DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
THE REPUBLIC OF THE PHILIPPINES

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE CONSTRUCTION
OF
A HYDRAULIC LABORATORY
IN
THE REPUBLIC OF THE PHILIPPINES

JULY, 2000

Japan International Cooperation Agency
Nissoken Architects / Engineers
Pacific Consultants International

PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study on the Project for the Construction of a Hydraulic Laboratory and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines a study team from 26th of January to 19th of February 2000.

The team held discussions with the officials concerned of the Government of the Philippines, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to the Philippines in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the teams.

July, 2000

Kimio Fujita
President
Japan International Cooperation Agency

July, 2000

Letter of Transmittal

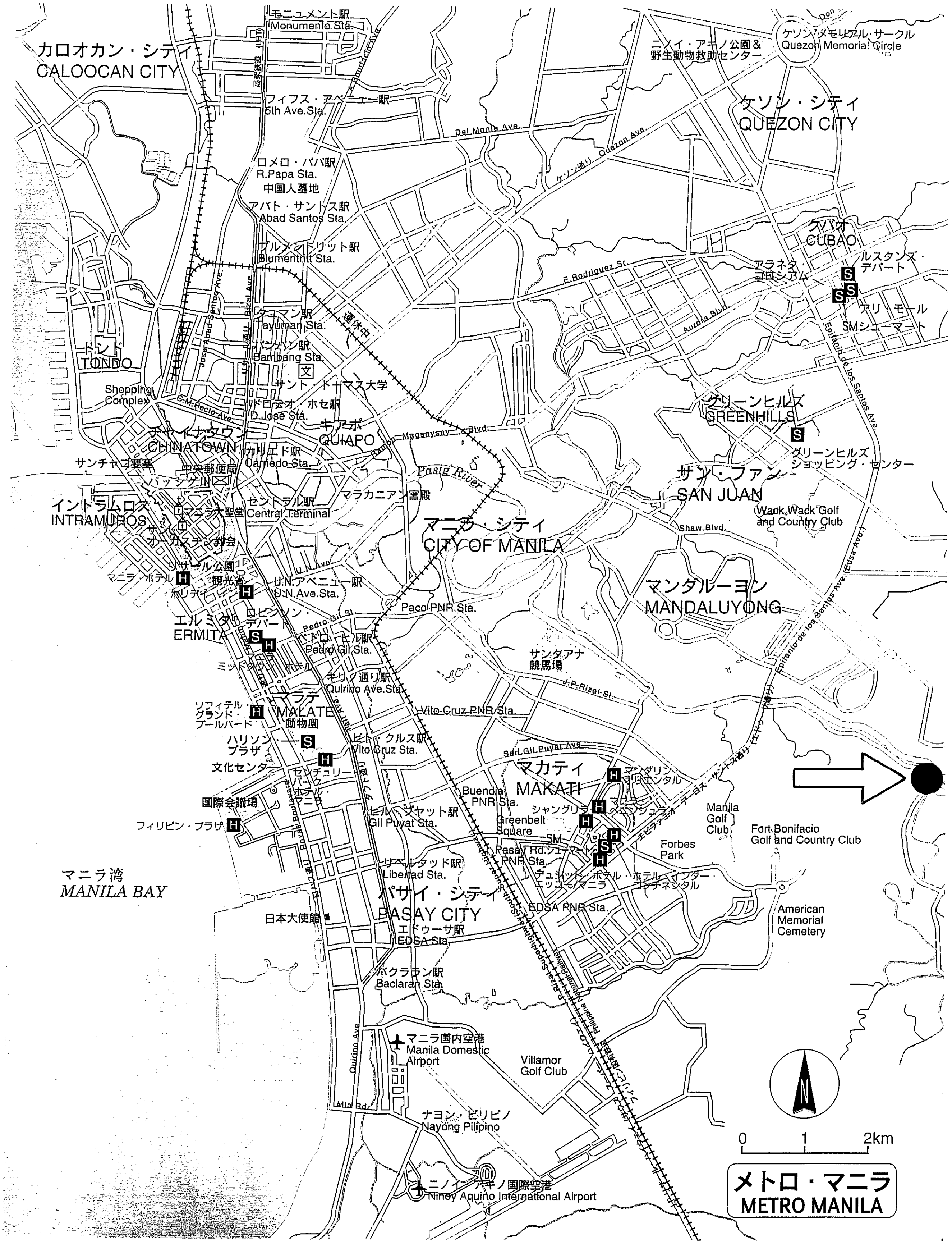
We are pleased to submit to you the basic design study report on the Project for the Construction of a Hydraulic Laboratory in the Republic of the Philippines.

This study was conducted by Nissoken Architects/Engineers and Pacific Consultants International, under a contract to JICA, during the period from January 20, 2000 to August 4, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of the Republic of the Philippines and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Hideaki Ota
Project Manager
Basic design study team on
The Project for the Construction of a
Hydraulic Laboratory in the Republic of
the Philippines
Nissoken Architects and Engineers
in association with
Pacific Consultants International



Site Location Map

PERSPECTIVE OF A HYDRAULIC LABORATORY

ABBREVIATION LIST

DENR	Department of Environment and Natural Resources	1
DPWH	Department of Public Works and Highways	17
ECC	Environmental Compliance Certificate	1
E/N	Exchange of Notes	2
FCSEC	Flood Control and Sabo Engineering Center	14
JICA	Japan International Cooperation Agency	3
LAN	Local Area Network	1
MDF	Main Distribution Frame	1
MERALCO	Manila Electric Railroad and Lighting Company	2
NHRC	National Hydrological Research Center	1
NSCP	National Structural Code of Philippines	3
PWRI	Public Works Research Institute	9
UP	University of the Philippines	5
UPS	Uninterruptive Power Supply	1

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Chapter 1 Background of the Project

Chapter 1 Background of the Project

The Philippines has a land area of 300,000 sq.kms. with a population of 7.9 million and is formed by 7,100 islands. Each island is mountainous and steep. The islands are volcanically active and are prone to earthquakes. The climate is hot and humid all year round and due to the proximity to typhoon generating regions, on average 20 typhoons have annually formed and visited the territory and hit the islands 9 times on the record. Not only because typhoons visit, but also because in the rainy seasons torrential rains occur at various places, yearly rainfall in some areas exceeds 3,500mm.

Every year flood disasters resulting from typhoons and torrential rains cause great damage throughout the country. Annual flood fatalities have numbered about 100 (min.) to 8,000 (max.). From 1970 to 1994 the average annual flood fatalities were 700 on the record and the average annual damage amounted to 8.1 billion pesos.

Although flood control and sabo in the Philippines fall under the jurisdiction of the Department of Public Works and Highways (DPWH), as the DPWH is not organized by fields such as “Road Bureau” or “River Bureau” but according to functions such as Planning Service or Bureau of Design, as well as the fact that budgetary accommodation being not adequate, technical standards in this area are still unorganized and engineering oriented staff lacking, as consequence of this situation, at present, flood control and sabo measures have yet to be implemented appropriately.

In countering this situation the Philippines Government has promoted policies as “increasing the budgetary allocation in the field of flood control” and “reinforcing disaster research”. In the Medium-term Philippine Development Plan 1999-2004, 14 items are listed as priorities in the field of ‘flood control and drainage’ and one to them is to ‘establish the Flood Control and Sabo Engineering Center (FCSEC) to conduct applied research and development and human resources development’.

In meeting with the above mentioned policies the DPWH established the FCSEC, and with the ‘Project Type Cooperation’ of Japan International Cooperation Agency (JICA), it will establish technical standards in this field, develop human resources through training, accumulate data and carry out research. The objectives of the FCSEC to be achieved through the above activities are to enhance the technical level of engineers and extend the expertise in the field of flood control and sabo and take charge of public relations.

The facilities of the FCSEC consist of Training and Administration Building, Hydraulic Laboratory Building and Dormitory. Initially all of the said facilities were to be built by the Government of the Philippines, however, as that the high level construction of building and procurement of equipment required for establishing a Hydraulic Laboratory proved difficult to implement domestically, the Government of the Philippines requested the grant aid of the Government of Japan for the construction of building and procurement of equipment for a Hydraulic Laboratory and JICA carried out the basic design.

Chapter 2 Contents of the Project

Chapter 2　Contents of the Project

2-1　Objectives of the Project

The objectives of the project is to provide a hydraulic laboratory building and hydraulic experiment equipment to the Flood Control and Sabo Engineering Center (FCSEC), established by the Department of Public Works and Highways (DPWH) to improve the flood control and sabo capabilities in the Philippines, so that it may carry out necessary research and train its personnel.

The objectives of the FCSEC to be achieved through the above activities are to enhance the technical level of engineers and extend the expertise in the field of flood control and sabo and take charge of public relations.

In order to achieve the objective of the FCSEC, the construction of not only the hydraulic laboratory building but also the construction of the training and administration building and the dormitory building, followed by the procurement of various equipment, etc. required by these buildings are essential in view of the smooth implementation of the above-mentioned activities.　The present grant aid cooperation aims at “the construction of the hydraulic laboratory building and the procurement of hydraulic experiment equipment” to ensure the proper implementation of the necessary hydraulic experiments among the various purposes of the FCSEC.

2-2　Basic Concept of the Project

The Hydraulic Laboratory Building, to be constructed by Japan’s Grant Aid, has the dual role of training DPWH staff in the area of flood control and sabo engineering and carrying out basic research.　Therefore the basic concept of the Hydraulic Laboratory Building has been determined as below.

- to plan the facility so as to optimize training;
- to provide adequate experiment equipment and ancillary facilities to enable basic and initial applied research
- to procure sufficient experiment equipment to enable the above

2-3 Basic Design

2-3-1 Design Concept

(1) Policy Concerning Natural Conditions

Manila, which is the location of the site, belongs to tropics type weather and is divided into a dry season from November to May and a rainy season from June to October. It is relatively warm and wet year round and is influenced by typhoons. The Pasig River, which flows alongside the site, is abundant in water but there are no recent records of it flooding. As the project is a laboratory facility for carrying out experiments, the building will not need to be designed considering any specially optimized room conditions or safety measures but as ordinary laboratory and office rooms in the said natural conditions.

(2) Policy Concerning Social Conditions

As the planned facility is a building of a technical nature, it cannot answer directly to various social demands. However the facility is an actualization of the commitment of the Philippines government to flood control and sabo, and will not only upgrade the knowledge of DPWH staff concerning flood control and sabo but will enlighten the general public in this area and will serve a social need in a broad sense.

(3) Policy Regarding the Situation of Local Construction Industry and the Use of Local Companies

As described in detail in the next chapter, most of the materials required for the construction of the planned building can be procured locally. The technical level of local construction companies is relatively high and no problems are anticipated in regard to their construction of the planned building, which is characterized by a large span. Consequently, the dispatch of engineers specialising in the planned type of building from Japan will be unnecessary and the building design will be conducted fully utilizing the conventional construction methods and the locally procured materials.

The Philippines has a well established legal framework for building construction, including the Building Standards Law, many laws and regulations relating to various building service equipment and systems, a procedure for building permit and guidelines for drawings, etc. There are many local consultants as can be expected by the strict system of building-related laws and regulations. A local consultant will, therefore, be effectively used to ensure the smooth execution of the design work for the planned building.

(4) Policy Regarding Facilities, Instruments and Equipment

In choosing the experiment facilities and equipment like the flumes and artificial rainfall device, design policies for them are that the basic hydraulic phenomena shall easily be understood by using the experiment facilities; that they shall be enable to reproduce the natural disaster of Philippines, especially debris flow and mud flow; and that they shall have the capabilities for the basic research. The specifications and numbers of measurement instruments/equipment shall be determined with considera-tion of items to be measured, application of training/research, ease of operation and maintenance.

2-3-2 Basic Design

(1) Site Layout Plan

The project site is sandwiched between the Pasig River and J.P. Rizal Road, which runs parallel, and is long and slender on a south-north axis. As such the planned building will also be long and slender on the similar axis. The area is therefore not large enough but construction of the Building is possible.

The road level rises towards the north and is some 4m higher than the site level in the northern part. The entry gate to the site will, therefore, be introduced in the southern part where the elevation is almost level with the Napindan Bridge. As such, access to the laboratory building will be from the south. No problems are anticipated in regard to infrastructure as described earlier.

(2) Construction Plan

1) Floor Plan

The project building consists of the Laboratory Room with a long span and large area along with Ancillary Rooms, which will support experiments and training programs. In view of economy of construction and functionality the Experiment Room and Ancillary Rooms will be housed in one building.

The Laboratory Room requires a high ceiling to accommodate such experiment facilities/devices as flumes and an artificial rainfall device. A large space will be created by adopting a single-story, single room design to enhance the operation efficiency of the device. A travelling crane (two tons) will be installed along the ceiling to transport items used for experiments and for the suspension of an observation gondola. The Ancillary Room Wing is designed to have two stories to ensure smooth linkage with the Laboratory Room and to optimize the use of the available space.

Function of each room and basis of floor area calculation are shown in the table on the next page.

Table 2-1 Function of Each Room and Floor Calculation

Name of Room		Function	Planned Floor Area (m^2)	Basis of Floor Area Calculation
First Floor	Entrance/Exhibition Hall	Display models	109.4	Set as minimum space as an entrance. Model exhibition space determined by model layout.
	Laboratory	Carry out various hydraulic experiments	1,308.0	According to layout of experiment layout
	Workshop/ Material Storage	Preparation for experiments	69.8	According to layout of machine tools
	Equipment Storage		25.2	
	Soil Testing Room	Carry out soil tests	62.3	According to layout of soil testing equipment
	Technician's Room	Waiting room for Technicians	8.6	Room for 3 to 4 technicians
	Electricity Room	Houses high voltage and low voltage panels	14.0	According to layout of panels
	Pump Room	Houses pump	7.9	According to layout of pump
	Shower Room	Shower booth for one person	8.2	Minimum required space
Second Floor	Staff Room	Accommodates staff and researchers	62.3	Office space for 10 people
	Monitoring Room	Monitor experiments	38.9	According to layout of monitors
	Conference Room	Lectures during training session	64.8	Accommodates 40 trainees
	Storage	Storage of data etc.	22.2	Minimum required space
	Pantry	Provide boiled water and tea sets	4.6	Minimum required space
	Catwalk	For observation of experiments and setting of lighting	343.7	Set at 1m width
Common	Toilet		24.0	Minimum required space
	Corridors/Staircase		75.0	Minimum required space
Annex	Guard House		12.0	Minimum required space
	Storage		16.0	Minimum required space
	Water Tower	Storage of water supplied to flume	121.4	According to scale of experiment
Total Floor Area			2,395.9	

2) Sectional Plan

The necessary height（overhead clearance under beam）of the Laboratory Room shall be determined by the incline of the flume and clearance required by the overhead crane. The roof shall be pitched with steel trusses and metal corrugated roofing. The roof will have top lights providing enough light together with windows at the floor level and the catwalk level in the daytime without resorting to artificial means. The Ancillary Rooms will have adequate ceiling height for the functions to be carried out. The roof of the Ancillary Room wing shall be flat concrete slab with asphalt waterproofing.

3) Structural Plan

(a) Main structure

In the Philippines, a reinforced concrete (RC) structure is basically used for large structures with a wide span as the planned building. The main structure of the building will be RC with a steel trussed roof structure, as in the many cases of similar size local building. The Ancillary Room Wing will adopt a rigid structure throughout with all pillars and girders being made of RC.

(b) The subgrade condition and structure of the foundation

As a result of a soil survey in the site, a hard sandy stratum was found and it starts from approximately 1M under the ground surface. Depending on location, however, there is a much thinner sandy stratum and a 10 N-value layer exists under this stratum. Consequently the hard sandy stratum is not thought to lie evenly in the site. However, the bearing capacity that is calculated with the layer of 10 N-value is $100kN/m^2$ so that the foundation of this building is to be a spread foundation.

(c) Structural Code and Load Condition

a) Structural Code

Basically the structural design conforms to National Structural Code of Philippines (NSCP) although it is possibly supplemented by Japanese regulations in some cases.

b) Dead Load

Self-loads of structural materials, finishes, necessary equip-ments, etc. are to be calculated.

c) Live Load

Design live load is given below.

- Laboratory roof	:	600	Pa
- Laboratory	:	4,800	Pa
- Office & Others	:	2,400	Pa
- Entrance/Hall	:	4,800	Pa

※1: Reaction of a ceiling-overhead crane
Vertical direction - 147kN

Travelling direction - 10.8kN
Orthogonal direction against traveling direction - 6.9kN

※2: Reactions of experimental devices in the Laboratory Room wing must be separately considered in each case.

※3: Live load of the Waterway in the laboratory - 7,840 Pa; the Japanese equivalent is $800 kg/m^2$.

d) Wind Load

Wind load is to conform to NSCP and wind pressure of the building is calculated by the following formula.

$$P = Ce \times Cq \times qs \times I$$

Ce : Gust Factor Coefficient (1.75)
Cq : Force Coefficient (0.9〜0.3, see the following figures)
qs : Wind Stagnation Pressure ($1,500pa = 153\ kg/m^2$)
I : Importance Factor (1.0)

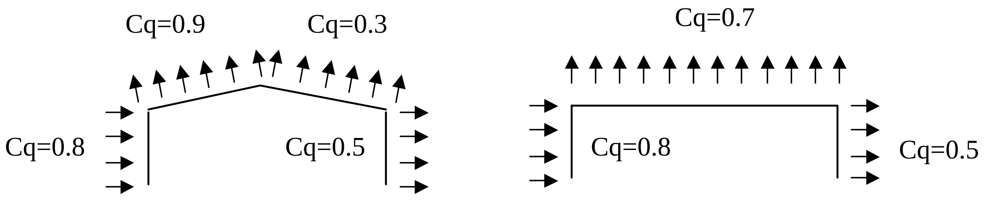


Figure 2-1 Wind Force Coefficient

e) Seismic Load

Seismic Load is calculated in the following formula accord-ing to NSCP.

$$V = Z \times I \times C \times W/Rw$$

V : Total Design Base Shear

Z : Seismic Zone Factor (0.4)

I : Importance Factor (1.0)

C : Site Coefficient for Vibration Characteristics(1.25 × S/T^2/3)

S : Site Coefficient for Soil Characteristics (1.5)

T : Fundamental Period of Vibration (Ct × hn^3/4)

Ct = 0.075 (reinforced concrete moment resisting frame),
hn ; height of building

W : Weight of building

Rw : Structure Characteristics Coefficient (10)

f) Structural Materials

Local materials are to be chosen for the project as much as possible, after the full survey on their quality, availability and costing. A normal concrete of fc' 21MPa is to be used (Japanese equivalent of Fc = 21N/mm^2). With regard to reinforcement for use, either Japanese reinforcements of SD295 and SD345 or Philippine equivalents GRADE 40 and GRADE 60 are to be considered. About shaped steels, SS400 or equivalent and SSC400 or equivalents are required.

4) Electrical Installation

(a) Power Intake and Sub-Station

The Manila Electric Railroad and Lighting Company (MERALCO) provides the commercial electricity in Metro Manila. Electricity will be supplied to the building via an incoming pole to be installed near the boundary line and an aerial power cable will be introduced between the existing high voltage line of the MERALCO which runs along the road in front and the said incoming pole on the site. The incoming voltage is 3ø 3 wire 34.5kV and an underground cable will be laid from the secondary side of the incoming pole to the high voltage incoming panel in the Electricity Room. The low voltage panel will be installed in the Electricity Room by the Japanese side and the electrical connection up to this panel including the high voltage incoming panel, primary side circuit breaker and the transformer will be installed by the Philippine side. The estimated load capacity of the main equipment is listed in the following table.

Table 2-2 Load Capacity

Load Name	Load Capacity
General lighting fixture, socket outlets	62.8 kW
A/C unit (Motor) etc.	35.0 kW
Pump etc.	223.7 kW
Experimental apparatus	28.0 kW
Total	349.5 kW

Transformer capacity shall be 3ø 3W 400kVA, according to the above.

(b) Main Feeder and Power Facilities

The wiring for the main feeder and power equipment will, in principle, be made through metal conduit pipes and 3ø 3 wire 220V power will be distributed from the low voltage panel to the lighting and receptacle panel as well as the power panel and from the power panel to each air conditioning unit, pump and laboratory equipment.

(c) Lighting Fixture and Final Circuit

Wiring from the lighting and receptacle panel will be conducted to each lighting unit, socket outlet, switch, ventilation fan and indoor air conditioning unit, etc. Fluorescent lamps will be used as the lighting sources because of their high efficiency and each lighting switch will, in principle, cover a small area. Socket outlets shall be of local standard. External lighting will be automatically switched on and off.

Table 2-3 Illumination Level Code

Main Room	Illumination Level Code [lx]
Laboratory, Offices	400-600
Entrance/Hall	200-400
Electricity room, Machine room	150-300
Corridor	100-200

(d) Conduit Pipe for Telecommunication/Network System

The Japanese side will be responsible for laying the conduit pipe from the MDF to each telephone outlet while the Philippine side will be responsible for extension of the telephone line to the site, wiring and installation of telephones. Conduit piping for the LAN system will be installed to link the Laboratory Room to the Monitoring Room as well as to the Staff Room. Five Uninterruptive Power Supply (UPS) units (1kVA each) will be installed in the Monitoring Room to serve electronic equipment.

(e) Manual Fire Alarm System Work

Bell alarm system will be installed to be rung by pushbutton when fire, etc. breaks out.

(f) Lightning Protection System

Lightning terminal will be installed on the roof to prevent hazard of thunder.

5) Water Supply and Drainage System

(a) Water Supply System

Domestic water service line will be tapped-off from the existing main water supply line presently running along west side of the site. After the water meter, the water supply system will be divided into two, i.e. that serving the Laboratory Room and that serving the Ancillary Rooms. Each system will have its own water tank as described below.

a) Water Supply for Laboratory Room

The branched water supply line for Laboratory Room will be connected to the low water tank located north side of the building. Water line for faucets in Laboratory Room will be tapped-off from primary supply line.

A high water tank system will be exclusively employed for water supply to the Laboratory since constant pressure and flow are required. Water control will be of a solenoid valve and a solenoid flow meter. The supplied water from the high tank to each hydraulic experiment will be returned to the low tank by return waterway. About this high water tank system details will be described in (3) Facilities and Equipment Plan: incidental facilities to the flume.

b) Water Supply for Ancillary Rooms

Water supply for Ancillary Rooms will be done by elevated tank system for convenience and maintenance. Domestic water will be supplied to Toilet, Soil Test Room and Shower Room. A water-receiving tank will be put on the ground at south side of the building and the water pumps will be installed in the pump room.

(b) Hot Water Supply System

Hot water will be provided only for Shower Room by an electrical hot water storage tank.

(c) Sewage, Waste Water and Storm Drainage

Sewage and waste water from the building will be connected to a sewage treatment and discharged to the existing public sewerage running along the road on the west of the site. Sewage treatment shall be of dual tank as normally used at the project area. Surface run-off inside the site will be discharged into Pasig River.

(d) Other Facilities

Such sanitary ware as closets and washbasins, etc. will be those which meet the relevant US standards and which are popularly used in the Philippines. Hydrants and portable fire extinguishers will be provided in the building pursuant to the Fire Services Law of the Philippines.

6) Air conditioning and Ventilation

Listed rooms will be air-conditioned:

1) Equipment Storage
2) Conference Room
3) Monitoring Room
4) Staff Room
5) Soil Test Room

The air conditioning will be of individual system for each room for easy operation and maintenance. Outside unit of air conditioner will be packaged type of cooling unit since it is high temperature and high humidity in Manila area. Interior cooling unit shall be ceiling recessed type for room usage, architectural design and cooling efficiency.

Mechanical ventilation system will be provided for other rooms as necessary. The Ancillary Rooms will have supply/exhaust fans or exhaust fans. The fans will be duct fan and/or propeller type of exhaust fan. The Laboratory Room will be fitted with exhaust roof fans.

7) Finishing Schedule

In selecting finishing materials, the policy is to adopt materials and methods of construction that are widely accepted in the Philippines and efforts will be made to procure construction material locally as much as possible in order to reduce cost and to simplify repairs and maintenance after construction.

(a) Exterior Finish

- The roof of Laboratory Room will be double ply insulation filled corrugated steel roofing which is lightweight, weather resistant and highly insulating (locally available).
- The roof of the Ancillary Rooms wing shall be flat concrete slab with asphalt waterproofing.
- The exterior walls shall be sprayed with synthetic spray paint, as it is weather resistant and durable.
- Exterior fittings shall be of steel for doors facing outside, aluminum sash for windows and aluminum curtain wall for Entrance Hall.
- Exterior rolling doors shall be of steel and hand operated.

(b) Interior Finish

- For Laboratory Room the floor will be trowel concrete with dust proofing paint, the walls emulsion paint on mortar. False ceiling will not be applied.
- For Staff Room, Monitoring Room, Conference Room, Equipment Storage Room and Pantry the floors will be PVC tiles, the walls emulsion paint on mortar and the ceiling acoustic tiles.
- Staff Room and Monitoring Room will have free access floors to allow for computer installation.

- For Workshop and Soil Testing Room the floor will be the same as Laboratory Room. False ceiling will not be applied and the exposed underside of the slab and beams will receive emulsion paint.
- For Corridors and Entrance Hall the floor will be terrazzo, the walls emulsion paint and the ceiling gypsum board painted with emulsion paint. Part of the Entrance Hall wall will be tiled.
- Interior doors will be of wood.

(3) Facilities and Equipment Plan

1) Flumes and Artificial Rainfall Apparatus

As a result of the examinations of items and scale of experiments, which would be done at the laboratory, four experiment flumes with tilting capability, namely “wide flume”, “two-dimensional flume”, “debris flow flume” and “lahar flume/model of fan”, will be provided by the Project to conduct the various experiments under the various hydraulic conditions.

In order to improve the flood control/sabo technology in the Philippines, it is necessary to grasp the phenomena on alluvial fan and dike, which are made of volcanic ash, and to study on their protection works. Therefore, the artificial rainfall apparatus, equipped with slope model, will also be provided in the laboratory.

The Table 2-4 on the next page summarizes experiment disciplines and items for each experiment flume.

Table 2-4 Experiment Disciplines and Items for Four Flumes

Experiment Facilities	Experiment Disciplines	Experiment Item
Wide flume	Width: 3m, Flume length: 40m, Slope variation: 0～1/50	
	• Experiments on the phenomena, affected by the cross sectional flow • Experiments on diversion and Junction etc.	• Appearance and movement of sandbars. • Riverbank erosion by sandbars and its movement. • Riverbank erosion by meandering river model • Effect of groin against river bank erosion • Scoring around bridge pier • Water level rising by bridge pier • Hydraulic phenomena at diversion and confluence
Two-dimensional Flume	Width: 0.5m, Flume length: 20m, Slope variation: 0～1/50	
	• Basic experiments on flow and sediment transportation • Experiments on two-dimensional flow, etc.	• Measurement of basic hydraulic figures (flow velocity distribution, resistance of riverbed, etc.) • Configurations and rates of sediment trans-portation by slope, diameter, water depth etc. • Scoring around structures and piers • Scoring at the downstream of ground sill, drop structure, weir • Effect of protection works • Water jump
Debris flow flume	Width: 0.5m, Flume length: 20m, Slope variation: 0～20^{o}	
	• Basic experiments on behavior of sediment transportation at the sabo section • Experiments on slope stabilization works for the steep slope rivers, etc.	• Basic characteristics of debris flow • Basic characteristics of hyper-concentrated debris flow and mudflow • Functions of sabo dam • Functions of consolidation works and river training works
Lahar flume /model of fan	Width: 1m + 4m, Length: 10m + 10m, Slope variation: 0～30^{o} + 0～1/50	
	• Experiments on the debris/mud flow from steep slope rivers to alluvial fan, etc.	• Characteristics of debris flow and washed sand in the rivers with steep slope. • Diffusion form of debris/mud flow to alluvial fan
Artificial rainfall apparatus	Effective rainfall area: 5m x 10m, Rainfall intensity: 200mm/hr equivalent	
	• Experiments on slope erosion and landslide by rainfall, etc.	• Amount of erosion by rainfall amount and soil condition. • Effect of erosion protection by vegetation. • Effect of erosion protection by geo-textile sheet. • Distribution of moisture content and collapse of slope by rainfall.

Experiment Flume

Experiment flumes consist of three sections namely “forebay: up-stream of flume”, “flume” and “sedimentation basin: downstream of flume” in general. The flume section of “lahar flume/model of fan” is divided into two parts of “lahar flume” and “model of fan”.

Dimensions and specifications of the flumes (width, length depth and slope range) have been determined in considerations of objectives and items of experiments to be done by the flumes, and referring to the size of other facilities, e.g. Public Works Research Institute (PWRI) in Japan.

The flow measurement and regulation tanks are installed in the forebay. The flow measurement tank should have enough length and height to measure the flow by using weir. Size of regulation tank has been determined by rise of water by baffles and referring to the other facilities.

The sedimentation basin at downstream of the flume will be used for the area for material sedimentation and sampling and measurement of washed material. Dimensions of the area have been determined in consideration of width of flume, necessary space for sampling, function of sedimentation, etc.

The proposed dimensions and specifications of the experiment flumes and its design basis are shown in the Table 2-5 on the next page.

Table 2-5 Specification of Flumes

	Wide Flume	Two-dimensional Flume	Debris Flow Flume	Lahar Flume/Model of Fan
Width	3.0m • Width being able to form the sandbars and to move it in the flume • Flume width for the experiments on sandbar production and movement: 1m〜2m in PWRI • Assumed width of lower channel: 2m + Width of upper channel/area of riverbank: 1m = Total: 3m.	0.5m • Width being able to keep stable two-dimensional flow	0.5m • Width being able to keep stable two-dimensional flow. • Taking account of the amount of supply sand from the upstream	Mud Flow Flume Section: 1.0m • Taking account of supply of sand, effects of cross sectional flow. • Section of Model of Alluvial Fan: 4.0m • Taking account of diffusion area from mudflow flume.
Length	40m • Necessary flume length for formation of stable sand bar: 20 times of flume width	25m • Approach: about 20 times of water depth + measurement section: about 20 x water depth + downstream section: about 10 x water depth = Total flume length: about 50 times of water depth • Max. water depth: 50cm	20m • Taking account of the necessary testing length for test with river training works.	Mud Flow Flume Section: 10m • Taking account of max. slope against laboratory scale. Section of Model of Alluvial Fan: 10m • Taking account of diffusion area from mudflow flume and handling of diffused mud.
Depth	70cm • Max. water depth of the experiment under mild slope conditions: about 50cm • Free board: 20cm	60cm • Max. water depth of experimentation: 50cm • Free board: 10cm	60cm • Taking account of the workability for setting model • Taking account of the free board for water raise by sabo dam model	Mud Flow Flume Section: 60cm • Taking account of mudflow condition, size of the flume, etc. Section of Model of Alluvial Fan: 50cm • Taking in the consideration of diffusion of mudflow, making of model of alluvial fan.
Slope Variation	0〜1/50 The objectives of the flume are to grasp the forming and moving phenomena of sand bar in the river course. To grasp the formation process of sand bar under the various conditions, the flume should have a tilting capability. Max. slope of flume is 1/50, which is taking into consideration of slope of alluvial fan.	0〜1/50 The objectives of the flume are to grasp the condition/behavior of sediment transportation in the flow. To conduct the test under the various conditions, the flume should have a tilting capability. Max. slope of flume is 1/50, which is nearly equal of max. slope of alluvial fan and scale of facilities.	0〜20^{o} The objectives of the flume are to grasp the basic phenomena of debris flow by slope of river, diameter of material, and sediment transportation in the debris flow. To conduct the test under the various conditions, the flume should have a tilting capability.	Mud Flow Flume Section: 0〜30^{o} The objectives of the flume are to grasp the debris/ mudflow conditions under the different river bed slope and its diffusion to the alluvial fan. To conduct the test under the various conditions, the flume should have a tilting capability. Max. slope of 30^{o} is determined taking account of the conditions of flume length and size, mud flow occurring slope, etc. Section of Model of Alluvial Fan: 0〜1/50 Max. slope of this section of 1/50 is determined taking account of max. slope of alluvial fan and size of model.
Flow Measurement	Electromagnetic flow meter: ø500 Assumed length of measurement basin of 5m would make building longer, and would be disadvantage from economical viewpoint. The electromagnetic flow mater would be applied for the measurement of flow to reduce the building length.	Flow measurement: Measurement tank: 1.5m x weir: 0.6m Since there are fewer limitations on the flume, the flow measurement tank with weir would be applied for flow measurement. The weir should be measured about 250 lit/sec with the assumptions of max. water depth of 30cm at max. slope.	Flow measurement: Measurement tank: 1.2m x weir: 0.48m Since there are fewer limitations on the flume, the flow measurement tank with weir would be applied for flow measurement. The weir should be measured about 150 lit/sec with reference of the facilities of PWRI	Electromagnetic Flow Meter: Max. scale 150 lit/sec To install the larger size of measurement tank at the movable section (at the top of flume) would be disadvantage from the mechanical and economical viewpoints. The electromagnetic flow mater would be installed at the water supply pipe. The measurement capacity of flow meter should be 150 lit/sec with reference of PWRI facilities.
Forebay	W: 3.0m x L: 5.0m x H: 2.0m • Referring to the flume at PWRI. • Baffles at intermediate section. • Taking account of the free board for water raise by baffles.	W: 1.0m x L: 3.0m x H: 2.0m • Referring to the flume at PWRI. • Baffles at intermediate section. • Taking account of the free board for water raise by baffles.	W: 0.5m x L: 3.0m x H: 1.6m (with sand supply equipment) • Necessity of soil injection to the water at forebay. • Referring to the flume at PWRI. • Taking account of the free board for water raise by baffles.	W: 1.0m x L: 1.5m x H: 1.0m (with mudflow occurrence equipment) • Necessity of mudflow occurrence equipment at most upstream of Lahar flume. • Referring to the flume at PWRI.
Sedimentation Basin	W: 4.0m x L: 4.0m x H: 1.0m Taking account of flume width and removal of soil/sand.	W: 1.0m x L: 5.0m x H: 0.6m Taking account of flume width and removal of soil/sand.	W: 2.0m x L: 5.0m x H: 0.6m Taking account of flume width and removal of soil/sand.	W: 5.0m x L: 5.0m x H: 0.5m Taking account of flume width and removal of soil/sand.

Artificial Rainfall Apparatus

The experiments using the artificial rainfall apparatus are mainly same scale experiments such as the experiments of slope erosion and landslide.

In considerations of the better reproduction of phenomena, the practical size of specimen, and limitation of space in the laboratory, the effective rainfall area of the artificial rainfall apparatus should be 5m x 10m. To obtain the equivalent energy of a raindrop, the height of the artificial rainfall apparatus should be 8~10m.

The proposed specifications of the artificial rainfall apparatus are shown in Table 2-6 below.

Table 2-6 Specifications of Artificial Rainfall Apparatus

Item	Specifications	Basis of Design
Effective rainfall area	10.0 x 5.0m	• Space for the artificial rainfall apparatus • Size of testing pieces
Rainfall capacity	Max. 200mm/hr	• Max. hourly rainfall intensity of Philippines • Pumping capacity to the apparatus
Rainfall system	Pump + Nozzle	• Max. pumping capacity: 180lit/min (200mm/hr equivalent) • Inverter pump for flow control
Water tank	2 x 2 x 0.8m	• Water tank should be constructed near the artificial rainfall apparatus to install the inverter pump. • Water flow: depends upon necessary volume for the experiment.

※ The artificial rainfall apparatus should be equipped with rain gauge to calibrate the rainfall amount

2) Incidental Facilities

Composition of the Incidental Facilities

Since a large quantity of water is necessary for the hydraulic experiments, the circulation system of experiment water should be provided to the laboratory. The summary of the system is shown in the Figure 2-2 on the next page.

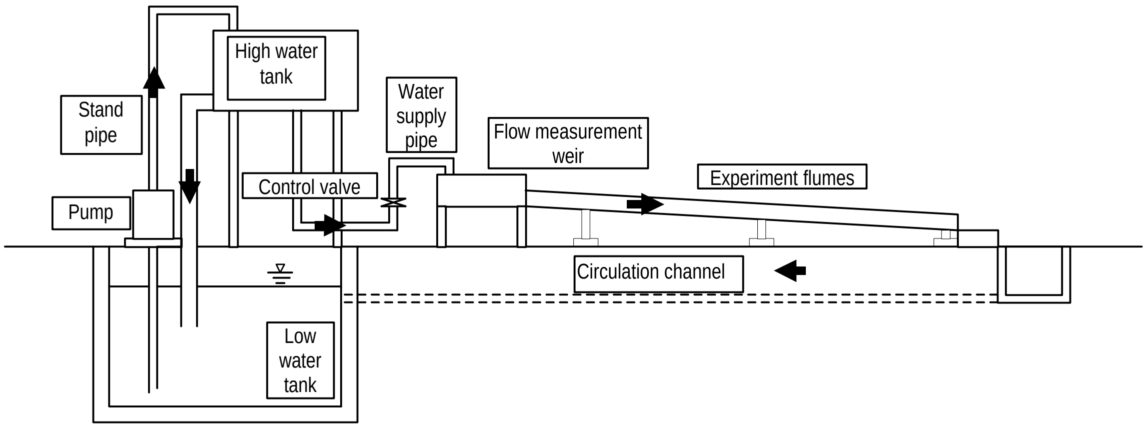


Figure 2-2 Experiment Water Circulation System

Water supply method

Two experiment water supply methods namely "high water tank method" and "pump supply method" to the flumes were studied. Because of the relatively fewer amount of maximum water supply (500 lit./sec.), and the ease of operation and maintenance, the proposed water supply method for the Laboratory is "high water tank method".

The comparisons of water supply method are shown in the Table below.

Table 2-7 Comparison of Water Supply Method

	High water tank method	**Pump supply method**
Water supply method	Experiment water is supplied from an elevated tank (high water tank), which has the overflow weir to keep water surface in fix level.	Direct water supply system from pump.
Flow control	Flow control valve	Pump operation control
Pump system	Relatively simple	Complicated
Remarks	Applied to many of hydraulic laboratory (e.g. PWRI, Universities, private companies, etc.)	Applied to University of the Philippines (UP) Experiment Site

Water supply capacity

Since there are fewer possibility to conduct the experiments using multiple flumes, and it is supposed that the necessary amount of experiment water for the outdoor experiment model, which would be expanded in the future, would not exceed the necessary amount of water for the wide flume, the maximum water supply capacity of 500 lit./sec. which is the same flow capacity of the wide flume has been proposed.

Low water tank

The capacity of the low water tank has been estimated at 400m^3, which is the sum of necessary amount of each facilities, circulation channel, temporary storage of facilities, etc. Basis of the calculation is shown in the table below.

Table 2-8 Calculation of Low Water Tank Capacity

Facility	Dimension	Capacity	Remarks
High water tank	4.0m x 5.0m x 2.0m	40.0 m^3	
Circulation channel	1.0m x 0.6m x 100m	60.0 m^3	
Experiment Flumes	3.0m x 0.5m x 45m 0.5m x 0.4m x 30m	73.5 m^3	Wide flume and two-dimensional flume
Water supply pipes	φ600 x 46.6m	13.2 m^3	
Suction basin capacity	10m x 15m x 1.0m	150.0 m^3	Water depth of pump stop: 1.0m
Sub-total		336.7 m^3	
Reserve 20%		67.3 m^3	
Total:		404.0 m^3	400 m^3

The water level of the low water tank should be lower than the bottom elevation of the circulation channel.

High water tank

It is necessary to maintain the water surface in a fixed level in the high water tank for stable water supply to the experiment flumes. To maintain the water surface in a fixed level, the pipes from low water tank and to flumes should be connected to the bottom of the high water tank, and overflow weir should also be provided in the tank (refer to the following Figure).

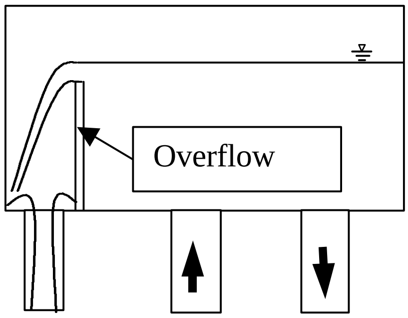


Figure 2-3　Image of High Water Tank Structure

The dimensions of the high water tank has been determined by pumping capacity, diameter of pipes connected, blow up velocity from pipes, length of weir for stable overflow, etc., and as shown in the Table below.

Table 2-9　Dimensions and Design Basis of High Water Tank

Dimension		Design basis
Width	4.0m	• Overflow length for stable water surface: B = 3.2m (formula of weir) • Reserve for fixing equipment for overflow weir, etc.: 0.8m
Length	5.8m	• Length of high water tank: about 3 times of water supply pipes • Distance from overflow weir: about 3 times of water supply pipes →Effective length of high water tank: 5.0m • Effective length: 5.0m + Space for excess water: 0.8m = Total: 5.8m
Height	3.0m	• Water depth: 2.0m (for decrease the velocity of blow up water from stand pipe) • Water depth: 2.0m + Free board: 1.0m = Total: 3.0m

The water supply pipe from low water tank and to the flumes should be 600mmϕ to decrease the velocity of water in the pipe. The excess water should be drained back to the low water tank with 500mmϕ pipe.

The water level of the tank must be high enough to supply the water to the debris flow flume, which has the highest blow up level.

The high and low water tank will be of reinforced concrete.

Water supply pumps

The total water supply capacity is 500 lit./sec. as mentioned above. Three water supply pumps (1 x 100 lit./sec. and 2 x 200 lit/sec.) should be provided at low water tank to supply the water to the high water tank. Because this pump combination can set up water supply amount every 100 lit/sec. for efficient pump operation.

Auxiliary drainage pump should be installed in the low water tank to drain the used water, to supply the experiment water for the artificial rainfall apparatus and the experiments using small amount of water (about 5 lit./sec.).

Circulation Channel

Design maximum flow of circulation channel is 500 lit./sec, which is the same amount of maximum water supply capacity. The proposed dimensions of the channel is 1m x 1m (with effective depth of 0.6m) in consideration of obstruction by waste choking at filter. Assuming that coefficient of roughness be 0.023, the slope of 1/500 is necessary to let the water to be needed circulate in the channel of this size.

The circulation channel is to be of reinforced concrete construction.

3) Measurement Instruments and Equipment

Minimal amount and variety of measurement instruments and equipment that are really necessary for the experiments will be procured based on the design of experiments to be submitted by Philippine side. Those to be used in the field which were included in the request are considered to be unnecessary for the experiments in Laboratory Room but would be used for pilot study conducted by the FCSEC. Therefore they shall be omitted from those to be procured in the scope of the Project. Concerning the equipment for soil tests, only that necessary for collecting data related to the hydraulic experiments shall be procured.

Proposed measurement instruments and equipment for the laboratory and its numbers and specifications are shown in the following table.

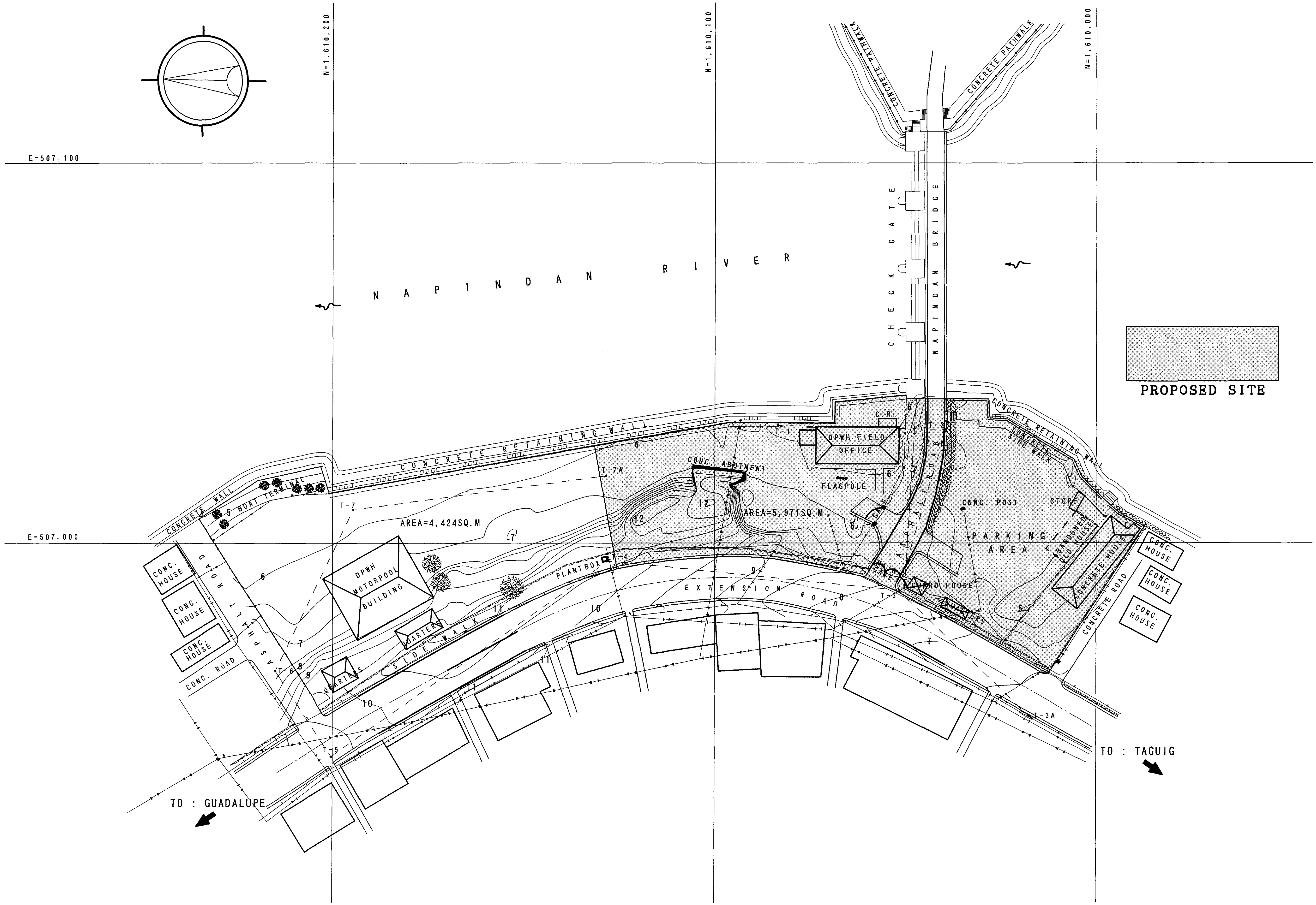
Table 2-10 Equipment and Instrument to be Procured

Item	Q'ty	Specification
I. Exhibition Model		
1. Exhibition Model (River)	1	
2. Exhibition Model (Sabo, Land slide)	2	Sabo: 1, Land Slide: 1
II. Instrument		
1. Water Level Gauge		
Point Gauge	16	Fixed type: 6, Movable type: 10, Measurement length: 50cm, Accuracy: 1/10mm
Servo Type Gauge	5	Max. Measurement: ±150mm, Analysis Ability: 50 μm
2. Current Meter		
Electromagnetic Type	5	Single direction
Electromagnetic Type (x-y direction)	3	Horizontal, Accuracy: ±2% of full scale
Electromagnetic Type (x-z direction)	2	Vertical, Accuracy: ±2% of full scale
Pilot tube (with manometer)	8	Pilot tube
	5	Manometer
3. Sediment Deposition Surface Measurement Equipment		
Profiler	5	Max. Measurement Length: 600mm, Accuracy: within ±0.5mm
Laser Type	1	
4. Piezometer	20	For laboratory use
5. Tensiometer	10	- do -

Item	Q'ty	Specification
6. Data Acquiring System	2	Note type PC with A/D converter and software
III. Soil Test Apparatus		
1. Precision Scale		
Small range	1	300g, Min. indication: 0.001g
Medium range 1	1	6kg, Min. indication: 0.01g
Medium range 2	1	100kg, Min. indication: 1g
Heavy range	1	1,200kg, Min. indication: 0.2kg
2. Box shear apparatus	1	Dia.: 10cm (With necessary specimen preparation tools)
3. Liquid-limit measuring device	5	
4. Hydrometer	5	
5. Soil sampler	5	For manual sampling
6. Sieve and sieve shaker	3	JIS: 2 sets, ASTM: 1 set
7. Sieve (Large Size)	1	75.0mm, 50.0mm, 9.5mm
8. Compaction Test Apparatus	5	JIS (Mold dia.: 10cm, Rammer: 2.5kg, 4.5kg)
9. Soil Mixer	1	For laboratory use, Capacity: approx. 50 liter
10. Dry instrument		
Large size	1	Oven (both sample dry and model making)
Small size	1	Sample Dryer
IV. Model Preparation Tools		
1. Wood-working machine	1 set	
2. Metal-working machine	1 set	
V. Vehicle		
1. Dump Truck	1	2 ton
2. Mini-Forklift	1	
3. Payloader	1	

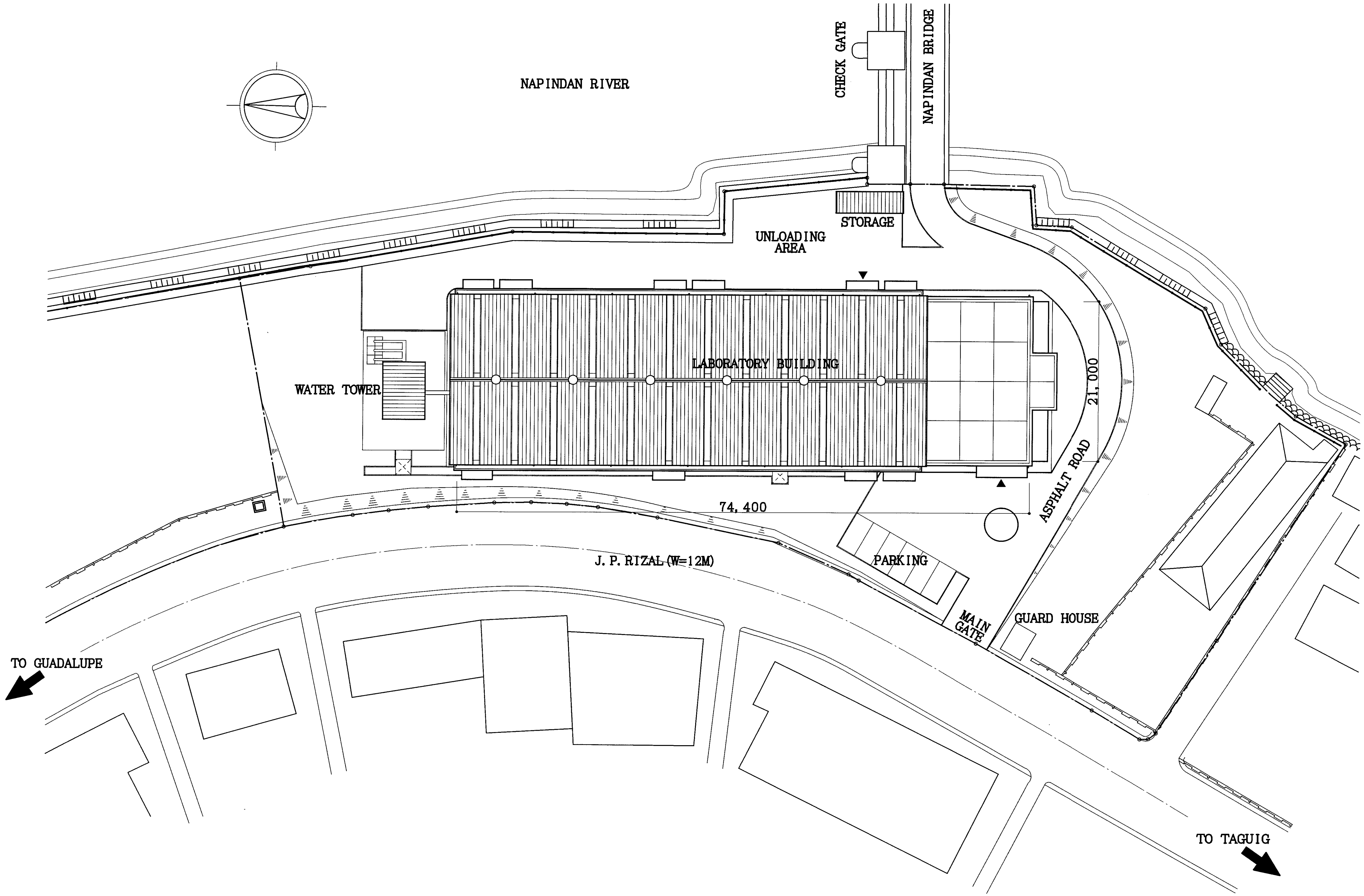
(4) Basic Design Drawings

Drwg-1 Present Site Plan .... S = 1/1000
Drwg-2 Site Layout Plan .... S = 1/500
Drwg-3 First Floor Plan .... S = 1/300
Drwg-4 Second Floor Plan .... S = 1/300
Drwg-5 Elevation .... S = 1/300
Drwg-6 Elevation, Section .... S = 1/300



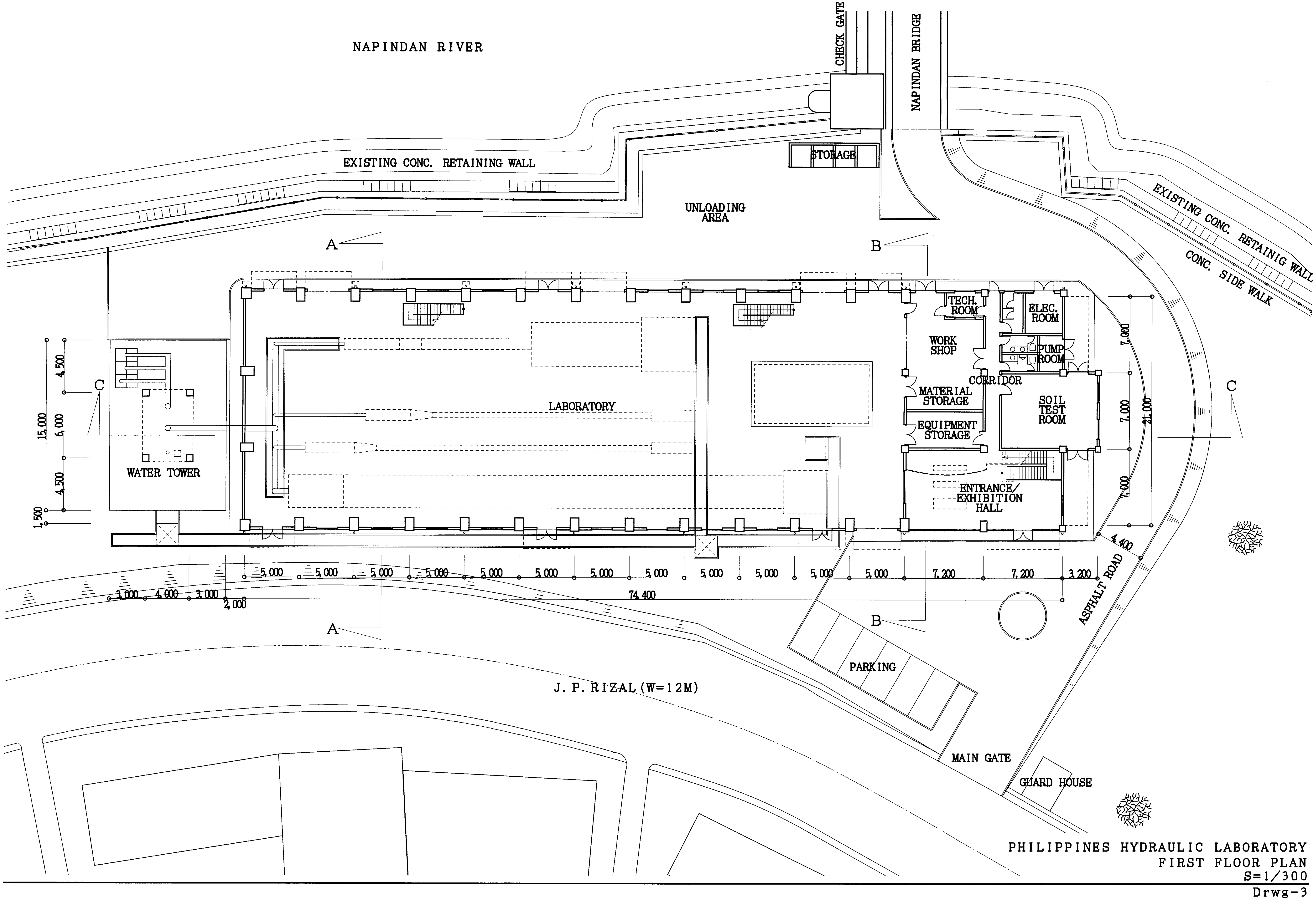
PHILIPPINES HYDAULIC LABORATORY
PRESENT SITE PLAN
S=1/1,000

Drwg-1



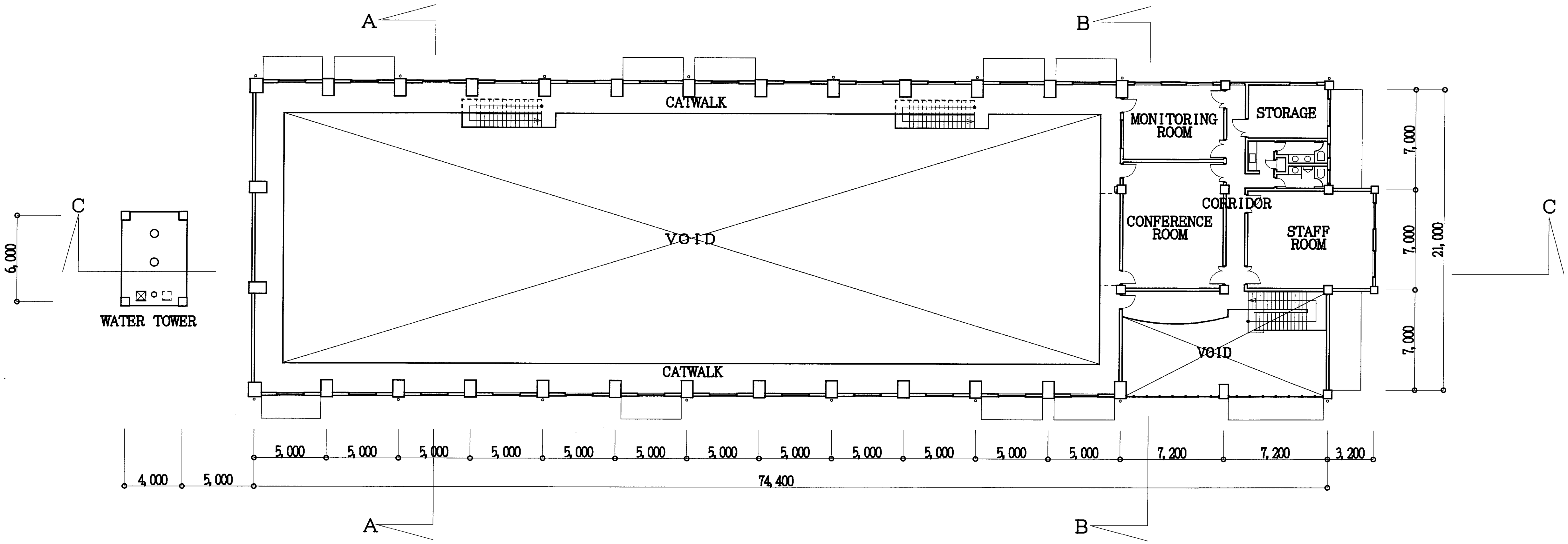
PHILIPPINES HYDAULIC LABORATORY
SITE LAYOUT PLAN
S=1/500

Drwg-2



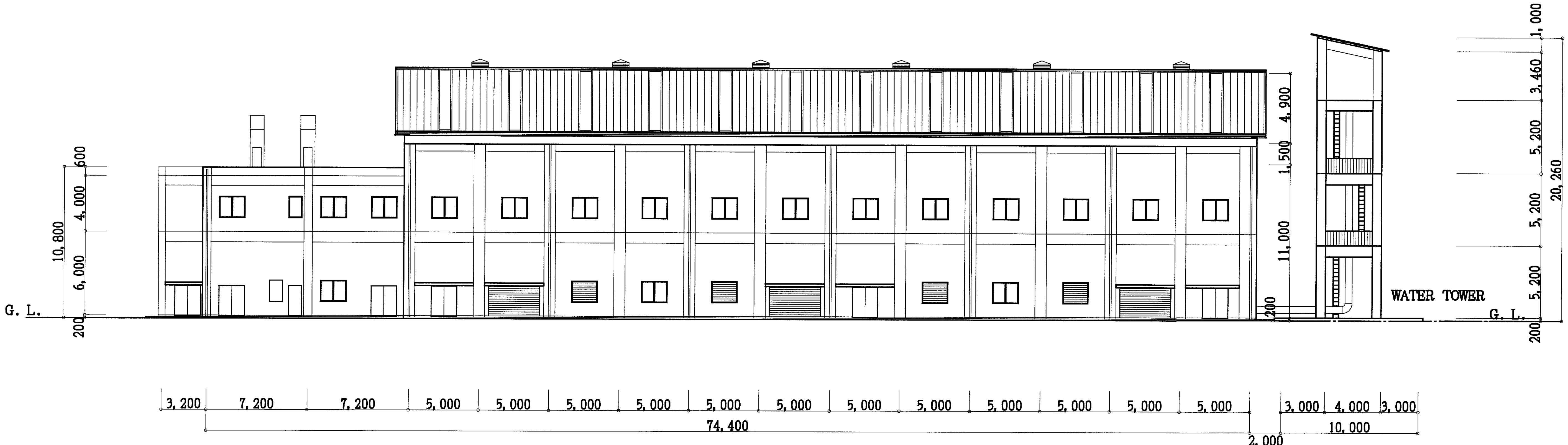
PHILIPPINES HYDRAULIC LABORATORY
FIRST FLOOR PLAN
S=1/300

Drwg-3

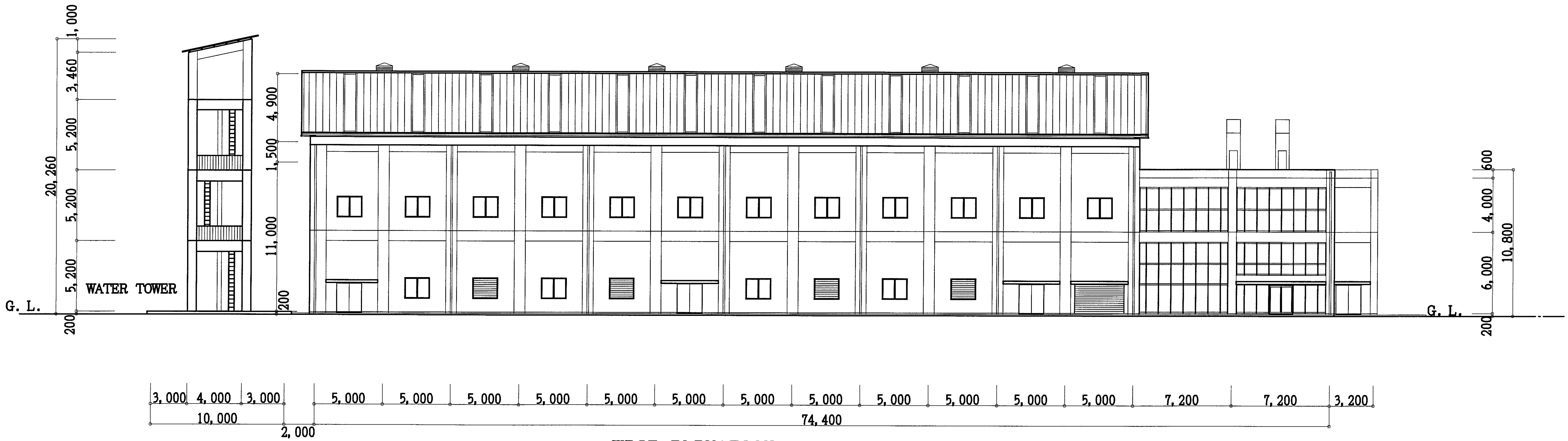


PHILIPPINES HYDRAULIC LABORATORY
SECOND FLOOR PLAN
S=1/300

Drwg-4



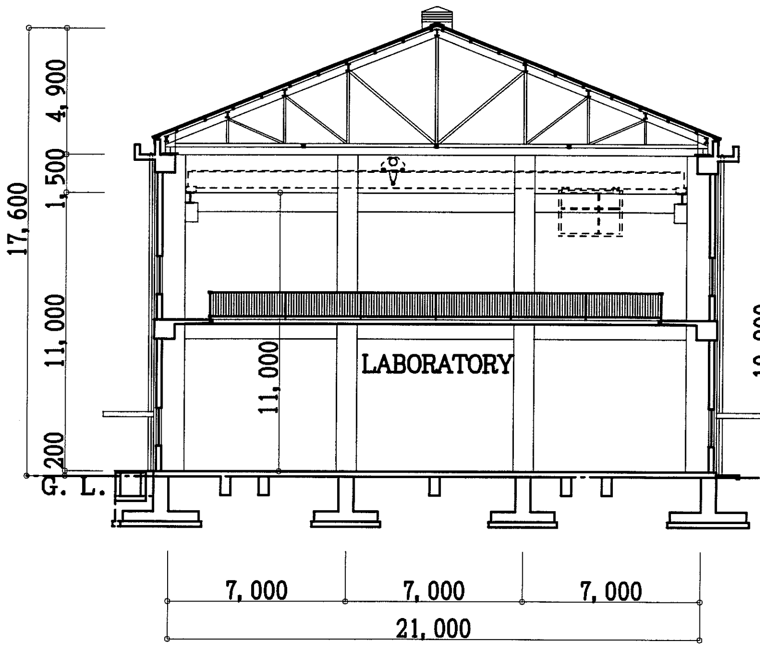
EAST ELEVATION



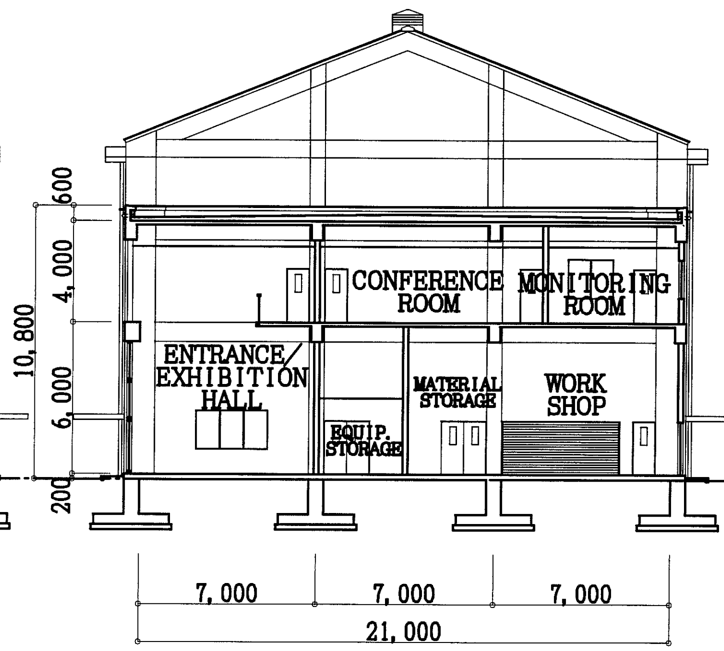
WEST ELEVATION

PHILIPPINES HYDRAULIC LABORATORY
ELEVATION
S=1/300

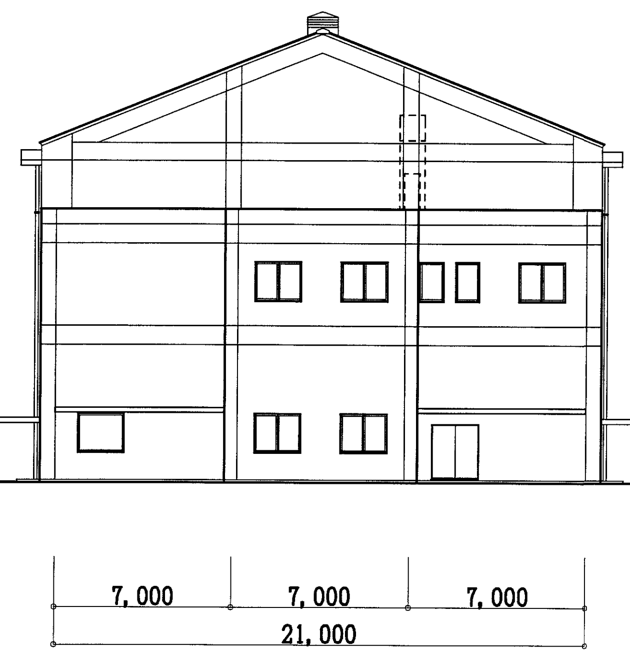
Drwg-5



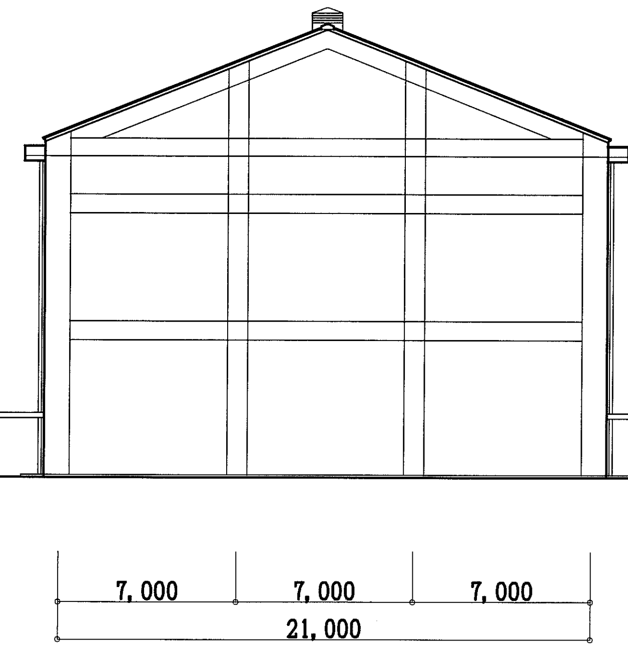
A-A SECTION



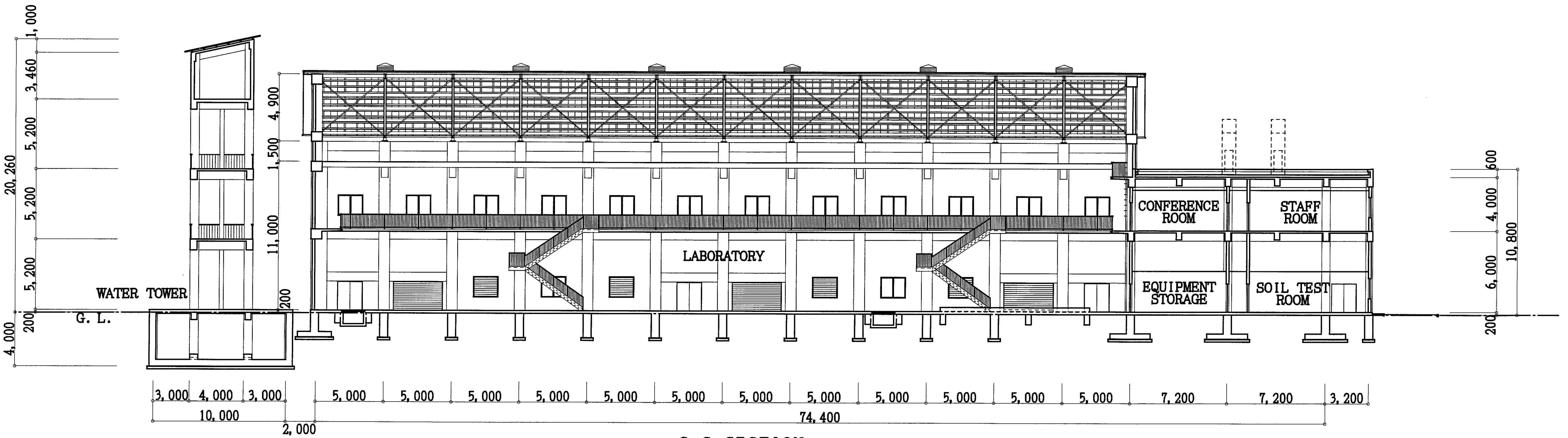
B-B SECTION



SOUTH ELEVATION



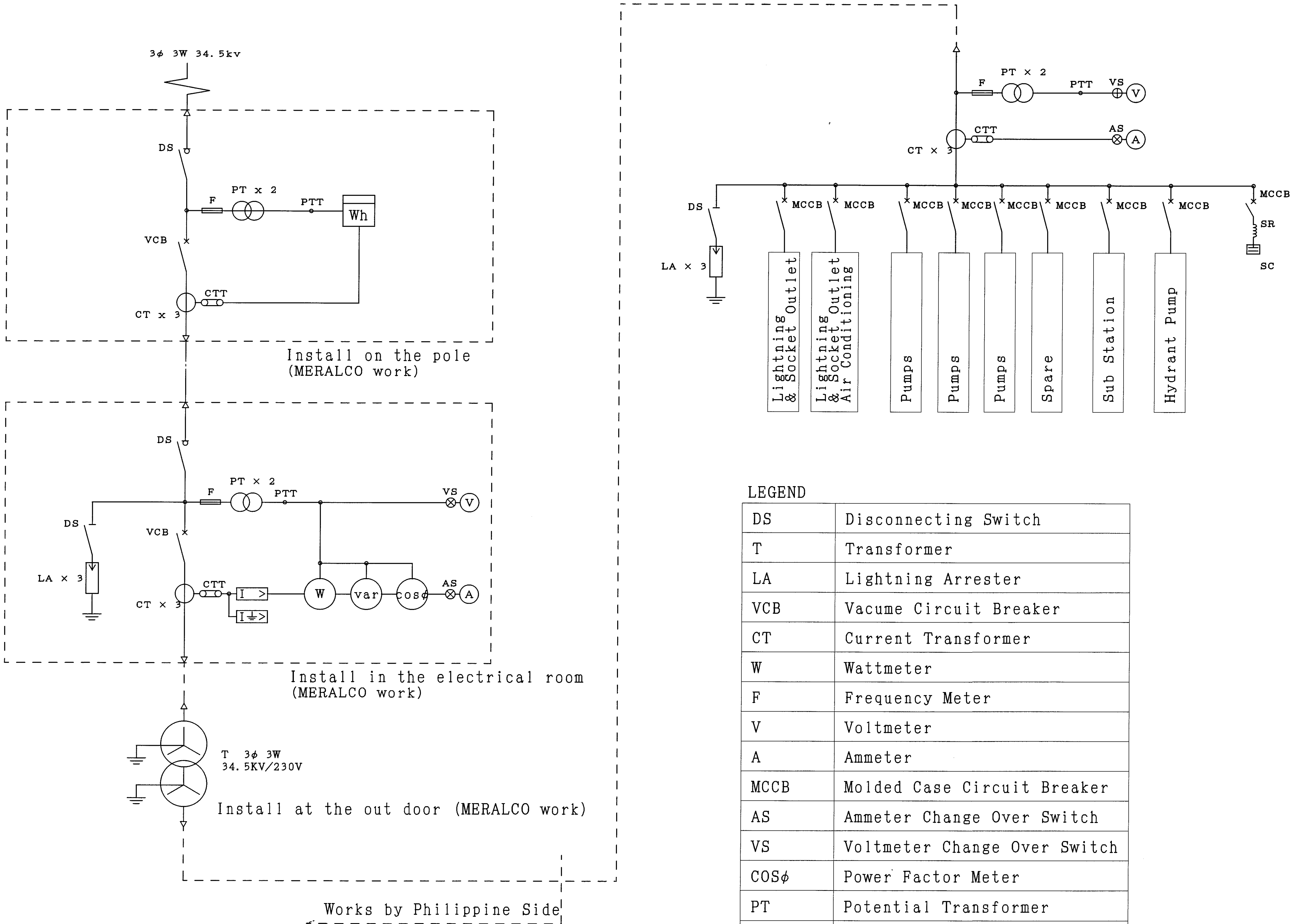
MORTH ELEVATION



C-C SECTION

PHILIPPINES HYDRAULIC LABORATORY
SECTION & ELEVATION
S=1/300

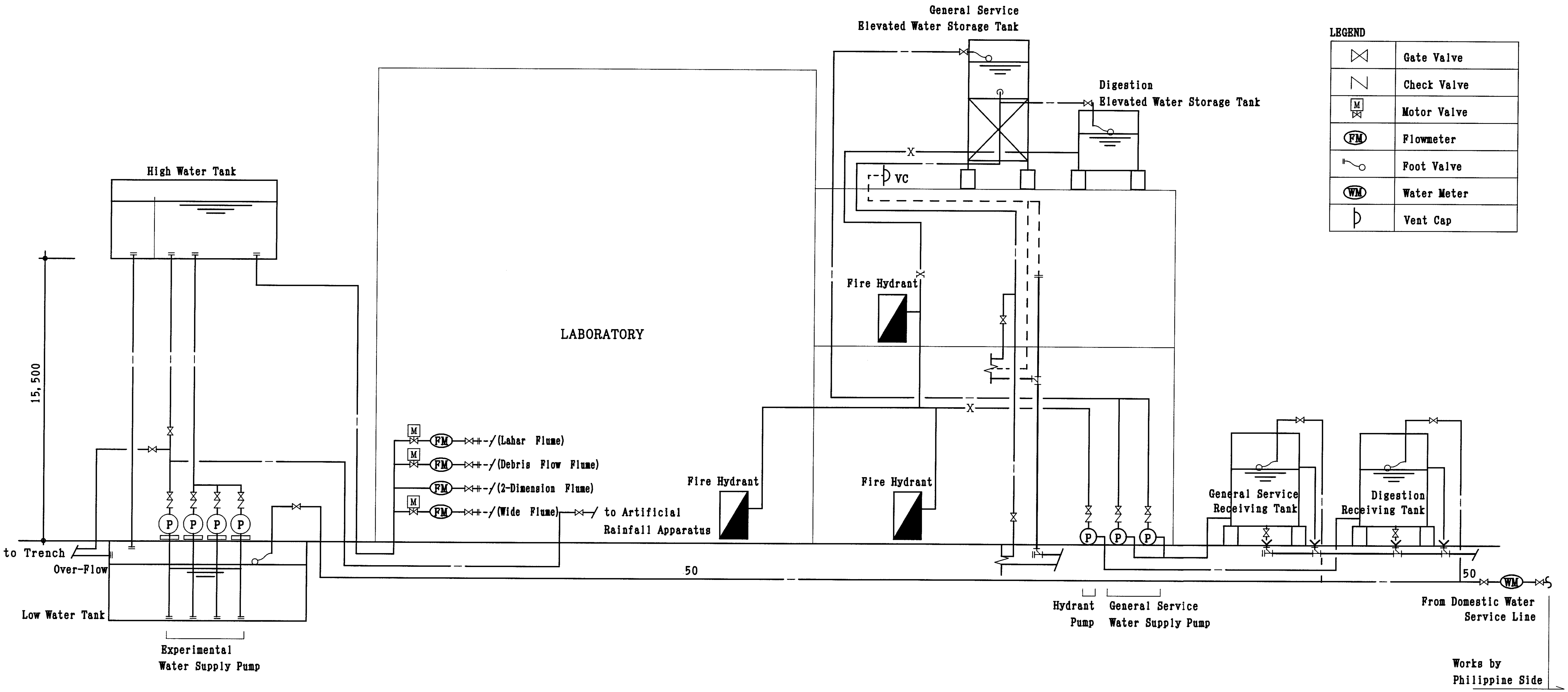
Drwg-6



LEGEND

DS	Disconnecting Switch
T	Transformer
LA	Lightning Arrester
VCB	Vacume Circuit Breaker
CT	Current Transformer
W	Wattmeter
F	Frequency Meter
V	Voltmeter
A	Ammeter
MCCB	Molded Case Circuit Breaker
AS	Ammeter Change Over Switch
VS	Voltmeter Change Over Switch
COSφ	Power Factor Meter
PT	Potential Transformer
var	var Meter
Wh	Watt Hour Meter

PHILIPPINES HYDRAULIC LABORATORY
SYSTEMATIC DIAGRAM OF ELECTRICAL INSTALLATIONS



PHILIPPINES HYDUAULIC LABORATORY
SYSTEMATIC DIAGRAM OF WATER SUPPLY AND DRAINAGE SYSTEM

Drwg-8

Chapter 3 Implementation Plan

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

The project shall be executed in accordance with the Japan's Grant Aid system, in conformity with the Exchange of Notes (E/N) between the Government of the Philippines and the Government of Japan, i.e. after conclusion of the E/N the Department of Public Works and Highways (DPWH) shall make a consulting agreement with a Japanese consultant. Following verification of the agreement by the Government of Japan, the consultant shall commence the detailed design work for the facilities and equipment and compile necessary tender documents consisting of detailed design drawings and specifications, etc.

After approval of the tender documents by the DPWH and the supervising agency on the Japanese side, tendering shall be carried out aiming at Japanese contractors. The consultant shall prepare a tender evaluation report to be screened and approved by the DPWH and the supervising agency on the Japanese side, and this shall lead up to the contract of the work. As with the consulting agreement, the contract shall become effective upon verification by the Government of Japan.

For implementation of the project, an implementation control setup shall be established under the supervision of related agencies of both governments, and this shall consist of the project implementing agency, the consultant and the contractor. Basic items and points requiring special consideration in project implementation are as described below.

(1) Control setup of the project-implementing agency

In order to execute the project smoothly, it is required that the DPWH assigns a responsible official as quickly as possible and establishes a control set-up whereby steady responsibility exists from the start of work through to completion. The responsible person in charge should be assigned from FCSEC staff.

As is described later, application procedures for obtaining building permission in the Philippines are many and complicated. Irrespective of the special nature of the project as a grant aid undertaking, six different permits including an Environmental Compliance Certificate and Building Permit are necessary, and almost all of these will need to be applied for by the DPWH. Since a minimum of six weeks is required to obtain permission, any delays in the acquisition may have a critical impact on proceeding of the work.

Therefore, it is important that the responsible official acquires thorough knowledge concerning the details of necessary procedures, holds ample consultations with government agencies responsible for permission in advance, and carries out coordination to ensure that swift screening can be carried out. This coordination work should be commenced before the tender documents are completed, and all permits required for the start of work should be obtained during the tendering period.

(2) Utilization of a local consultant

In order to apply for the building permit and other permits, the signature of a qualified professional engineer is necessary. Since this qualification is only permitted to engineers who possess a Philippine passport, it is indispensable that a local consultant be involved.

Moreover, the Philippines possesses its own building standard law, structural calculation criteria, fire fighting law and other building-related laws and regulations which have been formulated based on standards in the United States, and the standards cover such details as notational convention of drawings, etc. In carrying out design, it is compulsory for these standards to be adhered to. Accordingly, effective utilization of a local consultant well versed in these laws and standards is indispensable for the smooth proceeding of design work and swift acquisition of permits.

(3) Utilization of local contractors and dispatch of engineers

A total of 18,300 construction companies are currently registered with the Philippine Contractors Accreditation Board, and these are divided into six ranks consisting of AAA (274 companies), AA (142 companies), A (855 companies), B (1,682 companies), C (2,259 companies), and D (3,088 companies). Companies in the top AAA rank include 46 Japanese affiliated contractors.

The construction industry on the whole has enjoyed prosperous conditions over the past 10 years, and the high-rise office building construction boom was in progress up to 1998. Now, however, there is a surplus of these facilities and the industry is settling down again.

The above contractors cover not only building works but also include civil engineering works, electrical works, sanitary and plumbing installation works, air conditioning works, and so forth. In the project, except for installation of special equipment such as experiment flumes and artificial rainfall apparatus, which are the core project installations, utilization of local contractors can be anticipated in all areas of the construction work. However, from the viewpoint of adhering to the works schedule and securing quality, it is proper that the local construction contractor be selected from companies ranked in the AAA bracket as described above.

The Philippines is well known for having a trend whereby its skilled engineers leave for overseas countries in search of high rewards, and it has continually been known as a human resource exporting nation. However, in the construction sector, since experienced engineers who have until recently worked abroad in the Middle East and Africa, etc. have returned home due to a drop-off in work in such countries, it is presently relatively easy to secure skilled human resources, according to the DPWH.

Therefore, in carrying out construction of the project facilities, except for the installation of special equipment such as experiment flumes and artificial rainfall apparatus, there is not any particular need to dispatch expert engineers except for construction management.

3-1-2 Implementation Conditions

(1) Traffic Congestion and Quality Control of Concrete

In the Metro Manila region there are 17 concrete plants, and ready-mixed concrete supplied by these plants is used in almost all construction works in the metropolitan area. Traffic congestion has become serious in the area in recent years and, although time restrictions have been placed on large trucks, these have failed to have any major effect.

Delays in the arrival of ready-mixed concrete at site entails risk in that it may result in the hardening of concrete and may make it impossible to secure specified concrete strength. Therefore, when selecting the ready-mixed concrete company, in addition to its reliability, distance between the plant and the project site (required delivery time) is also an important condition.

In concrete placing, comprehensive and scrupulous care is required concerning selection of delivery times while paying constant attention to traffic congestion and adjustment of hardening by means of retarding agent.

(2) Consideration of Natural Conditions in Metro Manila

Due in part to the fact that the Philippines is hit by around 20 typhoons per year, annual average rainfall in Metro Manila from the past 10 years has been more than 2,000mm. Monthly average rainfall in the three months of July, August and September exceeds 300mm, and earth work and exterior painting work are confronted with numerous difficulties during this period.

The construction work schedule should be planned so that these works as a rule take place during the dry season from November to April. However, in the event where they have to be carried out during the rainy season due to unavoidable circumstances, it is vitally important that drainage be thoroughly carried out on the site and in excavated parts, that work times be coordinated, and that the utmost be done to ensure curing of work faces.

Moreover, because major roads in the city are often inundated during the typhoon season, traffic of goods is greatly affected. Site deliveries of materials, etc. can be held up for days, so typhoons have a major impact on works progress. The early securing of construction materials as described later is thus one of the most important points to consider when implementing works in Metro Manila.

(3) Procurement Situation and Early Securing of Construction Materials

Almost all of the construction materials used in the project can be procured in the Philippines. Basic materials such as aggregate, cement, reinforcing steel, forms and concrete, as well as wood and steel fittings, glass and paint, etc. are all produced locally. Moreover, concerning building interior materials, roofing steel sheet, aluminum sashes, structural steel, air conditioners, distribution panels and other metal fabricated products, the raw materials are imported from Japan, Europe and the United States and are converted into final products in the Philippines.

However, many of these locally procurable construction materials are not always available in large variety and there are often cases where stocks are limited. Labor disputes are another factor behind the exhaustion of stocks, and it is reported that with some suppliers it is hard to expect deadlines to be met unless advance payment is made.

Accordingly, the securing of construction materials with ample time to spare is essential to adhere to work schedule. It is desirable that the contractor quickly collect engineering data and samples of each finishing material from the start of work, and that the consultant also swiftly carry out the selection of the materials and give the go-ahead to securing of them.

(4) Appropriate Handling of Permit Procedures

When implementing construction work in the Philippines, starting from application for building permit it is necessary to apply for and obtain many permits up to the completion of work. Before the start of work, obtaining an Environmental Compliance Certificate (ECC) from the Department of Environment and Natural Resources (DENR) is compulsory, and then it is necessary to obtain the following permits from the Municipality:

- Building Permit
- Fencing Permit
- Electrical Permit
- Mechanical Permit
- Sanitary/Plumbing Permit

Moreover, as a condition for commencing work, it is obligatory to apply to the Municipality for the following permits at the time of completion:

- Occupancy Permit
- Electrical Permit to Operate
- Mechanical Permit to Operate

A minimum of six weeks is required from application through to acquisition of the above permits, which need to be obtained before starting the work. Therefore, to ensure that the work can be started smoothly, it is essential that related parties cooperate in making the necessary preparations.

3-1-3 Scope of Work

The contents of work to be performed by and in the expense of each government in the event where the project is implemented under the grant aid system of the Government of Japan are given below.

(1) Works to be Borne by the Japanese Side

1) Construction of the hydraulic laboratory building

- In addition to the laboratory building, this includes construction of the attached low water tank and high water tank, guard house, and warehouse (one building each). Moreover, supply and installation of incidental equipment such as electrical, plumbing, sanitary, air conditioning and ventilation systems, etc. in these facilities, as well as external work over the site area, are included.

2) Supply and installation of hydraulic experiment apparatus

- This is composed of experiment flumes (four types), artificial rainfall apparatus, display models, measuring instruments, soil test instruments and experiment preparation equipment.

(2) Works to be borne by the Philippine Side

1) Construction of the training and administration building and dormitory building

- Both of these facilities shall be completed by the time of completion of the above work to be conducted by the Japanese side.

2) Preparation of site for the hydraulic laboratory building construction

- Removal of the existing structures (deserted office building and house, guard station, storage shed, etc.), abut foundation remains, electricity poles, branch lines and other obstructions on the site, and leveling of the site land. All these things shall be completed before starting the construction of the hydraulic laboratory building.

3) Application for and acquisition of all domestic permits necessary for execution of the project

- Acquisition of the Environmental Compliance Certificate, Building Permit and incidental permits, Occupancy Permit, etc. required at the time of completion, and preparation of necessary documentation and swift acquisition of permits required of the applying agency (cooperation is expected from the consultant and the contractor concerning the preparation of engineering data necessary for making the applications).

4) Extension of commercial power supply and city water supply to the project facilities

- Arrangements shall be made for supply of the above services by the time of the project completion inspections.

5) Construction of gate and boundary walls

- These works shall either be finished by the time of or immediately after completion of the facilities (depending on coordination with the contractor).

6) Free provision of temporary workspace

- Since the construction site does not possess ample space, it is necessary to secure temporary workspace for the site office and stockyard, etc. in the neighborhood of the construction site.

7) Preparation of telephones, furniture, appliances, and plants and trees, etc. inside the premises as required

8) Supply of expendable items and replacement parts necessary for maintenance of facilities and equipment

9) Promotion of Banking Arrangement procedures, issue of Authorization to Pay and payment of commission

10) Prompt execution of tax exemption and customs clearance of imported materials and equipment

11) Appropriate and efficient maintenance and operation of the constructed facilities and procured equipment

12) Execution of all other responsibilities on the Philippine side as stipulated in the E/N

3-1-4 Consultant Supervision

(1) Basic Policy Regarding Supervision

The consultant shall form a project team to carry out the detailed design and supervision based on the purport of the basic design and shall strive for the smooth completion of the project. The basic concept of the supervision is described below.

1) The consultant shall coordinate closely with all parties concerned and shall make the utmost effort to ensure that the detailed design of facilities and equipment shall correctly reflect the ideas of basic design and that works are completed without delay.

2) Concerning acquisition of the various permits required for project execution, while making use of a local consultant, full preparations shall be made and cooperation offered to ensure that application procedures by the implementing agency proceed smoothly.

3) With respect to questions and items for examination presented by the contractor, swift responses and advice shall always be provided to help ensure smooth advancement of work.

4) To ensure that no inconsistencies arise in the understanding of conditions between the related agencies of both countries, appropriate and timely reporting concerning work progress shall be carried out.

(2) Details of the Supervision

The contents of the supervision to be provided by the consultant are described below.

1) Services Relating to Tender and Contracts

The consultant shall be engaged in preparation of detailed design drawings, specifications and other tender documents, pre-qualification for contractors, dealing with tenderers from the announcement of bidding to opening and evaluation of tenders and selection of contractor, preparation of contract agreement, contract negotiations and witnessing the signing of contracts. All the process and results of the tender shall be reported by the consultant to all parties concerned of both countries.

2) Examination and Approval of Contractor's Submittals

The consultant shall examine and approve all the documents such as work execution plan, implementation time schedules, manufacturer's shop drawings, technical documents, samples etc. submitted by the contractor and suppliers whether they are in accordance with the drawings and specifications,

3) Supervision of Work

The consultant shall dispatch supervisors as appropriate during the period of construction and installation to monitor the work and drawings and shall give the contractor appropriate instructions and advices. The consultant shall prepare a report every month regarding the status of the work progress and coordinate thorough understanding of the situation amongst the concerned parties.

4) Cooperation related to the Procedure for Payment Approval

The consultant shall review and approve the contents of payment requests presented by the contractor relating to the payment of contract prices to be paid during or at the end of the work.

5) Tests and Inspections

The consultant shall inspect all the materials and equipment prior to shipment, as well as attending any tests or inspections to be carried out during construction. The consultant shall, if the results of the tests or inspections are in accordance with the specifications give approval, and if not, give proper instruction to the contractor to rectify the matter. Results of said inspection and tests should be written in the monthly report.

6) Assistance in Handing-Over

Upon completion of the work, the consultant shall compile the final acceptance report and at the same time approve the submittals for handing-over such as keys, spare parts, instruction manuals for various equipments, maintenance manuals etc. The consultant shall also advise the DPWH on the proper running and maintenance of the building and equipment.

(3) Assignment of Supervisors

The project comprises building construction and equipment installation work thus requiring a high technical level of supervision. Supervision shall be carried out in an appropriate manner assuring the quality of the work, coordinating between building construction and equipment installation and keeping close coordination with the parties concerned in the Philippines Government and the contractor.

As such the dispatch of a resident supervisor is necessary and structural engineers, equipment engineers will be additionally dispatched on a short-term basis. In selecting the resident supervisor emphasis will be placed on broad experience, depth of technical knowledge, wide perspective and coordinating powers.

3-1-5 Procurement Plan

(1) Construction Materials Procurement Plan

Abundant supplies of construction materials including domestic items and imports are available at the Philippine market, and the building materials to be used in the project facilities can be procured locally. The table given in the next page shows a list of the procurement sources of major construction materials.

(2) Equipment Procurement Plan

1) Experiment flumes and artificial rainfall apparatus

To conduct the precise experiments, high accuracy of the experiment flumes and control devices is required, and flumes will have a complicated structure because they are in principle to be sloped type. However, there have been no experiences to manufacture such a complicated experiment flumes and artificial rainfall apparatus in the Philippines. Therefore, these facilities should be procured in Japan and be assembled in the site.

2) Measurement instruments and equipment

The measurement instruments and equipment should be all procured from Japan because the instruments/equipment that clear the required specifications have not been manufactured in the Philippines and the Japanese measurement instruments/equipment donated to the UP 20 years ago have been properly maintained and still function.

(3) Transportation of Materials and Equipment

Materials and equipment procured in Japan will be sent by ship. Unloading will be at Manila Port. Ordinary freight ships and container ships operate regularly between Japan and the Philippines. Of the former only one company operates once a week, and for the latter there are multiple companies operating once a week so that there is at least one shipment every one or two days.

Sea borne transport takes about five days and custom clearance at Manila Port takes about three to seven days. However as the submittal of shipping documents require the tax exemption documents from the implementing agency, actual clearance will depend on the footwork of the implementing agency.

The contractor shall comprehend the details of customs clearance and request for prior assistance from DPWH who must make all efforts for smooth clearance.

Table 3-1-1 List of Procurement Sources and Material Outline

Materials	Country of Procurement			Remarks
	Local	Japan	Third Country	
(Architectural materials)				
• Cement, aggregate	○			Local products; care is required concerning cement because of quality variations
• Forms	○ ○			Local products; repetitive use up to two times
• Reinforcing bars	○			Local products, ASTM standard items
• Steel work, steel plate	○			Locally fabricated using imported raw materials
• Concrete blocks	○			Local products, three types (thickness 100, 150, 200mm)
• Waterproofing and sealing materials	○			Imports from Japan and the United States, etc. are available
• Ceramic and porcelain tiles	○			Various local products are available but stocks are limited
• Timber and plywood	○			Local products exist but variety is limited
• Roof materials (steel corrugated sheet)	○			Sheet is imported from Japan, United States and Korea, etc. and fabricated locally
• Light gauge steel	○			Imports from Japan and the United States, etc. are available
• Aluminum sashes	○			Local products (Japanese affiliated companies) and imports are available
• Steel fittings, shutters	○			Local products are available, but imports are better quality
• Wooden furniture	○			Local products are good quality and are exported to Japan

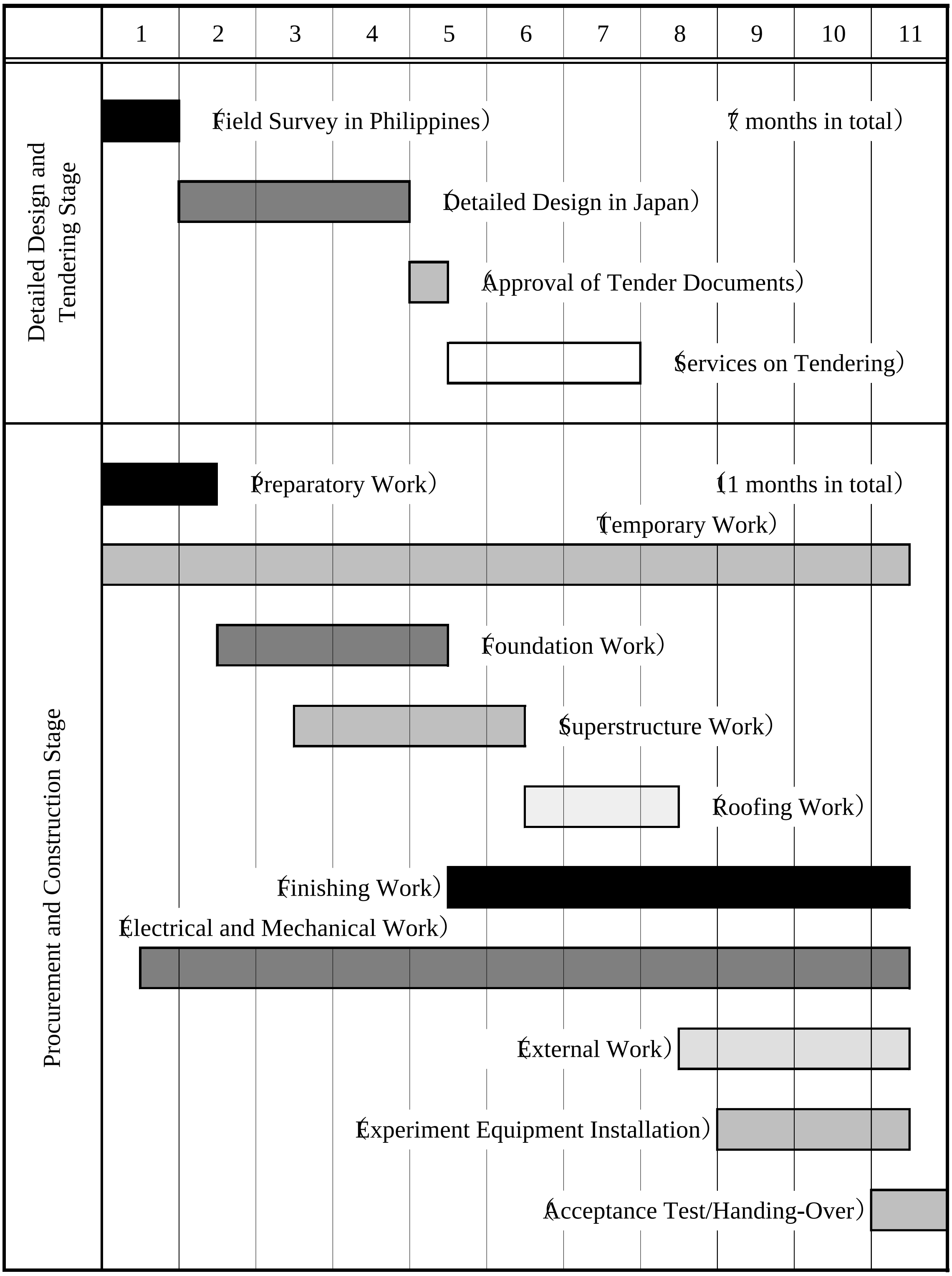
Materials	Country of Procurement			Remarks
	Local	Japan	Third Country	
• Hardware	○			Local products are available, but imports are better quality
• Ordinary plate glass	○			Local Japanese affiliates produce good quality products
• Paint	○			Local products
• Interior board	○			Local products are available, but imports are better quality
• Overhead crane	○			Raw materials imported from Japan are processed and assembled locally.
(Electric installation materials)				
• Lighting fixtures	○			Local products are available, but quality is poor
• Socket outlets, switches	○			Ditto
• wires, cables	○			Ditto
• Distribution panels, control panels	○			Local products are available and quality is good
• Interphone	○			Japanese and American imports are available
(Sanitary works)				
• Piping (PVC)	○			Local products are available, but quality is poor
• Piping (steel)	○			Ditto
• Sanitary fittings	○			Local products and imports of American standard are available
• Pumps	○			Japanese, European and American imports are available
(Air conditioning and ventilation work)				
• Air conditioners	○			Local products are available, but imports are better quality
• Ventilation fans	○			Ditto
• Insulation material	○			Ditto

3-1-6 Implementation Schedule

The implementation schedule for the project is as shown in the following table. It will take 19 months from the signing of the consulting agreement to the completion and handing-over of the project.

- From the signing of consulting agreement to the start of construction : 8 months (Time shown in the table plus one month for verification)
- Construction period : 11 months

Table 3-1-2 Implementation Time Schedule



3-2 Operation and Maintenance Plan

3-2-1 Operation and Maintenance for Facilities

(1) Buildings (laboratory building)

Building operation and maintenance mainly consist of everyday cleaning, repair work concerning wear and tear, breakage and deterioration of the interior/exterior of the building, facilities and equipment and replacement of parts, etc. Concerning periodic inspections and repairs, a maintenance manual shall be prepared and explained at the time of handing over, and special building maintenance techniques will not be required.

(2) Experiment facilities and equipment

One area of routine maintenance is the cleaning of flumes after experiments. Moreover, experiment flumes and pumps require periodic maintenance consisting of lubrication and painting. In particular, since the experiment flumes are a special item for facility, care shall be definitely taken according to the maintenance manual, which will be furnished at the time of procurement.

3-2-2 Operation and Maintenance Costs

Operation and maintenance costs are calculated as follows (all figures Philippine Peso).

Supplies:

1.	Cement and Aggregates	50,000P
2.	Steel, aluminum and other metal items	150,000P
3.	Lumber and Paint	50,000P
4.	Plumbing supplies	50,000P
5.	Computers and peripheral equipment	100,000P
6.	Office supply and devices	25,000P
7.	Equipment for auxiliary experiment	250,000P
8.	Miscellaneous	50,000P
	Sub total:	725,000P

Equipment Maintenance:

1.	Vehicles (3) operation and maintenance	150,000P
2.	Pumping system, repairs and parts	200,000P
3.	Measuring instruments, repairs and parts	300,000P
	Sub total:	650,000P

Utilities:

1.	Water-P5,000/mo	60,000P
2.	Electricity-P30,000/mo	360,000P
3.	Telephone-2 lines P4,000/mo	96,000P
	Sub total:	516,000P

Contracted Works and Services:

1.	Janitorial services-2 janitors	156,000P
2.	Security service-2 guard/shift	725,000P
	Sub total:	881,000P
	Total:	2,772,000P

The above trial estimate of annual operation and maintenance costs was approved in the DPWH meeting of May, 2000 in which Japan International Cooperation Agency (JICA) advisors also participated, and it is determined to be appropriated from the necessary budget.

Chapter 4 Project Evaluation and Recommendations

Chapter 4　Project Evaluation and Recommendation

4-1　Project Effect

By implementing this project the following effects can be expected.

Direct effect

(1) Improving the knowledge and engineering capabilities of Department of Public Works and Highways (DPWH) staff

By introducing hydrological experiments into the staff-training program it will be possible for the staff to obtain visual and sensual understanding of hydrological phenomena, which leads to improve technical level of flood control and sabo.

(2) Enabling the hydrological experiments peculiar to the Philippines

By constructing flumes of the size and function not found in other institutions including University of the Philippines (UP), it will be possible to carry out hydrological experiments that take into account the actual conditions prevailing in the Philippines and will enable the establishment of technical standards proper to the Philippines. Also, by using the flumes and artificial rainfall apparatus, to be procured for the project, research into actual disasters can become possible.

(3) Enabling experiments of actual disasters

By using the flumes and artificial rainfall apparatus actual disaster situations can be replicated and studied.

(4) Enlightening the general populace regarding flood and debris control

By holding seminars aimed at the general populace using the models that visually demonstrates flood and debris disasters the general populace will be educated of the importance of flood and debris control.

Indirect effect

(1) Establish new technical standards

Conducting basic research will help establish new flood control and sabo technical standards applicable to the Philippines.

(2) Enable a more efficient flood control and sabo implementation

By implementing the technical standards set up by Flood Control and Sabo Engineering Center (FCSEC) and reflecting the results of hydrological experiments in practice, a more efficient flood control and sabo may be achieved.

(3) Reduce the danger of flood

A swift and effective implementation of flood control and sabo measures will reduce the danger of floods faced by the populace.

4-2 Recommendations

As the project is expected to have a great effect in respect of flood control and contribute to improve BHN in general, it is highly significant to implement the project in the scheme of grant aid. Further, the setup of the Philippine side in respect of manpower and finances is not likely to become problem in operating and managing the project. Yet, the FCSEC should put effort in the following points for smooth and effective operation of the project facilities.

(1) Establishment of experiment program

A concrete pilot program for basic training and experiments is being planned by the FCSEC and it is desirable for them to complete it soon. The facility is planned to be opened to the UP, with which a cooperation agreement exists, and other institutions. By opening the facility to other users not only the research in this field will be enhanced but also rental revenues can be expected.

(2) Cooperation with University of the Philippines

Although the establishment of training and experiment program is to be carried out by the FCSEC, as the DPWH has not carried out hydraulic experiments independently, cooperation from the UP in addition to advisory setup in the scheme of project type technical cooperation is necessary.

The improvement of experiment quality rests on continuous accumulation of experiments. At the UP after the establishment of National Hydrological Research Center (NHRC) it has the accumulation of 20 years of experimental stock and expertise in the maintenance of experiment apparatus and equipment. The cooperation of the UP is desirable to take full advantage of their know-how.

Appendices

1. Member List of the Survey Team
2. Survey Schedule
3. List of Party Concerned in the Republic of Philippines
4. Minutes of Discussions
5. Cost Estimation Borne by the Republic of Philippines
6. Reference

1. Member List of the Survey Team

(1) Basic Design Study (Jan, 2000)

Name	Assignment	Present Post
Mr. Hidetomi OI	Leader	Senior Specialist, Institute for International Cooperation, Japan International Cooperation Agency (JICA)
Mr. Yoshio SUWA	Technical Adviser	Senior Research Engineer, River Hydraulics Division, River Department, Public Works Research Institute (PWRI), Ministry of Construction
Mr. Hideaki OTA	Chief Consultant/ Architectural Planner	Nissoken Architects/Engineers
Mr. Kenichiro HAMAGUCHI	Hydraulic Laboratory Construction Planner	Pacific Consultants International
Mr. Ryo MATSUMARU	Equipment Planner	Pacific Consultants International
Mr. Fumio UKAJI	Natural Conditions Surveyor/Geologist	Nissoken Architects/Engineers
Mr. Sumio MORITA	Procurement and Construction Planner/ Cost Estimate	Nissoken Architects/Engineers

(2) Explanation of Draft Basic Design Report (May, 2000)

Name	Assignment	Present Post
Mr. Motofumi KOHARA	Leader	Resident Representative, JICA Philippines Office
Mr. Yuichi MATSUSHITA	Coordinator	Staff, Third Project Management Division, Grant Aid Management Department Japan International Cooperation Agency(JICA)
Mr. Hideaki OHTA	Chief Consultant/ Architectural Planner	Nissoken Architects/Engineers
Mr. Kenichiro HAMAGUCHI	Hydraulic Laboratory Construction Planner	Pacific Consultants International
Mr. Ryo MATSUMARU	Equipment Planner	Pacific Consultants International

2. Survey Schedule

(1) Basic Design Study (Jan. 2000)

Date			Official Member		Consultant	
			OI	SUWA	OTA HAMAGUCHI MATSUMARU	UKAJI MORITA
1	1/26	Wed	Lv.Bankok Av.Manila Courtesy call on Embassy of Japan, JICA Office		Lv.Narita Av.Manila Courtesy call on Embassy of Japan, JICA Office	
2	1/27	Thu	Courtesy call on DPWH Visit a Laboratory of UP		Courtesy call on DPWH Visit a Laboratory of UP	
3	1/28	Fri	Survey of Project Site Meeting with FCSEC		Survey of Project Site Meeting with FCSEC	
4	1/29	Sat	Internal Meeting		Internal Meeting	
5	1/30	Sun	Holiday	Lv. Tokyo Av. Manila	Holiday	
6	1/31	Mon	Discussion with DPWH			Lv. Tokyo Av. Manila
7	2/1	Tue	Discussion with DPWH			Survey of Project Site Visit a Laboratory of UP
8	2/2	Wed	Discussion with DPWH			Survey of Project Site
9	2/3	Thu	Signing of M/D, Report to Embassy of Japan and JICA Office			
10	2/4	Fri	Discussion with MWSS Lv. Manila, Av. Tokyo		Discussion with MWSS（Ota, Hamaguchi） Discussion with Counterpart and Survey of Project Site	
11	2/5	Sat			Collection of data	
12	2/6	Sun			Holiday	
13	2/7	Mon			Discussion with Counterpart and Survey of Project Site	
14	2/8	Tue			Discussion with Counterpart and Survey of Project Site	
15	2/9	Wed			Discussion with Counterpart and Survey of Project Site	
16	2/10	Thu			Discussion with Counterpart and Survey of Project Site	
17	2/11	Fri			Progress Meeting for Laboratory	
18	2/12	Sat			Collection of data	
19	2/13	Sun			Holiday	
20	2/14	Mon			Discussion with Counterpart and Survey of Project Site	
21	2/15	Tue			Progress Meeting for Architecture	
22	2/16	Wed			Discussion with Counterpart and Survey of Project Site	
23	2/17	Thu			Discussion and Signing for Technical Note	
24	2/18	Fri			Report to JICA Office	
25	2/19	Sat			Lv. Manila, Av. Tokyo	

(2) Explanation of Draft Basic Design Report (May, 2000)

Date			Official Member		Consultant
			Kohara	**Matsushita**	**Ota, Hamaguchi, Matsumaru**
1	5/22	Mon	Courtesy call on Embassy of Japan, JICA Office		Lv. Tokyo, Av. Manila Courtesy call on Embassy of Japan, JICA Office
2	5/23	Tue	Courtesy call on DPWH, Explanation of Report Meeting with NEDA		Courtesy call on DPWH, Explanation of Report Meeting with NEDA
3	5/24	Wed	Explanation of Report, Discussion for M/D	Lv. Mongor, Av. Manila	Explanation of Report, Discussion for M/D
4	5/25	Thu	Explanation of Report, Discussion for M/D		
5	5/26	Fri	Signing of M/D		
6	5/27	Sat		Survey of Project Site	
7	5/28	Sun		Lv. Manila, Av. Tokyo	Holiday
8	5/29	Mon			Supplementary Survey and Collection of data
9	5/30	Tue			Ditto
10	5/31	Wed			Ditto
11	6/1	Thu			Report to Embassy of Japan and JICA Office
12	6/2	Fri			Lv. Manila, Av. Tokyo

3. List of Party Concerned in the Republic of the Philippines

Department of Public Works and Highways (DPWH)

Mr. Teodoro T. ENCARNACION	Undersecretary
Mr. Jesus P. CAMMAYO	Assistant Secretary

- Project Monitoring Office

Mr. Nonito F. FANO	Project Director, Major Flood Control Project

- Flood Control and Sabo Engineering Center

Mr. Resito V. DAVID	Officer in Charge, Project Director
Mr. Peter P.M. CASTRO	Deputy Director/ Associate Professor at University of Philippine
Ms. Rosalinda W. PARE	Officer in Charge, Engineer V
Mr. Ernie U. FANO	Engineer IV
Mr. Michael T. ALPASAN	Engineer II
Mr. Hideaki FUJIYAMA	Chief Adviser
Mr. Kazuhisa KOMATSU	JICA Expert
Mr. Toshihide KAWACHI	JICA Expert

- Planning Service

Mr. Kenji SUZUKI	JICA Expert
Mr. Yukihiko SAKATANI	JICA Expert
Ms. Rebecca T. GARSUTA	Engineer V, Development Planning Division
Ms. Aquilina T. DECILOS	Engineer III, Project Evaluation Division
Mr. Elmo F. ATILLANO	Engineer III, Project Evaluation Division

- Bureau of Design

Mr. Mariano C. Del CASTILLO	Architect III

- Bureau of Construction

Ms. Gloria C. BRIONES	Program Manager I
Mr. Rogelio R. ISTURIS	Engineer IV

- National Capital Region

Mr. Gil I. ITURRALDE	Engineer III, Pumping Station and Floodgates Division

National Economic Development Authority (NEDA)

- Public Investment Staff

Ms. Cristina Marie C. SANTIAGO	Senior Economic Development Specialist
Mr. Laurence Nelson GUEVARRA	Japan Desk Officer Economic Development Specialist I
Ms. Glory G. Natnat	Project Monitoring Staff – Infrastructure I

- Infrastructure Staff

Mr. Ruffie GUINTO	Senior Economic Development Specialist

Metropolitan Waterworks and Sewerage System (MWSS)

Ms. Maria A. Cruz	MWSS
Ms. Rebecca R. de Vera	MWSS
Mr. Benigno AYSON	MWSS
Ms. Leonor C. CLEOFAS	MWSS
Mr. Ascencion Fonte, Jr.	MWC
Mr. Husam MASRI	MWCI

Embassy of Japan

Mr. Shuntaro KAWAHARA	First Secretary

JICA Philippines Office

Mr. Hideo ONO	Resident Representative
Mr. Toshiyuki KUROYANAGI	Deputy Resident Representative
Mr. Motofumi KOHARA	Deputy Resident Representative
Ms. Noriko BANBA	Assistant Resident Representative

4. Minutes of Discussions

(1) Minutes of Discussions concluded at the time of the first field survey conducted by Basic Design Study Team

(February 3, 2000)

(2) Minutes of Discussions concluded at the time of explanation of Draft Basic Design Report

(May 26, 2000)

(1) Basic Design Study (February 3, 2000)

MINUTES OF DISCUSSIONS ON THE BASIC DESIGN STUDY ON THE PROJECT FOR THE CONSTRUCTION OF A HYDRAULIC LABORATORY BUILDING IN THE REPUBLIC OF THE PHILIPPINES

In response to a request from the Government of the Republic of the Philippines (hereinafter referred to as "the Philippines"), the Government of Japan decided to conduct the Basic Design Study on the Project for the Construction of a Hydraulic Laboratory Building (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA dispatched to the Philippines the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Hidetomi OI, Development Specialist, Institute for International Cooperation, JICA, and is scheduled to stay in the country from January 26 to February 19, 2000.

The Team held discussions with the officials concerned of the Government of the Philippines and conducted a field survey at the project area.

In the course of discussions and field survey, both parties confirmed the main items described in the attached sheets. The Team will proceed with further works and prepare the Basic Design Study Report.

Manila, February 3, 2000

大井英臣	Teodoro T. Encarnacion
Mr. Hidetomi OI Leader Basic Design Study Team JICA	Mr. Teodoro T. ENCARNACION Undersecretary Department of Public Works and Highways

ATTACHMENT

1. Objective of Project

The Government of the Philippines started the Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways under the JICA Project Type Technical Cooperation (hereinafter referred to as "PTTC").

The objective of the Grant Aid Project is to provide the Government of the Philippines with the Hydraulic Laboratory Building and appropriate equipment to be used by the PMO-Flood Control and Sabo Engineering Center (hereinafter referred to as "FCSEC") for the implementation of the PTTC Project.

2. Project Site

The Project Site is in the Napindan Compound of the Department of Public Works and Highways, Pasig City, Metro Manila (see ANNEX-1).

3. Responsible and Implementing Agency

The Responsible and Implementing Agency of the Project is the Department of Public Works and Highways (hereinafter referred to as "DPWH").

4. Items Requested by the Government of the Philippines

After discussions with the Team, the items as shown in ANNEX-2 were requested by the Philippine side.

JICA will assess the appropriateness of the request and will submit its recommendations to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

(1) The Philippine side understands the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-3.

(2) The Philippine side will take necessary measures, as described in ANNEX-4 for the smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

(1) The consultants in the Team will proceed with further studies in the Philippines until February 19, 2000.

(2) JICA will prepare the draft report and dispatch a team to explain its contents at the beginning of May 2000.

(3) After the contents of the report are accepted by the Government of the Philippines, JICA will complete the final report and send it to the Government of the Philippines by July 2000.

7. Other Relevant Issues

(1) The Philippine side shall ensure enough budget and personnel to operate and maintain the facilities and equipment after the completion of the Project.

(2) The Philippine side shall complete the following undertakings before the commencement of the Project.

(a) Clearance and leveling of ground on the proposed Project Site.

(b) Preparation of utilities necessary for the new facilities, such as electricity, water supply, drainage, and telephone line to the Site.

(3) The Team expressed its concern regarding the operation of the FCSEC and the delay of the construction of the Administration and Training Building. The Philippine side promised the allocation of adequate budget and personnel and the completion of the Building by December 2000.

(4) In the event that the Project is subjected to the National Economic Development Authority - Investment Coordination Committee (hereinafter referred to as "ICC") processing, the Team requested the DPWH to take all necessary measures for prompt clearance by the ICC. The DPWH acceded to this request.

(5) The Team requested the DPWH to take all necessary measures regarding the acquisition of the Environmental Compliance Certificate (hereinafter referred to as "ECC"). The DPWH acceded to this request.

(6) The Project Site was confirmed to be at the Napindan Compound of the FCSEC. However, as a result of the inspection by the Team and the FCSEC staff members, it was found that shifting the Project Site to the south of the originally proposed Project Site would be more appropriate. The Philippine side agreed to the appropriateness of shifting of the Site and promised to inform the Team regarding the decision on the site by February 11, 2000.

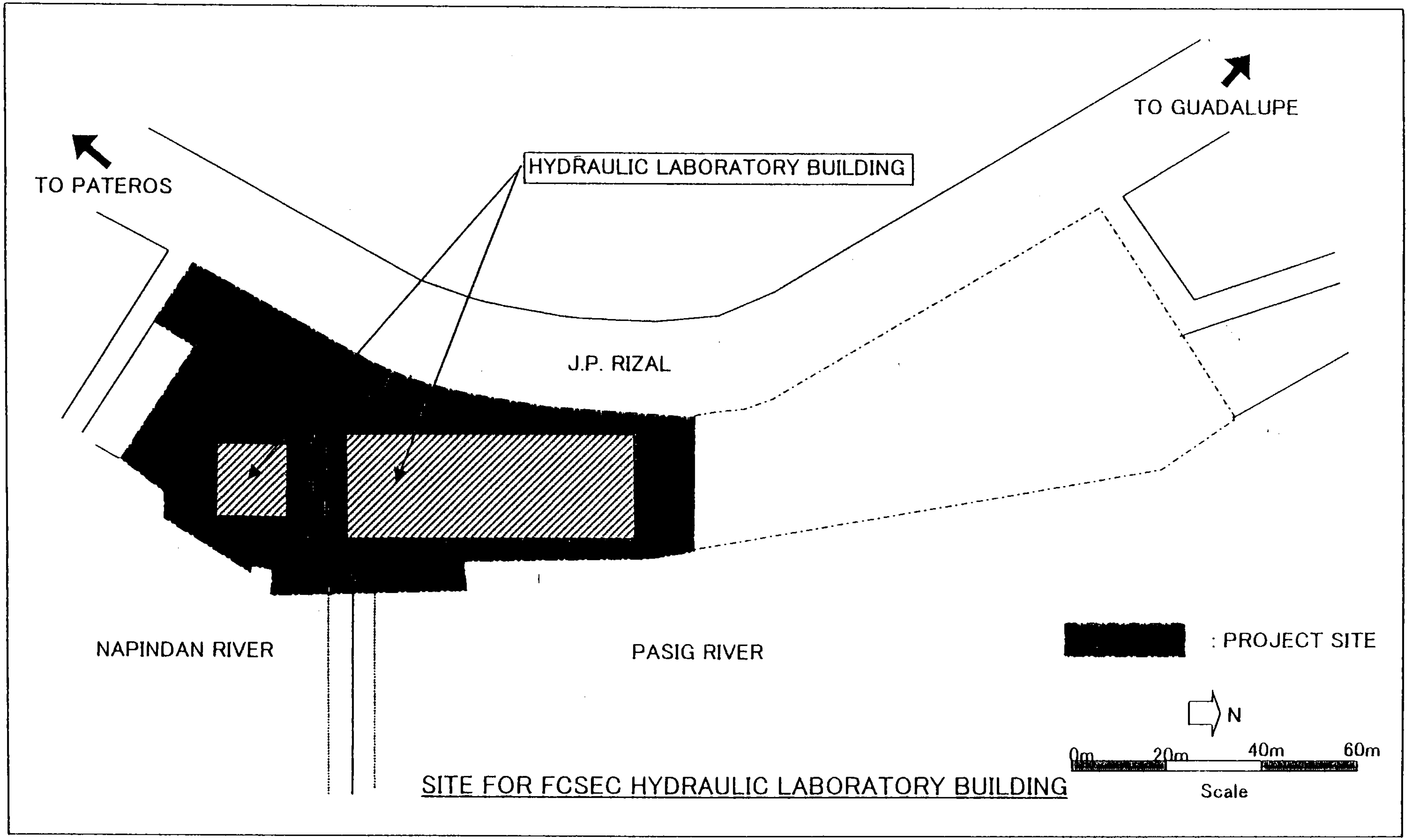
(7) The Philippine side requested the drilling of a well as part of the Grant Aid to ensure the required quality and quantity of water for the carrying out of hydraulic experiments. The Team agreed to convey the request to the Government of Japan.

(8) The Team requested to the Philippine side, regarding the temporary facility of Metropolitan Waterworks And Sewerage System (hereinafter referred to as "MWSS") to be built adjacent to the Project Site, to take all necessary measures so that the facilities will not hinder the construction and operation of the Project and would be dismantled upon the termination of the lease.

(9) The Philippine side will submit answers to the questionnaire by February 18, 2000, which the Team handed over to the Philippine side.

(10) The Philippine side has agreed to provide necessary number of counterpart personnel to the Team during the period of their studies.

ANNEX-1



SITE FOR FCSEC HYDRAULIC LABORATORY BUILDING

Item	Nos. of Request		Remarks
	Original	Final	
A. FACILITY			
I. Hydraulic Laboratory			
(1) Hydraulic model channel			
a. Wide Flume	1	1	W=3.0m, H=0.5m, L=40m, I=0~1/100
b. 2-Dimensional Flume	1	1	W=0.5m, H=0.5m, L=40m, I=0~1/100
c. Debris Flow Flume	1	1	W=0.5m, H=0.5m, L=20m, I=0~1/2
d. Lahar Flume, Model of Fan	1	1	Lahar: W=1.5m, H=0.5m, L=15m, I=0~1/3, Model of Fan: W=4.0m, H=0.5m, L=10m
e. Artificial Rainfall Apparatus	1	1	W=10m, L=5m
f. Exhibition Model (river)	1	1	
g. Exhibition Model (sabo, landslide)	1	1	debris flow and land slide
(2) Rooms			
a. Material storage room	1	1	
b. Equipment storage room	1	1	
c. Workshop	1	1	
d. Staff room	1	1	
e. Conference room	1	1	
f. Monitoring room	1	1	
g. others	1	1	
h. Hydraulic experiment room	-	1	
i. Soil test room	-	1	
II. Supplementary Facilities			
(1) Pumping Facilities			
a. Pump dicharge capacity more than 30 m3/min	1	1	
b. Low water tank (>150m3)	1	1	
c. High water tank (H>4m, Q>7m3)	1	1	
d. Pump room (3m x 2m)	1	1	
e. Circulation channel	1	1	
(2) Overhead Crane and Gondola	1	1	
B. Equipment			
I. Measurement Equipment			
(1) Water Level Meter			
a. Point gauge	15	16	(Fix type: 6, other: 10)
b. Servo type	5	5	
(2) Current meter			
a. Propeller current meter (handy type)	5	0	
a'. Electromagnetic current meter (single-direction)		5	
b. Electromagnetic current meter (x-y direction)	5	x-y: 3 x-z: 2	
c. Pitot tube (with manometer)	10	Pitot: 8 mano: 5	
(3) Sediment deposition surface measurement equipment			
a. Profiler	3	5	
b. Laser type	2	1	
(4) Survey Equipment			
a. Auto Level	3	3	
b. Transit	2	2	
c. Totalstation	1	1	
d. Kinematic GPS	1	1	
(5) Data processing equipment (with A/D converter)	2	2	Data acquiring system (A/D converter w/PC)
Data processing equipment	-	3	Data processing system (PC)
(6) Dial Scale			
a. Precize scale	8	0	
b. Heavy weight	2	0	
(6)' Dial Scale (Electric Type)			
a. Small range	-	1	Precize type
b. Medium range 1	-	1	- do -
c. Medium range 2	-	1	- do -
d. Heavy range	-	1	- do -
(7) Rain gauge (examination of artificial rainfall equipment	6	2	

Item	Nos. of Request		Remarks
	Original	Final	
(8) Piezometer	20	20	for Labo. Use
(9) Tensiometer	10	10	for Labo. Use
(10) Video camera	6	3	
(11) Camera	10	3	
(12) Digital camera	5	2	
(13) VCR and monitor	2	2	
(14) Video Editor	−	1	
II. Soil Test Apparatus			
(1) Box shear apparatus (medium size)	1	1	
(2) Triaxial compressing test apparatus (medium size)	1	1	
(3) Permeameter			
a. constant head	1	1	for Labo. Use
b. falling head	1	1	
(4) Liquid-limit measuring device	5	5	
(5) Hydrometer	5	5	
(6) Soil sampler	5	5	
(7) Cone penetrometer	5	5	
(8) Specimen preparation tools	1	1 set	
III. Supplementary Instrument			
(1) Sieve and sieve shaker	3	3	JIS: 2 set, ASTM: 1 set
Sieve(Large Size)	−	1	
(2) Concrete mixer	1	1	
(2)' Soil mixer	−	1	
(3) Wood-working machine	1	1 set	
(3)' Metal-working machine	−	1 set	
(4) Dry instrument			
a. Large size	1	1	Oven
b. Small size	1	1	Sample Dryer
(5) Submersible Pump			
a. 50 l/min	1	1	
b. 20 l/min	1	1	
c. 10 l/min	1	1	
d. 5 l/min	1	1	
(6) Sand supply equipment	3	3	belt conveyer
(7) Stereoscope	3	2	
(8) Weighting scale	1	0	
(9) Electric Generator	1	1	
(10) Oven	1	0	
IV. Vehicles			
(1) Payloader	1	1	
(2) Mini-Forklift	1	1	
(3) 6 Wheeler Truck (4 ton)	1	2 ton: 1	dump truck

Japan's Grant Aid Program

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid is executed by the following procedures.
- **Application** (request made by a recipient country)
- **Study** (Preparatory Study / Basic Design Study conducted by JICA)
- **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- **Determination of Implementation** (Exchange of Notes between the Governments of Japan and the recipient country)
- **Implementation** (Implementation of the Project)

(2) Firstly, an application or a request for a Project submitted by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is suitable for Japan's Grant Aid. If the request is deemed appropriate, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the study (Basic Design Study), using a Japanese consulting firm(s). If the background and objective of the requested project are not clear, a Preparatory Study is conducted prior to a Basic Design Study.

Thirdly, the Government of Japan appraises the project to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted for approval by the Cabinet.

Fourthly, the Project approved by the Cabinet becomes official when pledges by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Basic Design Study

(1) Contents of the Study

The purpose of the Study (Preparatory Study/Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

(a) to confirm background, objectives, benefits of the project and institutional capacity of agencies concerned of the recipient country necessary for project implementation;
(b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view;
(c) to confirm items agreed on by both parties concerning the basic concept of the Project;
(d) to prepare a basic design of the project,
(e) to estimate cost involved in the project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures is necessary to ensure its self-reliance in the implementation of the project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the project. Therefore, the implementation of the project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms, which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is (are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid provides a recipient country with non-reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation as such.

(2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

(3) "The period of the Grant Aid" means Japanese single fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding contracts with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed. However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of single fiscal year at most by mutual agreement between the two Governments.

(4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant may be used for the purchase of products or services of a third country origin.

However the prime contractors, namely, consulting, construction and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

(5) Necessity of the "Verification"

The Government of the recipient country or its designated authority will conclude into contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is deemed necessary to secure accountability to Japanese tax payers.

(6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

(a) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,

(b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

(c) to secure buildings prior to the installation work in case the Project is providing equipment,

(d) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,

(e) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,

(f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

(8) Re-export

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

(9) Banking Arrangement (B/A)

(a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.

(b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

ANNEX-4

Major Undertakings to be taken by Each Government for the Project

No	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a) The distributing line to the site		●
	b) The drop wiring and internal wiring within the site	●	
	c) The main circuit breaker and transformer	●	
	2) Water Supply		
	a) The city water distribution main to the site		●
	b) The supply system within the site (receiving and/or elevated tanks)	●	
	3) Drainage		
	a) The city drainage main (for storm, sewer and others) to the site		●
	b) The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4) Telephone System		
	a) The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b) The MDF and the extension after the frame / panel	●	
	5) Furniture and Equipment		
	a) General furniture		●
	b) Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

(2) **Explanation of Draft Basic Design (May 26, 2000)**

MINUTES OF DISCUSSIONS
ON BASIC DESIGN STUDY
ON THE PROJECT FOR THE CONSTRUCTION OF
A HYDRAULIC LABORATORY BUILDING
IN THE REPUBLIC OF THE PHILIPPINES
(EXPLANATION ON DRAFT REPORT)

In January 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for the Construction of a Hydraulic Laboratory Building (hereinafter referred to as "the Project") to the Republic of the Philippines, and through discussions, field surveys, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain to and to consult the officials of the Government of the Philippines (hereinafter referred to as "the Philippine side") on the components of the draft report, JICA sent to the Philippines the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Motofumi KOHARA, Deputy Resident Representative, JICA Philippines Office, JICA, from May 22 to June 2, 2000.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Manila, May 26, 2000

For the Team:

Motofumi KOHARA
Leader
Draft Report Explanation Team
JICA

For the Philippine side:

Teodoro T. ENCARNACION
Undersecretary
Department of Public Works and Highways

ATTACHMENT

1. Components of the Draft Report

The Philippines side agreed and accepted in principle the components of the draft report explained by the Team.

2. Japan's Grant Aid Scheme

The Philippine side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of the Philippines as explained by the Team and described in ANNEX-3 and ANNEX-4 of the Minutes of Discussions signed by both parties on February 3, 2000.

3. Schedule of the Study

(1) The consultants will pursue further studies in the Philippines until June 2, 2000.

(2) JICA will complete the final report in accordance with the confirmed item and send it to the Government of the Philippines by August, 2000.

4. Other Relevant Issues

(1) The Philippine side shall ensure enough budget and personnel to operate and maintain the facilities and equipment after the completion of the Project.

(2) The Philippine side assured the maximum utilization of the Hydraulic Laboratory by establishing a comprehensive utilization program. The Philippine side promised to provide the details of the said program to the Team by May 31, 2000.

(3) The Philippine side shall allocate adequate budget and personnel and assure the completion the Administration and Training Building by December 2000.

(4) The Philippine side shall complete the following undertaking before the commencement of the Project.

(a) Clearance and leveling of ground on the Project Site.

(b) Preparation of utilities necessary for the new facilities, such as electricity, water supply, drainage, and telephone line to the Site.

(5) DPWH shall take all necessary measures for prompt issuance of clearance by the Investment Coordination Committee (ICC) to the National Economic and Development Authority by the end of June 2000.

(6) DPWH shall take appropriate measures to carry out the provisions of Annexes 3 and 4 of Minutes of Discussion signed by both parties on February 3, 2000 pertaining to exemption of Japanese nationals engaged in the Project from customs duties, internal taxes, and other fiscal levies which may be imposed in the Philippines with respect to the supply of products and services under the verified contractors.

(7) The Team informed the Philippine side that, without the settlement of the VAT issue between the two governments, the implementation of the Project would be affected.
The Philippine side understood the situation.

5. Cost Estimation Borne by the Republic of Philippines

The cost to be incurred by the Government of the Philippines for implementing the Project is as listed below.

1)	Training and administration building construction cost	23,000,000 Peso
2)	Dormitory building construction cost	20,000,000 Peso
3)	Site preparation (removal of obstructions, etc.) cost	1,340,000 Peso
4)	Electricity, city water, telephone line extensions cost	390,000 Peso
5)	Commission for issuance of Authorization to Pay	270,000 Peso
	Total:	45,000,000 Peso

6. References

Collected documents to have been referred for preparation of this Basic Design Report are as follows;

No.	Name of the Document	Issued on	Prepared by
1.	The Short-term Survey Report on the Flood Control and Sabo Engineering Center Project	1999	Japan International Cooperation Agency (JICA)
2.	Medium-Term Philippine Development Plan 1999-2004	1999	National Economic and Development Authority (NEDA)
3.	The Philippine National Development Plan Directions for the 21st Century	1998	NEDA
4.	Medium-Term Infrastructure Development Plan 1999-2004	1999	Department of Public Works and Highways (DPWH)
5.	The National Building Code of the Philippines	2000	Philippine Law Gazette
6.	Philippine Electrical Code	1992	Institute of Integrated Electrical Engineers
7.	National Plumbing Code of the Philippines (R.A. 1378) 1993-94 Revision	1993	Technical Committee of the National Master Plumber/Plumbing Engineering and Plumbing Contractor's Association of Philippines
8.	PMSE Code	1993	Philippine Society of Mechanical Engineers
9.	The Fire Code of the Philippines and Regulations (Revised Edition)	1978	Safety Organization of the Philippines, Inc.
10.	The Labor Code of the Philippines	1999	Philippine Law Gazette