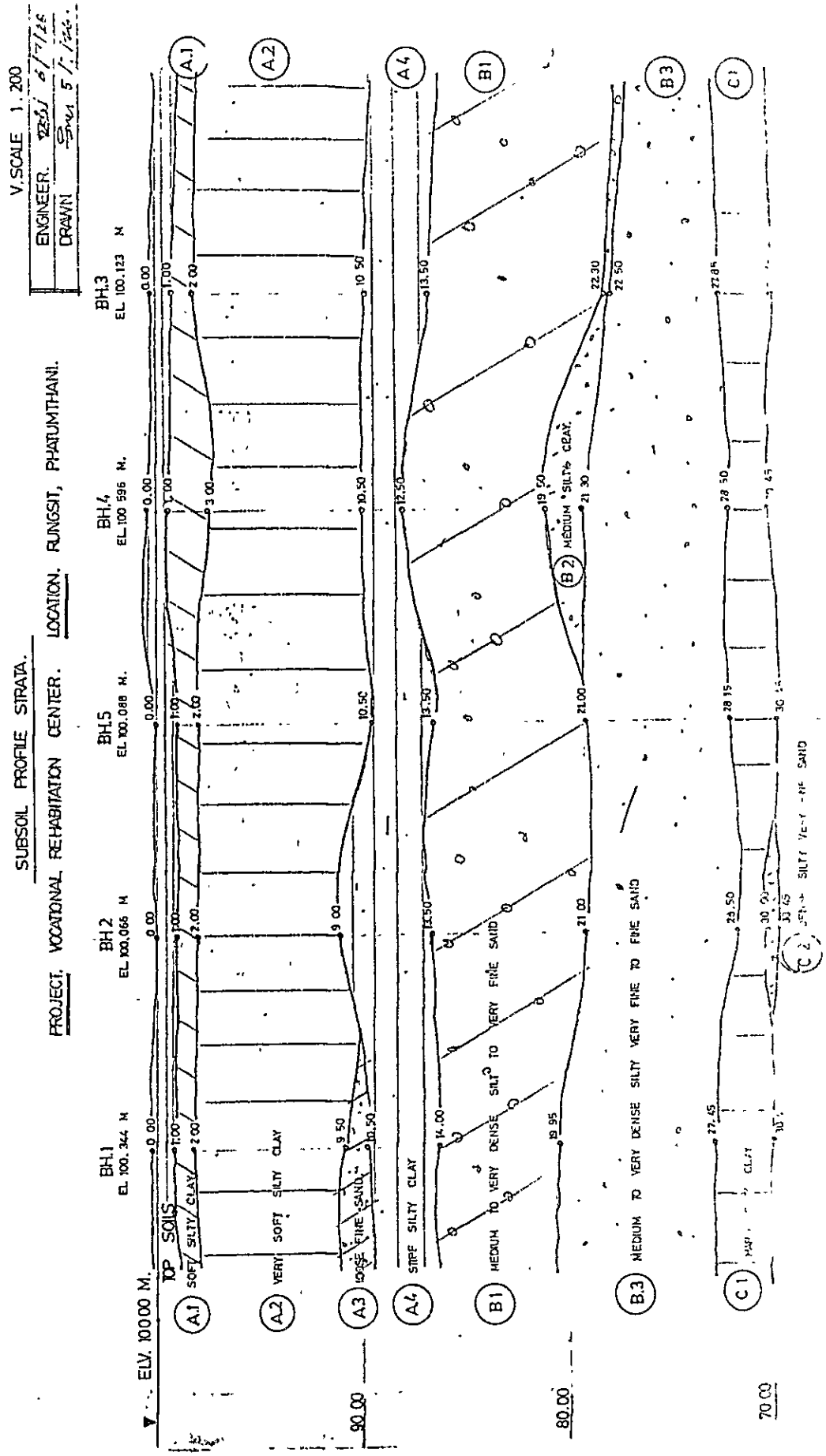
APPENDIX III

III-1 Geological Survey (Results)



III-1-2 Boring Location

III-1-3 Subsoil Profile Strata



ST.6

VOCATIONAL REHABITATION CENTER.., DEPT. OF LABOUR., RUNGSIT.

FIG.

GROUND WATER OBSERVATION.			
...TE	TIME	EL. of HOLE	EL. of WATER
... SAMPLING		- 1 05 M.	

BORING LOG

LOCATION. PHATUMTHANI.

BORING NO. 1
SURFACE EL. 100.344 M
DATE START 14. 6. 26
DATE FINISH 29. 6. 26

SOILS DESCRIPTION..

SOIL PROFILE | SAMPLE TYPE NO... | DEPTH, M. | ⊖ STANDARD-PENETRATION. BLOWS / FT. | ⊖ LIQUID LIMIT, ⊖ PLASTIC LIMIT, X NATURAL MOISTURE CONTENT. % | ● One half Unconfined Compressive strength ■ peak, □ remoled — Vane Shear, One half Pocket 0 Penetrometer Rdg. KSC. | TOTAL DENSITY γd, γt GM/CC.

FILLED LEVEL		0.00	30 60	20 40 60 80	1 2 3	1 2
FILLED TOP SOILS		1.00				
SOFT YELLOWISH BROWN & LI-BROWNISH GREY SILTY CLAY	ST 1	2.00				
	ST. 2					
	ST -					
VERY SOFT DARK GREY SILTY CLAY TRACE OF DECAYED WOOD	ST 3					
	ST. 4					
	ST. 5					
	ST. 6	9.50				
HARD DARK GREY FINE SAND.	SS. -	10.50	10 14			
	SS 8		17			
STIFF LI-GREY & YELLOWISH BROWN SILT TO VERY FINE SANDY CLAY.	SS. 9	14.00	14			
	SS 10		41			
DENSE TO VERY DENSE LI-BROWN SILT TO VERY FINE SAND	SS 11		86			
	SS. 12		50			
	SS 13		54			
	SS 14	19.95	52			
	SS. 15		20 32			
DENSE LI-GREY SILTY VERY FINE TO FINE SAND, TRACE OF COARSE SAND	SS.16		65			
	SS.17		45			
	SS 18		41			
	SS.19	27.45	46			
HARD OLIVE BROWN SILTY CLAY	SS.20		32			
END OF BORING	SS.21	30.45	30 38			

HEAD OF DIVISION
HEAD OF SECTION
ENGINEER.
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FIG

WATER OBSERVATION

TIME	EL. of HOLE	EL. of WATER
HRS AFTER BORING	0 80 M	

BORING LOG

LOCATION. PHATUMTHANI.

BORING NO. 2
SURFACE EL. 100 066 M
DATE START 14 6 26
DATE FINISH 19 6 26

SOILS DESCRIPTION...

SOIL PROFILE | SAMPLE TYPE NO. | DEPTH, M. | STANDARD PENETRATION. | LIQUID LIMIT | PLASTIC LIMIT | NATURAL MOISTURE CONTENT. | One half Unconfined Compressive strength | peak & remolded Vane Shear | One half Pocket Penetrometer Pstn | TOTAL DENSITY

BLOWS / FT | % | KSC. | γ_t GM / CC.

GROUND LEVEL 0 00

ORGANIC TOP SOILS 1 00

LT BROWNISH GREY SILTY CLAY 2.00

VERY SOFT DARK GREY SILTY CLAY. 9 00

STIFF TO HARD LI-GREY & DARK OLIVE BROWN SILTY CLAY, TRACE OF SILT CEMENTATION 13.50

DENSE BROWN SILTY FINE SAND, SOME PART OF SILTY CLAY. 21 00

DENSE LI-GREY SILTY FINE SAND TRACE OF COARSE SAND & PEA-GRAVEL 28 50

BROWN SILT TO VERY FINE SANDY 30.00

END OF BORING 30 45

DENSE YELLOWISH BROWN SILTY VERY FINE SAND, TRACE OF SILT CEMENTATION

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FIG.

BORING LOG

GROUND WATER OBSERVATION			BORING NO	3
TIME	EL. of HOLE	EL. of WATER	SURFACE EL.	100 123 M.
AFTER BORING	0.75 M	LOCATION. PHATUMTHANI.	DATE START	14 6 26
			DATE FINISH	29 . 6 26

SOILS DESCRIPTION	SOIL PROFILE	SAMPLE TYPE NO.	DEPTH, M	STANDARD PENETRATION (BLOWS / FT)	LIQUID LIMIT / PLASTIC LIMIT / NATURAL MOISTURE CONTENT (%)	One half Unconfined Compressive strength; peak, remolded Vane Shear; One half Pocket Penetrometer Rdg (KSC.)	TOTAL DENSITY (T / CC.)
GROUND LEVEL			0.00	30 60	20 40 60 80	1 2 3	1 2
ORGANIC TOP SOILS 1.00							
SOFT YELLOWISH BROWN & GREY SILTY CLAY 2.00		ST 1					
		ST 2					
		ST 3					
VERY SOFT DARK GREY SILTY CLAY [illegible] OF DECAYED WOOD & SILT POC[illegible]		ST 4					
		ST 5					
		ST 6					
		ST 7		10			
10.50		ST 8					
STIFF TO HARD LT-GREY & OLIVE [illegible] SILTY CLAY, TRACE OF CALCAREOUS POCKET WITH BLACK MOTTLED COLOR		SS 9		34			
13.50		SS 10		28			
		SS 11		31			
MEDIUM TO VERY DENSE LT-BROWN [illegible] FINE TO VERY FINE SAND		SS 12		65			
		SS 13		12			
		SS 14	20	20			
		SS 15		19			
22.50		SS 16		26			
MEDIUM TO DENSE LT-GREY [illegible] TO FINE SAND, TRACE OF [illegible]		SS [illegible]		33			
		SS 17		41			
27.85		SS 18		35			
HARD LT-GREY & DARK OLIVE BROWN, SILTY CLAY		SS 19		70			
30.45		SS 20	30	36			
END OF BORING							

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FIG

GROUND WATER OBSERVATION.		
TIME	EL. of HOLE	EL. of WATER
WHILE SAMPLING		-0.75 M.

BORING LOG

LOCATION. PHATUMTHANI

BORING NO.	4
SURFACE EL.	100 596 M.
DATE START	14 6 29
DATE FINISH	19 6 26

Column headings: SOILS DESCRIPTION.. | SOIL PROFILE | SAMPLE TYPE NO. | DEPTH, M. | ⊙ STANDARD-PENETRATION. (BLOWS / FT.: 30, 60) | ⊖ LIQUID LIMIT, O- PLASTIC LIMIT, X NATURAL MOISTURE CONTENT (%: 20, 40, 60, 80) | ■ One half Unconfined Compressive strength; ■ peak –, □ remolded – Vane Shear; O One half Pocket Penetrometer Rdg (KSC.: 1, 2, 3) | TOTAL DENSITY $\gamma d, \gamma_t$ (GM/CC.: 1, 2)

SOILS DESCRIPTION	Depth to base (m)	Sample	SPT (blows/ft)
GROUND LEVEL	0.00		
ORGANIC TOP SOILS	1.00		
SOFT YELLOWISH BROWN & LI-BROWNISH GREY SILTY CLAY	3.00	ST 1, ST 2	
VERY SOFT DARK GREY SILTY CLAY, TRACE OF SILT POCKET & DECAYED – WOOD	10.50	ST 3, ST 4, ST 5, ST 6, ST 7	
STIFF LI-GREY & YELLOWISH BROWN SILTY CLAY, TRACE OF CALCAREOUS.	12.50	ST 8, SS 9	SS 9: 20
MEDIUM TO VERY DENSE BROWN SILTY FINE TO VERY FINE SAND, TRACE OF SILT CEMENTATION	19.50	SS 10, SS –, SS 11, SS 12	33, 33, 75, 34
MEDIUM DARK GREY SILTY CLAY, SOME SILT TO VERY FINE SAND, TRACE OF GRAVEL	21.90	SS 13, SS 14	15 (20), 53
DENSE TO VERY DENSE LI-TO DARK GREY SILTY VERY FINE TO FINE SAND, TRACE OF COARSE SAND & PEA-GRAVEL	28.50	SS 15, SS 16, SS 17, SS 18	39, 51, 30, 118
HARD L-GREY SILTY CLAY, TRACE OF SAND SEAM	30.45	SS 19, SS 20	76, 69
END OF BORING.			

Depth marks: 0.00, 10, 30

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FIG.

BORING LOG

GROUND WATER OBSERVATION		
TIME	EL. of HOLE	EL. of WATER
HU SAMPLING		0 85 M

LOCATION. PHATUMTHAN.

BORING NO.	5
SURFACE EL.	100 098 M
DATE START	14 6 26
DATE FINISH	29.6.26

Columns: SOILS DESCRIPTION | SOIL PROFILE | SAMPLE TYPE NO. | DEPTH, M. | ⊙ STANDARD PENETRATION, BLOWS / FT. (30, 60) | -⊖ LIQUID LIMIT, O- PLASTIC LIMIT, X NATURAL MOISTURE CONTENT, % (20, 40, 60, 80) | One half Unconfined Compressive strength, ■ peak, □ remolded, Vane Shear, One half Pocket O Penetrometer Rdg., K/G. (1, 2, 3) | TOTAL DENSITY γd, γt G1/CC. (1, 2)

Depth (M)	Soils description
0.00	GROUND LEVEL
0.00 – 1.00	ORGANIC TOP SOILS
1.00 – 2.00	LI-BROWNISH GREY SILTY CLAY, SOFT
2.00 – 10.50	VERY SOFT DARK GREY SILTY CLAY, TRACE OF DECAYED WOOD
10.50 – 13.50	STIFF OLIVE BROWN & LI-GREY SILTY CLAY, TRACE OF CALCAREOUS
13.50 – 21.00	MEDIUM TO VERY DENSE LI-BROWN SILT TO VERY FINE SAND
21.00 – 28.15	MEDIUM TO VERY DENSE LI-GREY SILTY VERY FINE TO FINE SAND, TRACE OF COARSE SAND
28.15 – 30.45	HARD LI-GREY & OLIVE BROWN SILTY CLAY
30.45	END OF BORING

Sample	Standard penetration (blows/ft)
ST 1	
ST 2	
ST 3	
ST 4	
ST 5	
ST 6	
ST 7	
ST 8	
SS 9	32
SS 10	32
SS	29
SS 11	51
SS 12	38
SS 13	32
SS 14	49
SS 15	46
SS 16	53
SS 17	48
SS	64
SS 18	39
SS 19	36

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III-2 Water Quality Test

WATER ANALYSIS REPORT

To	:	Department of Labour
Analyzed by	:	Department of Public Works
Taken	:	June 10, 1983
Received	:	June 10, 1983
Sample of	:	Well Water
Source of Water	:	Udol Patana Saw Mill Co., Ltd.
		(50 meters from the IRC site)

Turbidity		18
Color		2
Total Hardness	(ppm) as $CaCo_3$	276
Magnesium Hardness		19
Iron	(ppm) as Fe	0.27
Manganes	(ppm) as Mn	0.40
Salfate		-
Nitrite Nitrogen	(ppm) as NO_2	0.01 as Nitrogen
PH Value		7.1
Total Alkalinity		324
Residual Alkalinity		48
Electrical Conductivity (cm)		1140
Chloride		231 (250)
Fluoride		0

JICA