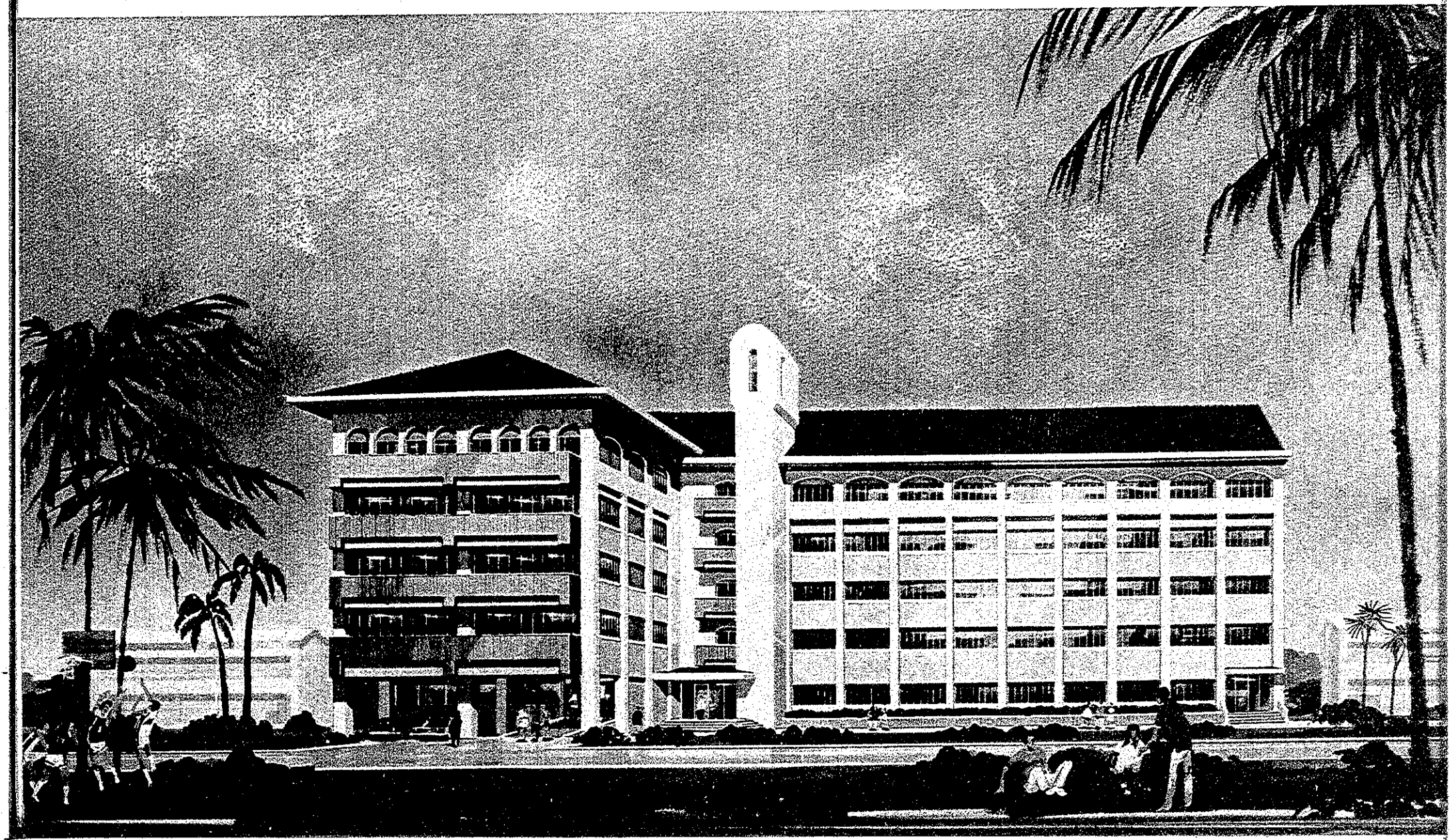
BASIC DESIGN REPORT
FOR
THE INTEGRATED RESEARCH AND TRAINING CENTER
IN
THE TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES

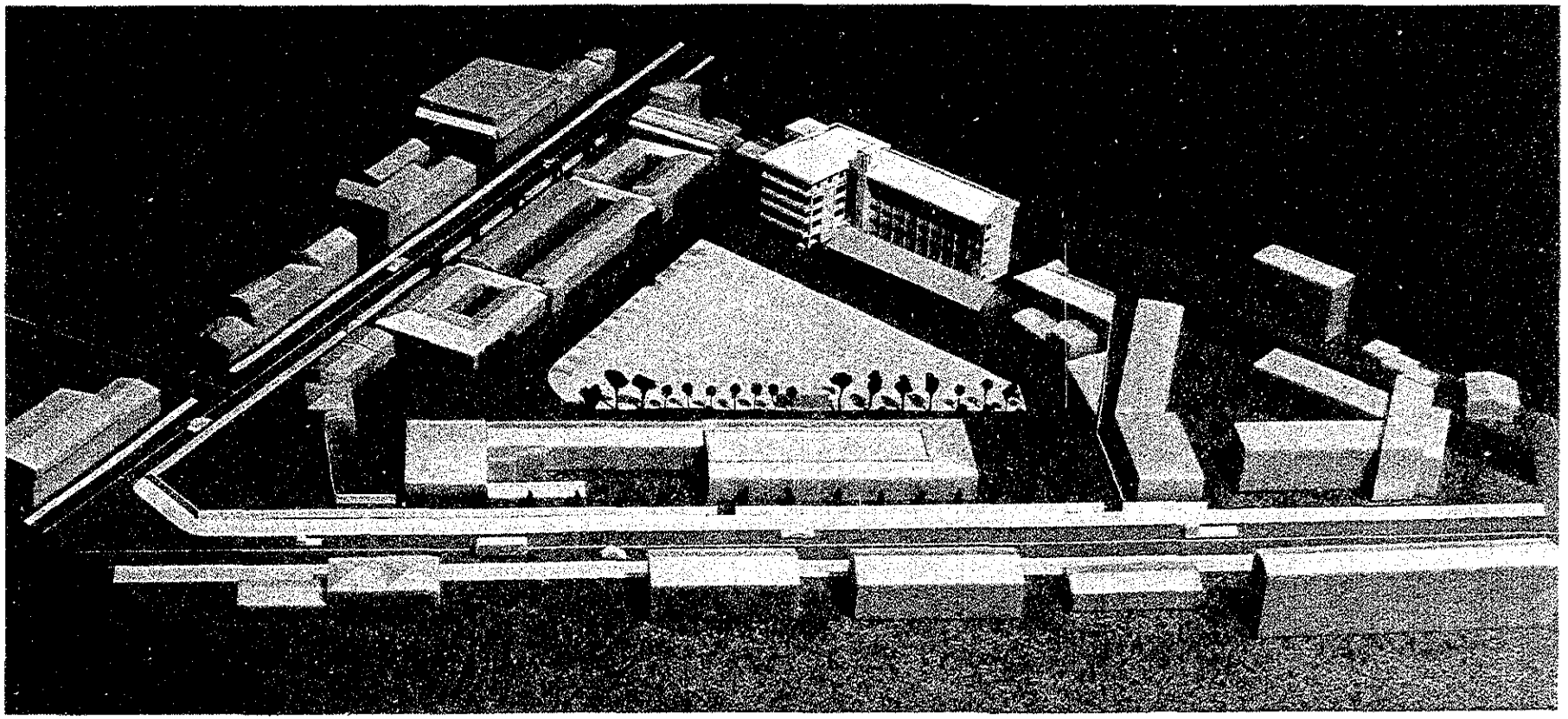
APRIL 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

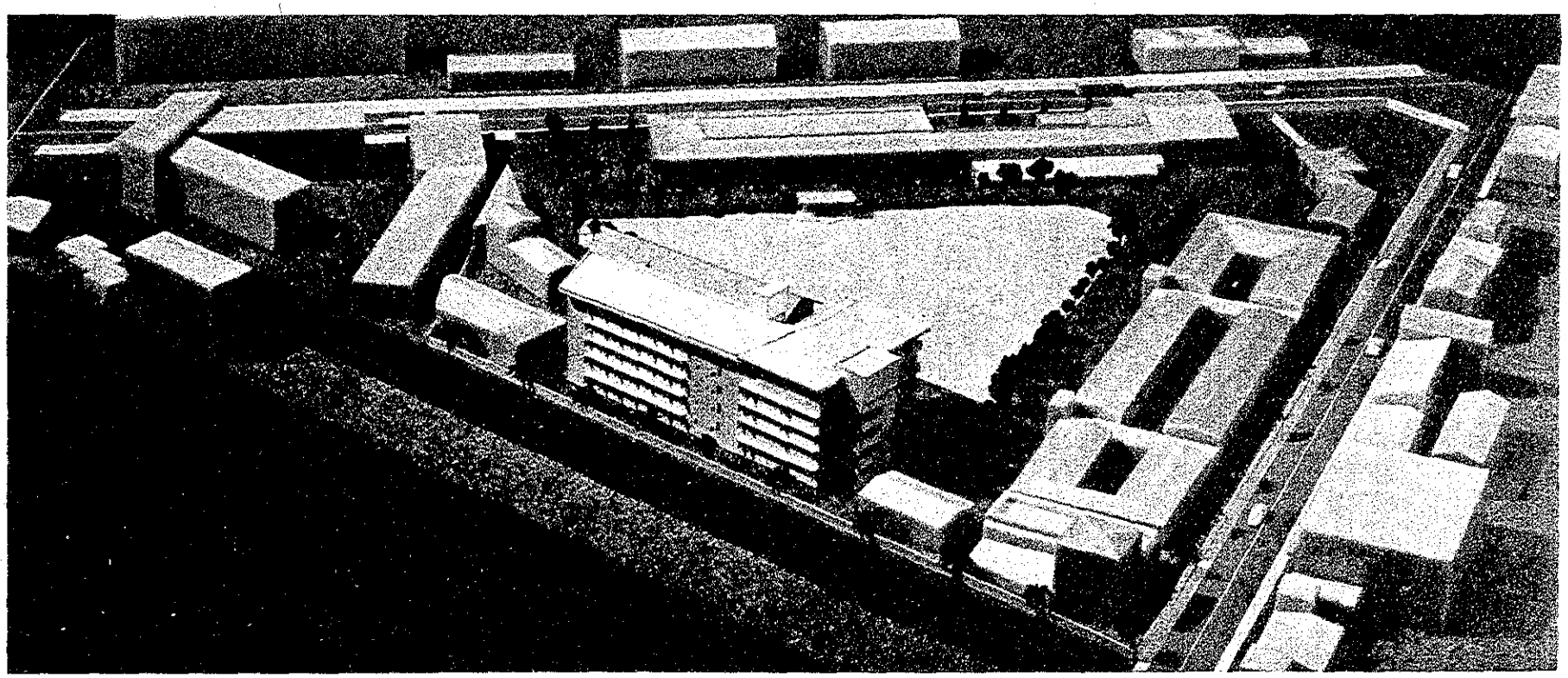
Front View



Bird's-eye View from Ayala Boulevard



Bird's-eye View from Estero de Balite



PREFACE

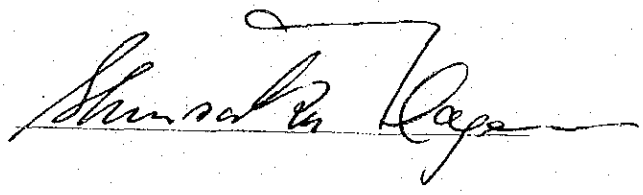
In compliance with the request from the Government of the Republic of the Philippines, the Government of Japan decided to undertake a survey necessary for the basic design of constructing an Integrated Research and Training Center in the Technological University of the Philippines.

The Japan International Cooperation Agency (JICA) executed this survey on behalf of the Government of Japan by dispatching a survey team from January 23rd to February 9th of 1979. This survey team was headed by Dr. Toshio Sekiguchi, professor, Tokyo Institute of Technology, Department of Electrical and Electronic Engineering, and was composed of eight other members.

This survey team, in close cooperation with the staff of the Technological University of the Philippines, made a thorough study of the background, requirements and conditions of the proposed Center, and confered with concerned officials of the Philippine Government. This Report has been completed for submission to the Philippine Government after careful analyses and consideration of the findings made by the survey team.

I wish to express my deep appreciation to the concerned officials of the Philippine Government and staff members of the Technological University of the Philippines for the full cooperation they extended to our survey team. I hope that this Report will prove useful to the Project and will contribute to deepening the friendly relationships happily existing between the Philippines and Japan.

April 1979



Shinsaku Hogen

President

Japan International Cooperation Agency

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CHAPTER 1 BACKGROUND

1–1 Preamble

A request was made by the Government of the Republic of the Philippines in 1977 for assistance in the establishment of an Integrated Research and Training Center (the Center) at the Technical University of the Philippines (Philippine College of Arts and Trades at that time). Further information on the proposed project was collected in June by a Project Finding Team headed by Mr. Toshiaki Tanabe of the Ministry of Foreign Affairs. This mission was followed in November 1978 by a contact and survey mission headed by Dr. Toshio Sekiguchi of the Tokyo Technological University.

In accordance with discussions held between the latter mission and the management of the Technological University of the Philippines, which is the executing agency for the Philippine Government, a Basic Design Survey Team was dispatched in January 1979 under the conductance of Dr. Toshio Sekiguchi.

The findings outlined in the following sections were made by the above mentioned missions with the enthusiastic and sincere assistance and cooperation of staff members of the Technological University of the Philippines (TUP) and members of the Philippine-Japan Fellows Association.

The firm of Matsuda, Hirata & Sakamoto, Architects and Engineers, Inc. was commissioned by the Japan International Cooperation Agency to prepare the preliminary design for the Center, and participated in the Basic Design Survey Team.

1–2 Members of Japanese Basic Design Survey Team

Dr. Toshio Sekiguchi	Team Leader Professor Department of Electrical and Electronic Engineering Tokyo Institute of Technology
Dr. Takashi Watanabe	Academic Professor Department of Civil Engineering Tokyo Institute of Technology
Mr. Shinya Takashima	Technical Training Overseas Technical Cooperation Division Vocational Training Bureau Ministry of Labour
Mr. Yoichi Seki	Coordination *Japan International Cooperation Agency*
Mr. Kenichi Imai	Coordination Japan International Cooperation Agency
Mr. Hisashi Ogitani	Design Management Director Matsuda, Hirata & Sakamoto, Architects & Engineers, Inc.
Mr. Masao Takahashi	Design Coordination and Quantity Survey Architect *Matsuda, Hirata & Sakamoto, Architects & Engineers, Inc.*
Mr. Yoichi Hiramatsu	Architectural Design Architect Matsuda, Hirata & Sakamoto, Architects & Engineers, Inc.
Mr. Katsumi Kimura	Architectural Design Architect Matsuda, Hirata & Sakamoto, Architects & Engineers, Inc.
Mr. Toshikatsu Miura	Structural Design Architect Matsuda, Hirata & Sakamoto, Architects & Engineers, Inc.
Mr. Shigeru Fujii	Utility Engineering Design Engineer Matsuda, Hirata & Sakamoto, Architects & Engineers, Inc.

1–3 Philippine Authorities Concerned

Philippine Government

Mr. Carlos P. Romulo	Minister of Foreign Affairs
Dr. Gerardo P. Sicat	Director General National Economic & Development Authority
Mr. Nicanor Fuentes	Deputy Director General National Economic & Development Authority
Mr. Bienvenido Villavicencio . . .	Director of External Affairs National Economic & Development Authority
Mr. Juan L. Manuel	Minister of Education and Culture
Mr. Antonio Dumlau	Ministry of Education and Culture
Mr. Desiderio Anolin	Director of Public Works
Mr. Francisco Pascual	Chief Architect, Building Division Department of Public Works
Mr. Rosalio A. Mallonga	Assistant Secretary Department of Public Works, Transportation and Communications

Technological University of the Philippines

Dr. Jose R. Vergara	President
Prof. Bernardo F. Adiviso	
Prof. Fernado Alfonso	
Arch. Alejandro T. Balais	
Prof. Cristeto Bonilla	
Arch. Mel V. Calderon	
Prof. Galicano Datu	
Prof. Radames Doctor	
Prof. Iluminada Espino	
Prof. Teofilo S. Gapasin	

Prof. Bayani I. Gutierrez

Prof. Antonio M. Lasam

Prof. Gerardo Lee

Prof. Guillermo L. Mercado

Prof. Augusto L. Pascual

Prof. Savalfran R. Sealtiel

1–4 Officials of the Japanese Government and JICA Stationed in the Philippines

Embassy of Japan

Mr. Kiyohisa Mikanagi . . . . . Ambassador

Mr. Kenjiro Izumi . . . . . First Secretary

Japan International Cooperation Agency

Mr. Tadakazu Tsunakawa . . . . . Resident Representative

Mr. Michio Kanda

1–5 Conditions and Requests

A. Role of TUP

Since its establishment in 1901 and its recent advancement to college level, TUP has been providing leadership in trade and industrial education for arts and technology in the Philippines by turning out technicians for the industry and by training of technological instructors for vocational training centers located throughout the country. TUP is also placing emphasis on promoting research and advanced studies in the fields of trade, technical and industrial education. Retraining of technological instructors, design and product development activities and preparation of instruction texts and material for technological training are also being performed at TUP.

At present, TUP is offering the following programs:

(1) Two-year trade-technical education and training program

(2) Three-year industrial technician program

(3) Four-year industrial teacher education program

(4) Masteral program in industrial education

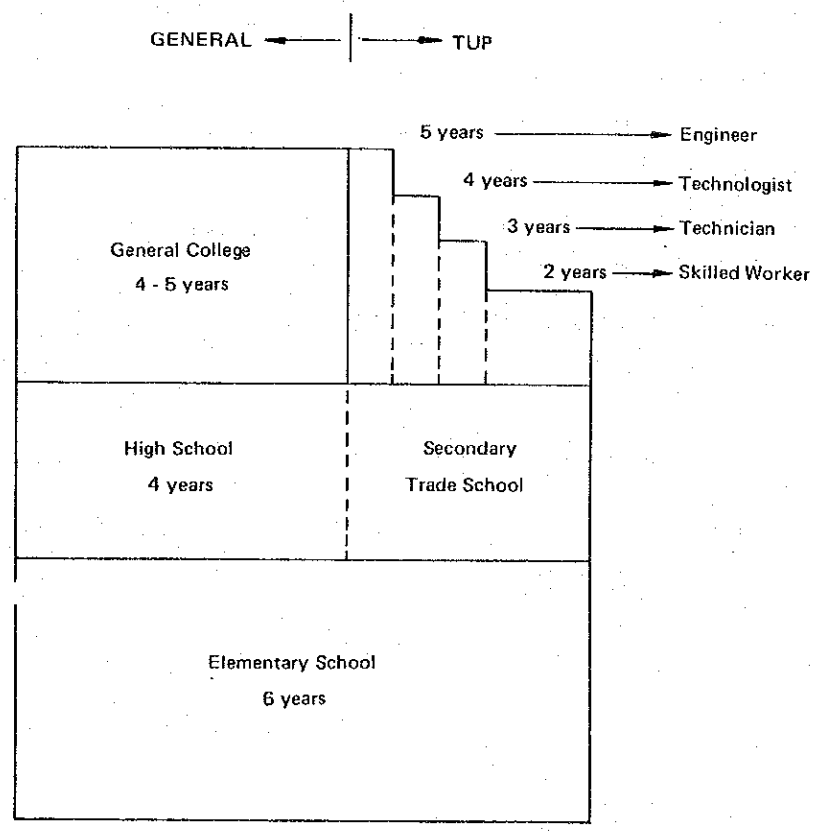
(5) Doctoral program in industrial education

(6) Four-year secondary trade school

(7) Special program consisting of the Baker School and Garment School

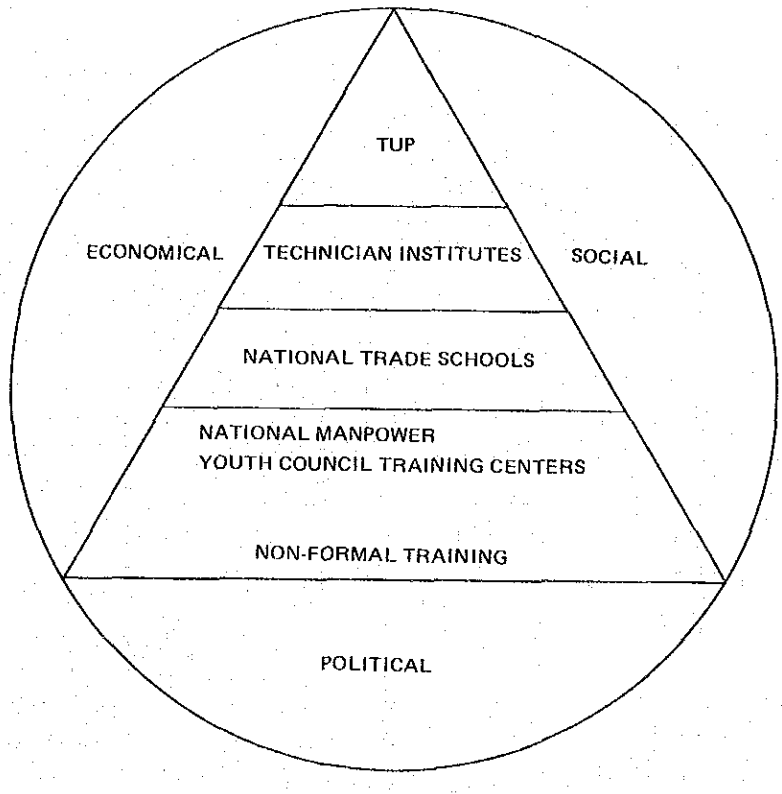
In accordance with its recent promotion to a university, TUP is adding regular five-year college engineering courses in Mechanical, Electrical and Electronics, Civil, Industrial and Chemical, and freshmen to these courses are to be admitted this coming June 1979.

Educational program of TUP as compared with general education in the Philippines is illustrated as follows:



Another most vital role which has been assumed by TUP in accordance to the presidential Letter of Implementation No. 79 entitled "Establishing a National Polytechnic System on Technical/Technician Education through the Integration of All State Supported Institutions in the Philippines," TUP has been made the apex of a nationally integrated technical/ technician education and training system involving three state-supported prototype technician institutes, ten regional Manpower Training Centers of the National Manpower and Youth Council as well as approximately 200 trade schools under the Ministry of Education and Culture.

The National Polytechnic System in the Philippines is illustrated as follows:



This national policy has been declared to insure a continuous stream of graduates possessing technical capabilities. As is the case with other developing countries, in spite of the large number of surplus engineering graduates being provided by the technical colleges in the Philippines each year, there exists an acute shortage of manpower having practical technical capabilities. The National Polytechnic System is a countermeasure to this urgent problem.

B. Requirements for a Center

In order to fulfill its responsibilities outlined hereinabove, a facility is urgently required to serve as a center for practical and advanced engineering studies to strengthen the activities of the newly established College of Engineering in the following three areas:

(1) Mechanical Engineering with options in the following:

a. Mechanics
b. Refrigeration and Air Conditioning
c. Automotive
d. Stationary and Marine Engines

(2) Electrical and Electronic Engineering

(3) Civil Engineering

In line with the above, it has been proposed that the Center undertake the following activities:

(1) Applied research and study on transfer of technology for countryside development.

(2) Development of human resourses by providing science and engineering education.

(3) Promotion of national and international cooperation for the advancement of engineering education and training.

C. Request for Assistance

Due to the limited capabilities and resources of TUP, the Philippine Government is requesting the assistance of the Japanese Government to provide the Center building, training equipment for the Center, as well as technical cooperation in establishing curriculums for the new five-year college level engineering courses and in technological training by use of the training equipment to be provided.

CHAPTER 2 CONCLUSIONS AND RECOMMENDATIONS

2—1 Justification of the Center

It is the conclusion of the Basic Design Survey Team that the establishment of this Center will be a most appropriate undertaking for many reasons including the following:

(1) There is an acute shortage in the Philippines as well as neighbouring countries of capable technicians and engineers with practical technical knowledge, and TUP is looked upon and is determined to be most instrumental in providing this type of education and training.

(2) In spite of its great endevours in the past to upgrade its level of education and quality of instruction by sending many of its faculty for training in various countries, particularly Japan, much more must be accomplished in this sense to meet the needs of the advancing industrial world as well as to prepare itself for the new five-year engineering courses.

(3) The functions which are proposed to be provided in the Center are indispensable for TUP in fulfilling its roles and responsibilities.

(4) *Existing building facilities are insufficient and obsolete. The majority of existing training* equipment are obsolete or in unusable condition.

(5) The earnest determination shown by the TUP staff to establish and operate the Center is being manifested and proven by all of their assertions and actions, and is being endorsed by their governmental authorities including those of diplomatic, educational, financial, developmental, labor and constructional agencies.

(6) It is evident that TUP and its graduates will become in the future most influencial in industrial fields in the Philippines as well as other asian countries, and with its existing intimate relationship between Japan as evidenced by the placing of the Philippine-Japan Fellows Association Headquarters within its campus, assistance in the form of this important facility will be a tremendous asset in furthering the friendship and fellowship with Japan, not only with the University itself, but also with the industrial circles in the Philippines as well as in other asian countries.

(7) The Basic Design Survey Team also concludes that the establishment of the Center is technically feasible as set forth hereafter in CHAPTER 3 PRELIMINARY DESIGN and CHAPTER 4 TRAINING EQUIPMENT.

2--2 Exchange of Memorandum

In view the confirmation of justifications listed hereinbefore, the following Memorandum was exchange between Dr. Jose R. Vergara, President of the Technological University of the Philippines and Dr. Toshio Sekiguchi, Head of the Japanese Basic Design Team.

M E M O R A N D U M
ON
THE CONSTRUCTION PROGRAM OF THE INTEGRATED EQUIPMENT, LIBRARY, RESEARCH AND TRAINING CENTER IN TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES

At the request of the Government of the Republic of the Philippines for assistance in establishing the Integrated Equipment, Library, Research and Training Center (the Center), the Government of Japan through Japan International Cooperation Agency (JICA) has sent a survey team headed by Dr. Toshio Sekiguchi (Professor, Tokyo Institute of Technology) to conduct the Basic Design on the program of the Center from 23 January 1979. The team held a series of discussions and exchanged views with the Philippine Authorities concerned on the establishment and construction of the Center.

As a result of the survey and discussions, both parties have agreed to recommend to their respective Governments to take the necessary measures toward establishing the Center as stated in the attached documents.

30 January 1979
Manila, Philippines

Dr. TOSHIO SEKIGUCHI
Head of the Japanese
Basic Design Survey Team

Dr. JOSE R. VERGARA
President
Technological University of the Philippines

WITNESS:

Mr. TADAKAZU TSUNAKAWA
Resident Representative
Japan International
Cooperation Agency
(Manila Office)

Mr. BAYANI T. GUTIERREZ
Vice President
Technological University of the Philippines
President
Philippine-Japan Fellows Association

ATTACHED DOCUMENTS

1. The Proposed Center shall be an integral part of the Technological University of the Philippines (TUP), but shall have distinct functions from those of the other Units and Offices of the University.

2. The outline of the Center is attached in Annex I.

3. The proposed site for the Center will be located at Ermita, Manila as shown in Annex II. The land is the property of the Technological University of the Philippines.

4. The Government of Japan will take necessary measures to provide such building and equipment for the Center as listed in Annex III.

5. The Government of the Philippines will take necessary measures as follows:

   (1) To secure land for the Center.

   (2) To clear and to level the building site and related land required for constructional activities before the start of the construction of the Center.

   (3) To construct or prepare the access and the throughway to the construction site from adjacent public road before the start of the construction of the Center.

   (4) To provide other items necessary for establishment of the Center as listed in Annex IV.

ANNEX I

1. The Integrated Equipment, Library, Research and Training Center shall serve as a Center for practical and advanced engineering studies to strengthen the activities of the newly established College of Engineering, TUP, in three (3) areas as follows:

   (1) Mechanical Engineering with options on the following:
   - a. Mechanics
   - b. Refrigeration and Air Conditioning
   - c. Automotive
   - d. Stationary and Marine Engine

   (2) Electrical and Electronic Engineering

   (3) Civil Engineering

2. In line with above, it shall undertake the following activities:

   (1) Applied research and study on transfer of technology for countryside development.

   (2) Development of human resources by providing science and engineering education.

   (3) Promotion of national and international cooperation for the advancement of engineering education and training.

T.S.

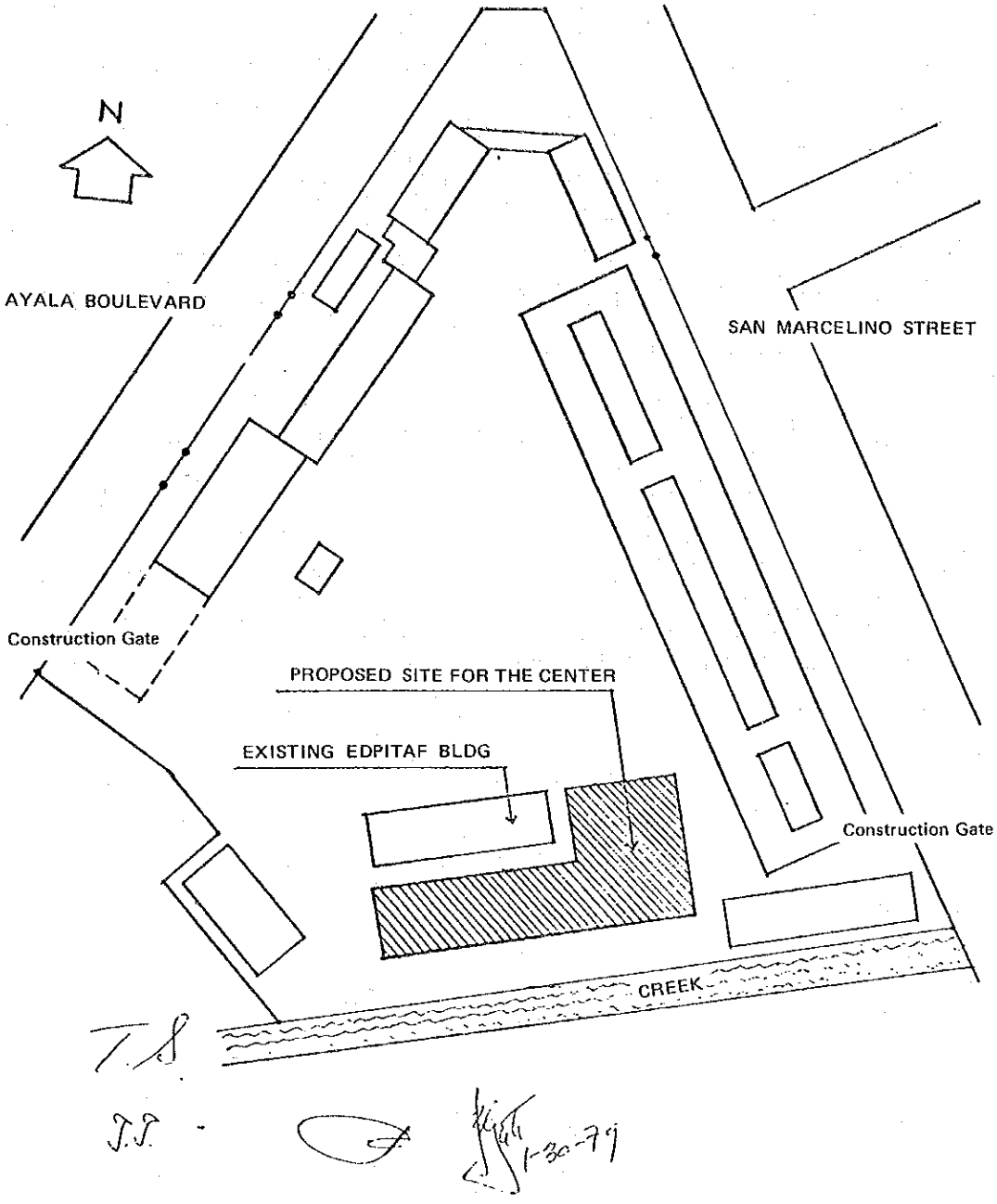
J.J.

1-30-79


SITE LOCATION
MANILA
QUIAPO
SAN MIGUEL
ERMITA
PACO
PANDACAN
BUILDING SITE

ANNEX II-(2)

SITE PLAN



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ANNEX III

The Building shall have the following functions and accommodations:

1. Heavy, medium and light equipment demonstration and training

2. Portable equipment lending and storage

3. Audio-visual education

4. Design and proto-type product development

5. Classrooms and laboratories

6. Library and reference material

7. Conference hall

8. Center and staff offices

9. Support service utilities: control and maintenance areas, lounge and comfort rooms

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1-30-79

ANNEX IV

Items to be provided by the Government of the Philippines.

1. Provide accurate land information on the building site including but not limited to the following:
   (1) Survey map of the campus showing topography extent with dimensions of existing buildings and facilities in and around the building site.
   (2) Demolish and remove all obstacles, both above and underground, in and in the immediate vicinity of the building site.

2. Utilities to the Center Building
   (1) External water supply line
   (2) External storm drainage lines
   (3) External sewer drainage lines
   (4) External power supply line
   (5) External telephone lines
   (6) Telephone wiring and handsets required within the Center
   (7) LPG gas supply

3. Incidental Works
   (1) Landscaping
   (2) Furniture, rugs and drapes

4. Other Items
   (1) Provide temporary electric power and water supply to the

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J.J.

construction site. Consumption charges will however be borne by the Contractors.

(2) Be responsible for required customs charges and arrange for timely customs clearance of building materials, building utilities and equipment, training equipment and other items donated which are to be incorporated into the Center.

(3) Be responsible in arranging for timely customs clearance of construction equipment, rigs, vehicles and temporary material to be used for construction of the Center and installation of training equipment and which items are to be brought back to Japan upon completion of the Center.

(4) Take necessary procedures in obtaining permission, duties and tax exemptions for Japanese nationals and firms engaging exclusively in the realization of the Center.

(5) Be responsible in obtaining required building and other permits for the establishment and operation of the Center.

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2–3 Recommendations

It is recommended that an integrated center be provided to function as an equipment library for training equipment, and a facility for research and training.

This integrated center with the above mentioned functions would be used for the folloiwing objectives:

(1) Performance of technical training and education for the following listed college-level five-year engineering courses by provision of facilities indicated.

	Facilities
Mechanical Engineering	
Mechanics	Machining Training Room Woodwork Training Room Classroom Storage
Refrigeration & Air Conditioning	Training Room Classroom Storage
Automotive	Automotive Training Room Classroom Storage
Stationary & Marine Engine	Stationary & Marine Engine Training Room Boiler Training Room Generator & Control Room Classroom Storage
Electrical & Electronic Engineering	
Electric Electronics	Electric Training Room Electronic Training Room Generator & Control Room Broadcasting Room Classroom Storage
Civil Engineering	
Civil	Civil Engineering Training Room Classroom Storage

(2) Provide further the following facilities to serve the above mentioned engineering courses.

	Facilities
Common Facilities	Finishing, Welding & Sheet Metal Training Room Sheet Metal Working Training Room Welding Training Room Audio-Visual Training Room Design & Product Development Training Room Equipment Library Storage Room Printing Publication Room Library, Reference & Materials Room Staff Study & Research Room Conference Hall (Sports & Recreation Room) Recording Room

(3) The facilities listed above are also to be utilized for the following functions in relation to the National Polytechnic System on Technical/Technician Education which encompasses the Technician Institutes, National Trade Schools, the Regional Manpower Training Centers of the National Manpower and Youth Council and other similar state-supported training institutions.

(a) Retraining and raising the level of their teaching staffs
(b) Conductance of researches on training methods
(c) Drafting and publication of teaching and training material

2--4 The Center and Technical Cooperation

The satisfactory growth or advancement of TUP to university level will depend greatly on the establishment of appropriate curriculums for five-year courses and on the effective functioning of the Center. Technical cooperation from Japan is therefore considered to be of utmost importance to make this undertaking successful, as well as to follow-up on technical cooperations being made to the school up to this time.

It is obvious that technical cooperation will be required as to advise on technological university education in general and on educational methods utilizing training equipment. However, though the foundations as a unversity have just been laid, its future structure and the proper mode of required technical cooperation cannot yet be determined. This matter will require further study as to its execution and appropriations to be made in the fiscal years to come.

CHAPTER 3 PRELIMINARY DESIGN

3–1 Basic Policies

The basic policies of this Preliminary Design are as follows:

(1) To harmonize the Center with existing buildings and facilities, with due consideration given to future master plans of the TUP. Special attention to be given to the new EDPITAF Building, which together with the Center, is to become architecturally the central attraction of the campus.

(2) Provide ample space between existing buildings.

(3) Utilization of locally accepted construction methods and material.

(4) The design of the Center should be a clear manifestation of its functions, and is to be clean and simple, worthy of an educational facility.

(5) Administration, management and maintenance of the building is to be considered in its design.

(6) To provide as much floor space, functions and equipment as possible by avoiding unessential building elements and costs.

3–2 Site Planning

Of the two candidate sites for locating the Center, as result of conferences between the TUP staff and the Survey Team, the site between the existing EDPITAF Building and the Estero de Balite was chosen to be more favorable than the one facing the Ayala Boulevard due to the following reasons:

(1) Available building site area and clearances between existing facilities to remain are ample at chosen site, while they are insufficient at the rejected site.

(2) Protection from traffice noise and resultant shape of building plan favor the chosen site.

(3) Functions which would have to be demolished to make way for the Center favor the chosen site.

(4) Soil bearing conditions are expected to be similar and not to differ substantially.

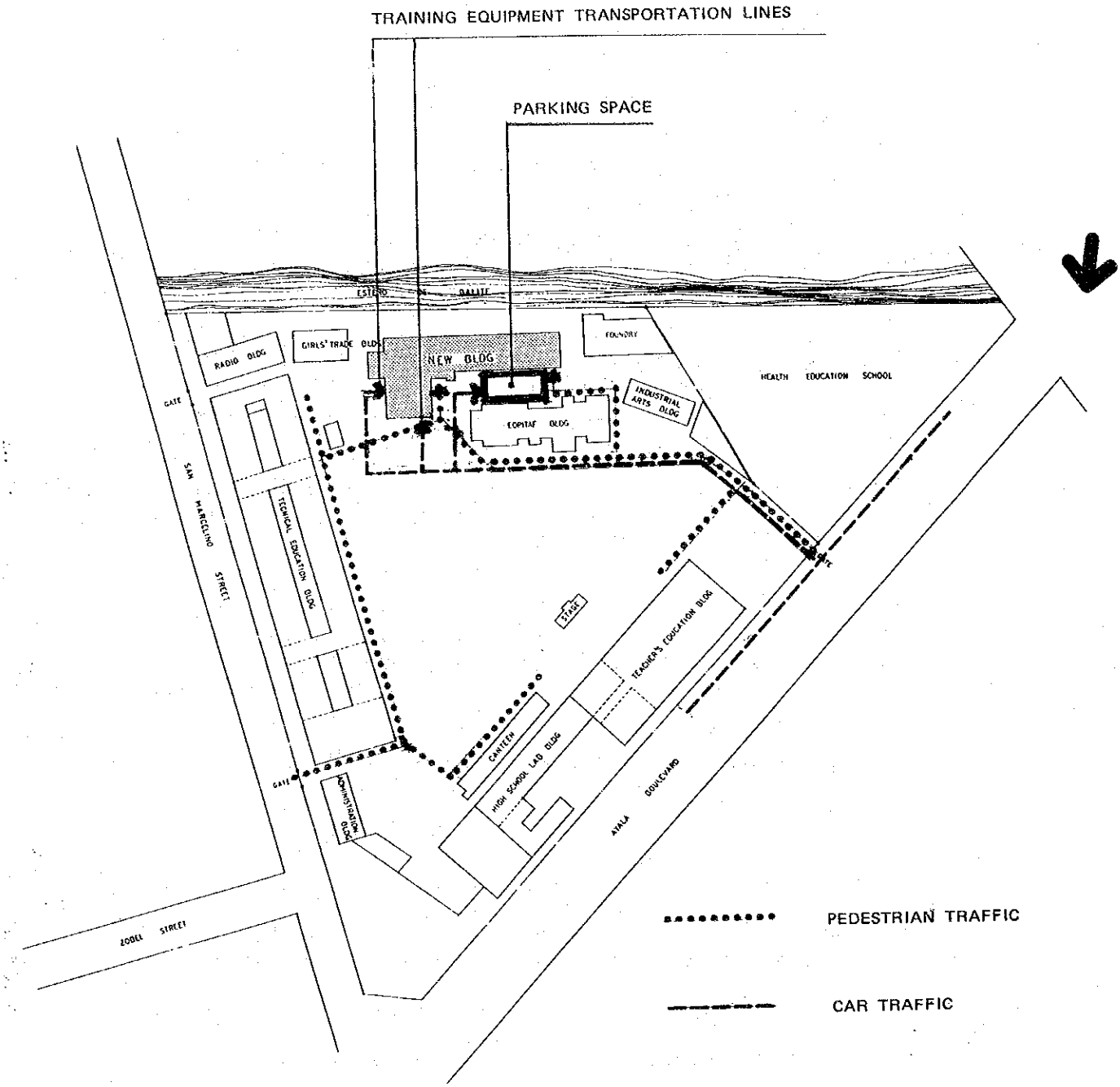
As the result of selecting the chosen site, planning merits outlined hereafter were attained:

(1) The longitudinal axis of the building could be made in the east-west direction which gives best protection against solar heat while being oriented best to take in prevailing breezes from the southwest during wet seasons and from the northeast in dry seasons.

(2) Car parking space adjoining the building was made possible.

(3) Quieter and cooler environment for classrooms, and proximity to service mains for the training areas.

(4) Harmonization with the EDPITAF Building.



TRAFFIC PATTERN

3–3 Architectural Planning

A. The functions of the Center are classified and distributed as follows.

(1) Training Sections

As these sections accompany such nuisances as noise, odor, dust and vibration, and as their requirements for power, ventilation, water supply and drainage are heavier than other sections, they have been isolated in a wing at the north end which is closer to the San Marcelino Street. Although it would be ideal to place them all on the 1st floor, due to the limited ground area available, they have been arranged on four (4) levels as follows:

1st Floor
- Automotive Training Room
- Welding Training Room
- Boiler Room
- Generator & Control Room
- Office & Storage

2nd Floor
- Stationary & Marine Engine Training Room
- Refrigeration & Air Conditioning Training Room
- Test Room
- Freezer Room
- Equipment Library Storage
- Office & Storage

3rd Floor
- Machining Training Room
  including Finishing, Welding & Sheet Metal Training
- Woodwork Training Room
- Precision Measuring Room
- Office & Storage

4th Floor
- Electrical Training Room
- Electronic Training Room
- Radio Equipment Room
- Staff Office

(2) Classrooms

A classroom wing with five (5) levels is aligned parallel to the creek Estero de Balite, away from the noisy San Marcelino Street and making avail of the prevailing cross breezes.

Classrooms have been arranged as foollows:

1st Floor
- Civil Training Room
- Lounge
- Toilets
- Staircase

2nd Floor
- Classrooms
- Toilets
- Staircase

3rd Floor
- Classrooms
- Toilets
- Staircase

4th Floor
- Design & Product Development Room
- Printing & Publication Room
- Office
- Toilets
- Staircase

5th Floor
- Audio Visual Room
- Library, Reference & Materials Room
- Staff Study & Research Room
- Toilets
- Staircase

(3) Conference Hall

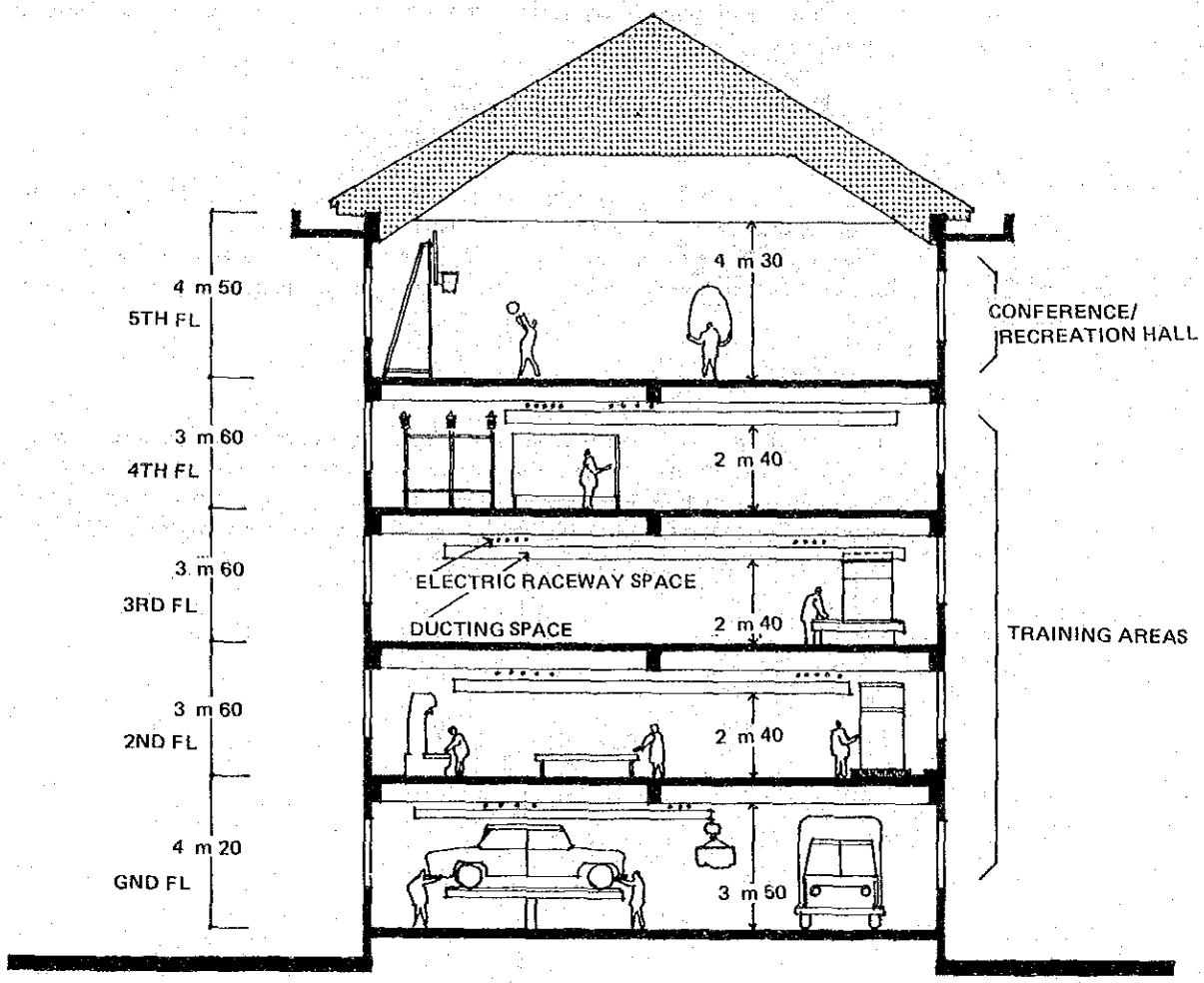
This facility, which is to serve also as a Sports and Recreation Room, is located on the 5th floor of the wing accomodating the Training Sections. It can accomodate 500 seats. A recording studio is located adjacent to the Hall.

B. Span and Head Clearances

The following column spans and head clearances have been provided:

Training Wing	Span	Floor to Beam Soffit Clearance
1st Floor (Automotive Training)	4.5 x 7.75 m	3.5 m
2nd – 4th Floors	4.5 x 7.75 m	2.9 m
5th Floor (Conference Hall)	4.5 x 15.5 m	4.3 m

Classroom Wing	Span	Floor to Ceiling Clearance
1st Floor	4.0 x 9.0 m	3.3 m
2nd – 4th Floors	4.0 x 9.0 m	3.1 m
5th Floor	4.0 x 9.0 m	3.1 m



BUILDING SECTION

C. Building Components

(1) General

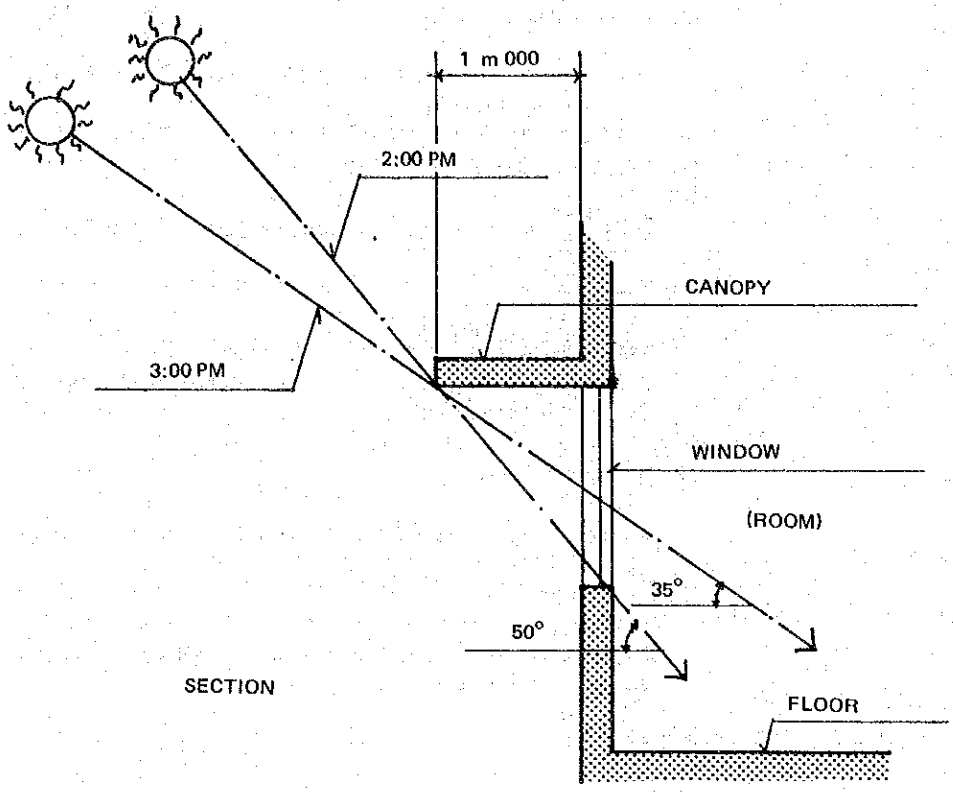
In planning the building components, the following were considered to be most important:

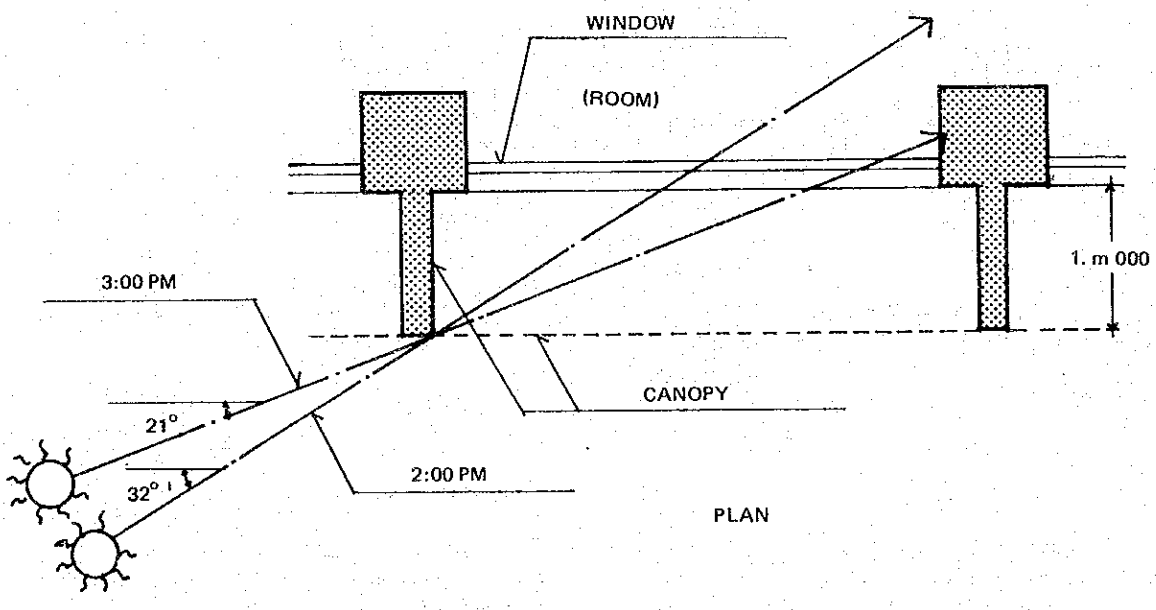
Countermeasures against high temperature
Countermeasures against torrential downpours

As sole dependance on building utilities as countermeasures against these elements would impose a heavy burden on maintenance costs, first priority was placed on providing building components in forms, structure and material which would serve as principal protection. Utility equipment is to be considered only as a secondary means.

(2) Roof and Canopies

The local double roof system composed of a concrete deck and a sloped steel trussed roof is adopted to provide thermal insulation and protection against rain. Spanish tiles over wood sheathing is also adopted for further insulation and to harmonize with the EDPITAF Building. Canopies for rain and solar protection are to be designed as illustrated hereinafter.





SOLAR DESIGN

(3) Exterior Walls

Exterior walls are to be reinforced concrete surfaced with cement mortar and a colored cement-base spray finish.

(4) Exterior Fenestration

Fully ventable water-tight steel sash of local manufacture is planned to be adopted.

(5) Floors

Resilient vinyl tile is considered for classrooms. The 1st floor is to be raised 80cm above the ground as protection against flood water which has been recorded to have reached the height of 60cm.

(6) Interior Partitions

Wooden partitions fabricated of superior local timber is contemplated for partitioning.

(7) Ceiling Finish

Direct finish under structural slabs will be adopted in general. Hung ceilings of timber framing will be provided as required.

3–4 Structural Planning

A. General

The structure of this facility is to be engineered so that forces are transmitted as simply and neatly as possible in accordance with the basic policies outlined hereinbefore.

B. Structural Systems

(1) Framing System

The main structure is to be a reinforced concrete rigid frame supplemented with properly placed seismic walls. In order to reduce the total dead weight and floor-to-floor heights of the building, post-tension precast concrete beams are to be adapted for spans exceeding 8 meters.

(2) Roof System

The roof over the Conference Hall on top of the training wing is to be designed with steel trusses of 16 meter spans which are supported on cantilevered columns. The roof over the classroom wing is to be a simple steel structure placed on a reinforced concrete roof slab.

(3) Floor System

Floor structure is to be a rigid reinforced concrete slab system including that of the 1st floor slab. Independent foundations will be provided at the 1st floor as necessary for equipment having excessive weight or vibration.

(4) Foundation System

(a) Subsurface Conditions:
Results of boring tests which were performed at the building site by the Philippine side are attached hereto as follows:

Fig. A. 1	Boring Locations
Fig. A. 2(a)	Boring Log TBH - 1
Fig. A. 2(b)	Boring Log TBH - 2
Fig. A. 2(c)	Boring Log TBH - 3

From the tests it has been found that soil bearing capacities are weak down to depths of 10 - 20 meters, and that an especially soft stratum is encountered at the depth of 6 - 7 meters. Reliable bearing is found at depths of 12 - 22 meters.

The underground water level is only 1 - 2 meters deep, and provisions must be taken during excavation activities against seepage.

(b) Foundation Design

Due to the unreliability of the immediate subsurface soil conditions and in view of the weight of the 5 story structure, prestressed concrete pile foundations are to be provided under footings which are to be connected with rigid beams.

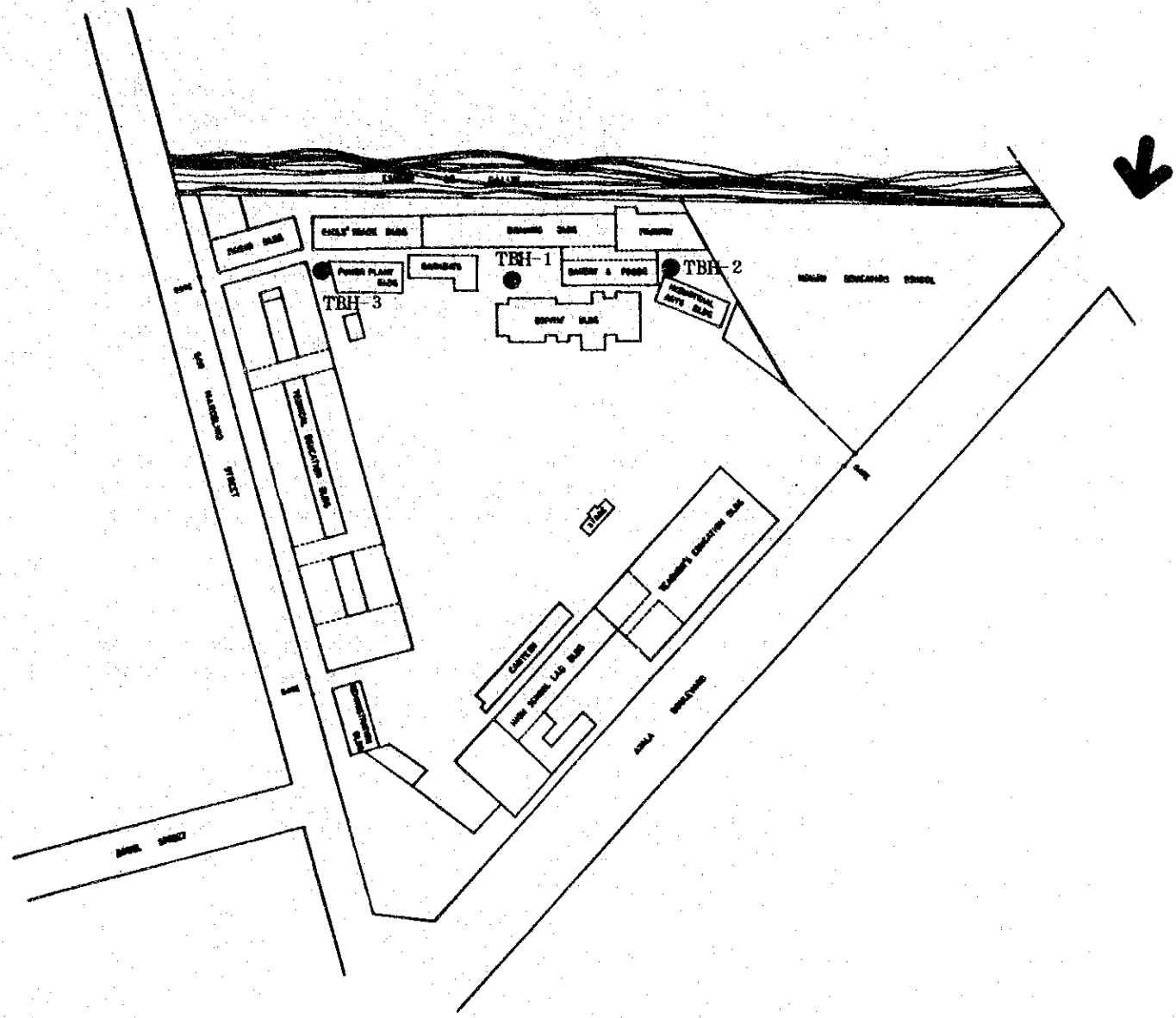


Fig. A.1 BORING LOCATIONS

BORING LOG TBH - 1		ALTITUDE m	GROUNDWATER LEVEL 2.19m	DATE STARTED	DATE COMPLETED

DEPTH (m)	DESCRIPTION OF MATERIALS AND REMARKS	BLOWS /10cm	BLOWS/30cm (N-VALUE) BLOWS/30cm	0 10 20 30 40 50
0.0	Stiff dark brown silty clay with gravel		48	
	Very soft dark gray clayey silt with fine sand		5	
	Very loose dark gray silty clay with fine sand		7	
	Very loose dark gray silty clay with fine sand and traces of shell fragments		2	
	Very loose dark gray silty fine sand		5	
5.0	Very loose dark gray silty fine sand with shell fragments		2	
			Shelby	
	Very soft dark gray clay with shell fragments		3	
			1	
			3	
10.0			5	
	Very soft dark gray silty clay with plenty of shell fragments		6	
			8	
	Loose dark gray silty clay with fine sand, shell fragments and silt shale		9	
	Soft light gray clayey silt with shell fragments		10	
15.0			21	
	Stiff light gray silty clay with shell		27	
	Very stiff yellowish brown silty clay with fine gravel		43	
	Very stiff yellowish brown silty clay		49	
	Firm yellowish brown silty clay with fine gravel		25	
20.0	Stiff reddish to yellowish brown silt		38	
	Stiff yellowish brown silt with sandstone		22	
	Stiff yellowish brown silty clay with fine gravel		39	
	Hard yellowish brown silty fine sand		50/16	
			50/19	
25.0				

Fig. A.2(a) BORING LOG TBH-1

BORING LOG TBH - 2	ALTITUDE m	GROUNDWATER LEVEL 2.05m	DATE STARTED	DATE COMPLETED

DEPTH (m)	DESCRIPTION OF MATERIALS AND REMARKS	BLOWS /10cm	BLOWS/30cm (N-VALUE) BLOWS/30cm	0 10 20 30 40 50
0.0	Very loose yellowish to dark brown silty clay with fine sand and gravel		5	
	Very soft dark brown silty clay with peasize gravel		3	
	Very loose dark gray fine sandy silt		6	
	Very loose dark gray fine sandy silt with shell fragments		5	
	Loose dark gray silty clay with fine sand and shell fragments		3	
5.0	Soft dark gray silty clay with fine sand		3	
	Very soft dark gray clayey silt with shell fragments		4	
			2	
	Very soft dark gray clayey silt with plenty of shell fragments		2	
			1	
10.0	Very soft dark clayey silt with shell fragments		6	
	Very hard dark gray silty clay with friable siltstone		50/18	
	Very hard yellowish brown silt with friable siltstone		50/17	
	Very hard dark brown silt with friable sandstone		50/7	
	Very hard friable dark brown silt with friable siltstone		50/4	
15.0	Hard yellowish brown silty clay		50/13	
	Hard yellowish brown silt		50/16	
			50/14	
20.0				
25.0				
30				

Fig. A.2(b) BORING LOG TBH-2

BORING LOG TBH - 3

ALTITUDE m

GROUNDWATER LEVEL 1.62m

DATE STARTED COMPLETED

DEPTH (m)	DESCRIPTION OF MATERIALS AND REMARKS	BLOWS /10cm	BLOWS/30cm (N-VALUE)
0.0	Very loose dark brown silty fine sand with fine gravel		6
	Very soft dark gray silty clay with fine sand and pessite gravel		6
	Very soft brownish gray silty clay with fine sand and pessite gravel		6
			7
	Loose dark gray silty fine sand with shell fragments		4
5.0			5
	Very loose dark gray sandy silt with plenty of shell fragments		2
	Very soft dark gray silty clay with shell fragments		1
			Shelby
	Very soft dark gray clay with shell fragments		1
10.0			5
	Very soft dark gray clayey silt with shell fragments		4
	Very soft dark gray clayey silt		5
	Very soft dark gray clay with shell fragments		4
	Very soft dark gray clay		5
	Soft dark gray clay with traces of shell fragments		4
15.0			6
	Very soft dark gray clay		7
			6
	Soft dark gray clay with traces of shell fragments		8
			8
20.0	Very soft dark gray clay		12
	Soft gray clayey silt with shale		24
	Stiff yellowish brown silt		50/6
	Very hard yellowish brown silty clay		50/8
	Very hard yellowish brown silt		
25.0			

Fig. A.2(c) BORING LOG TBH-3

C. Structural Design

(1) Design References

The local practice of refering to UBC, ACI and AISC is to be followed. The Ultimate Strength Design method prescribed in ACI is to be adopted in accordance to the common local practice.

(2) Design Loads and External Forces

The following loads and external forces are to be taken in accordance with the recommendations of UBC and NSCP.

(a) Live Loads

Concentrated loads of heavy training equipment will be accomodated with consideration given to future relocation and addition of equipment.

General live load assumptions to be used in the design are to be taken as follows:

		Design Live Load (kg/m^2)
1st Floor		
Civil Training Room	min.	750
Snack & Lounge		500
3rd Floor		
Drawing Classroom		*300*
4th Floor		
Radio Equipment Room		750
Design & Product Development Room		500
Printing & Publication Room		750
Office		300
5th Floor		
Conference Hall		500
Conference Hall Stage Floor		750
Air Conditioning Room		*750*
Production Studio Recording Room		750
Audio Visual Room		750
Library, Reference & Materials Room		625
Staff Study & Research Room		500
Common		
Training Room	min.	500
Classrooms		200
Storage, Office & Storage		750
Corridors, Lobbies, Stairs		500
Toilets		300

Live loads for the training rooms will be dependant on the weight of training equipment.

(b) Earthquake Forces

The earthquake force assumed to act on the structure is to be derived by the following formula in accordance with NSCP.

$$V = ZKCW$$

where V: Base Shear

Z: Coefficient dependant on the locality and foundation conditions, taken here as Z = 1.4

Refer to attached Figure

K: Coefficient dependant on structural system, in this case of a rigid frame system with seismic walls it is taken as K = 0.8

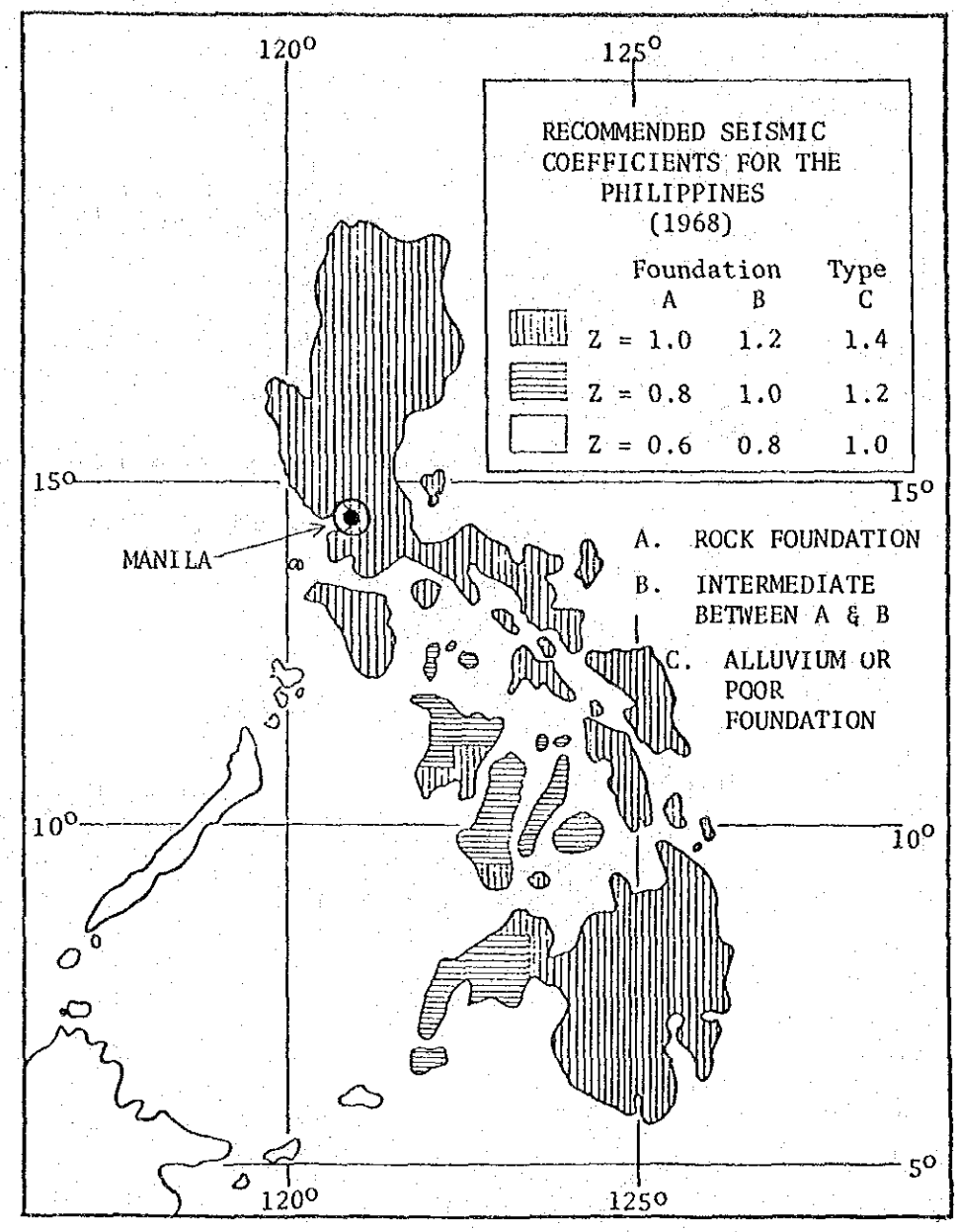
C: Coefficient dependant on the typical cycle (T) of the structure

$$C = 0.05/\sqrt[3]{T} = 0.084$$

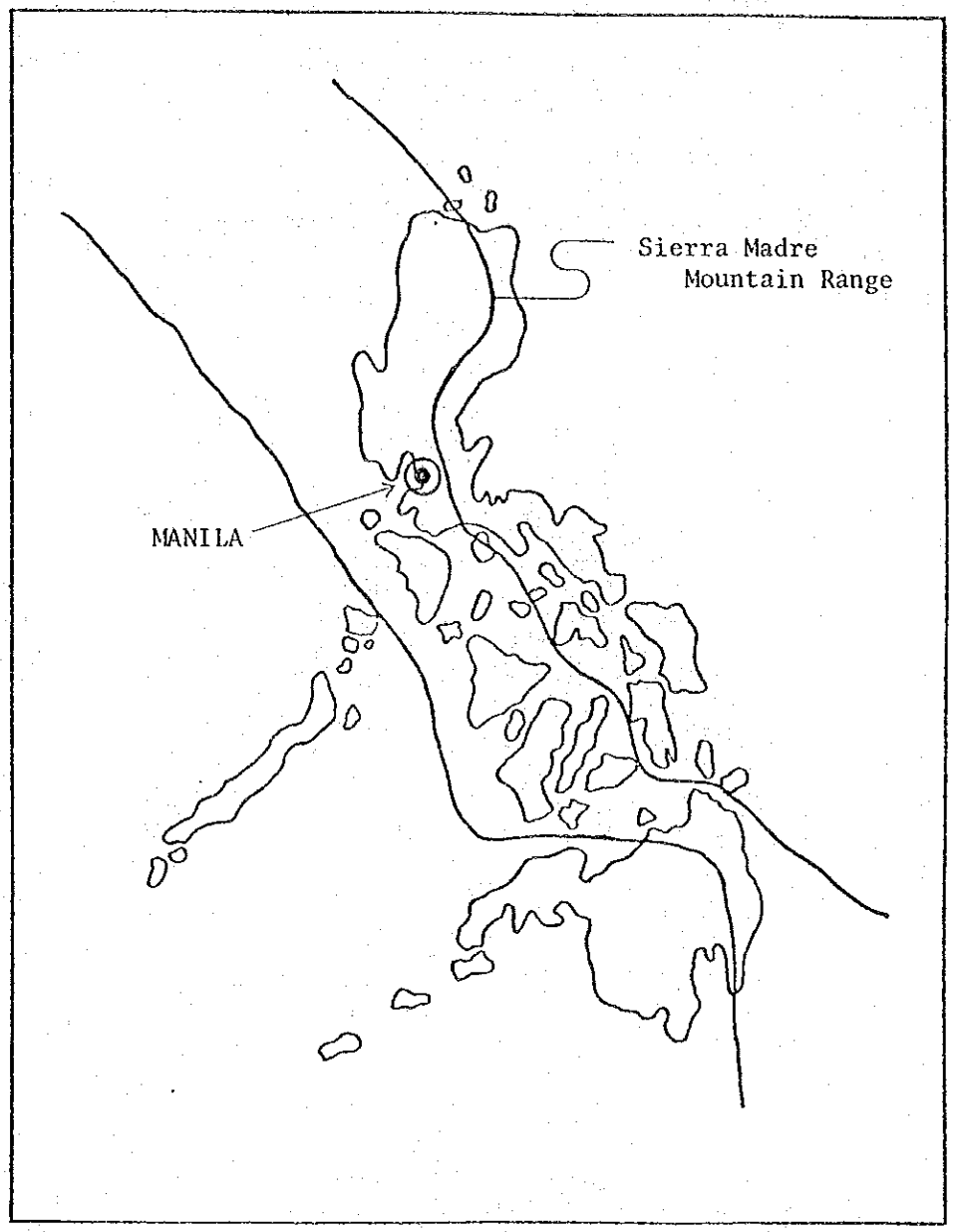
W: Total weight of the building

(c) Wind Forces

The design pressure of wind forces is to be determined in accordance to the attached table on Wind Zones and Minimum Wind Pressure as prescribed by NSCP.



SEISMIC COEFFICIENTS



ZONE I

V = 200 KPH = 125 MPH
p = 300 Ksm = 60 psf,h above 100'
p = 250 Ksm = 50 psf,h 30' to 100'
p = 200 Ksm = 40 psf,h 0' to 30'

ZONE II

V = 175 KPH = 108 MPH
p = 250 Ksm = 50 psf,h above 100'
p = 200 Ksm = 40 psf, h 30' to 100'
p = 150 Ksm = 30 psf, h 0' to 30'

ZONE III

V = 153 KPH = 96 MPH
p = 200 Ksm = 40 psf, above 100'
p = 150 Ksm = 30 psf, 30' to 100'
p = 100 Ksm = 20 psf, 0' to 30'

LEGEND:

KPH = Kilometers per Hour
MPH = Miles per Hour
Ksm = Kilograms per Square Meter
Psf = Pounds per Square Foot

WIND ZONES AND MINIMUM WIND PRESSURE

(3) Structural Materials

Strengths and other characteristics of structural materials are to be as prescribed by UBC, ACI, AISC, NSCP and ASTM.

(4) Deflection

The building structure and its components are to be designed to have sufficient deformation capacities as prescribed by applicable codes and regulations.

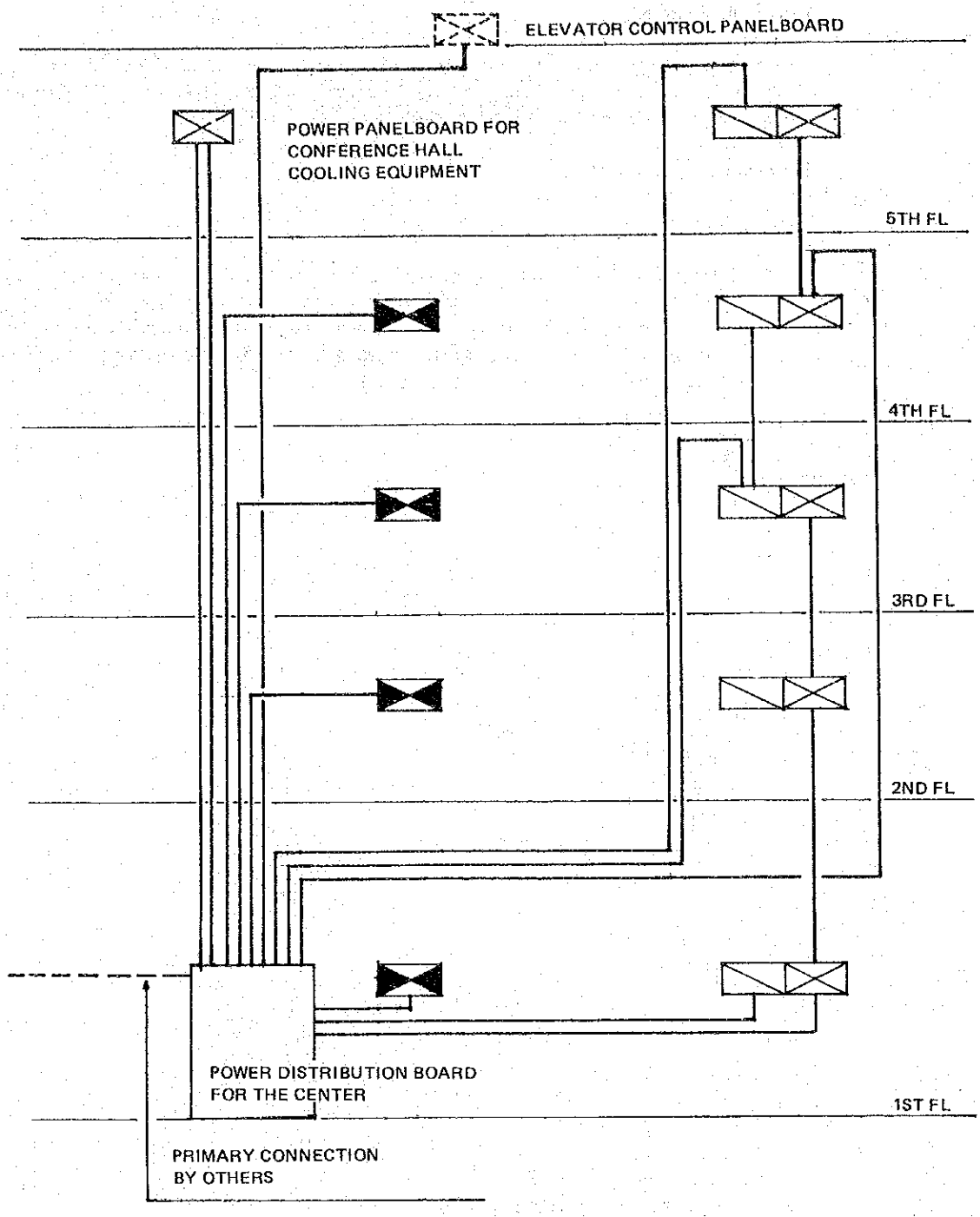
3–5 Utility Planning

The design of utility equipment is to be in accordance with the basic policies of this preliminary design, and is to honor all existing codes and regulations in the Philippines pertinent to the design, material, equipment and workmanship of utilities for buildings.

A. Electrical Equipment

(1) Power Feeder

Low tension (3P-3W-230V) supply for both power and lighting is to be received at a power distribution board located in the Generator and Control Room on the 1st floor of this Center. The total consumption is estimated at about 400 KVA. Power is to be distributed by wiring in conduit piping to panelboards on each floor via individual branch breakers in the power distribution board.



	LIGHTING PANELBOARD
	POWER PANELBOARD FOR BUILDING EQUIPMENT
	POWER PANELBOARD FOR TRAINING EQUIPMENT

POWER FEEDER DIAGRAM

(2) Power Supply

Power and incidental control wiring in conduit piping is to be designed for building utility equipment such as water supply, hydrant and drainage pumps, ventilation fans, cooling equipment and the elevator motor. Similar supply is also to be designed for training equipment via panelboards located in walls near the entrances of the training rooms. Training equipment will be provided also with individual control panels or with wiring to a convenient outlet.

(3) Lighting Fixtures and Convenience Outlets

Illumination in general is to be provided with fluorescent lighting fixtures supplemented with incandescent lighting. Lighting fixtures are to be controlled by room switches located at doorways.

Lighting intensities and fixture types for main rooms are to be designed as follows:

Classrooms, Offices, Snack & Lounge	300 lux	surface mounted without reflectors
Conference Hall	300 lux	ceiling mounted
Training Rooms	300 - 400 lux	surface mounted with and without reflectors
Corridors and Staircases	100 lux	

Convenience outlets are to be provided at 3 - 5 locations in classrooms and at about 10 meter intervals in corridors.

(4) Telephone Conduit

A service connection panelboard is to be provided on the 1st floor. Distribution panelboards on each floor and outlet boxes in main rooms are to be provided with necessary conduit connections so that telephone equipment can be installed by others.

(5) TV and FM Antennas and Feeders

Television and FM broadcast antennas are to be provided on the roof and outlets provided in the following rooms together with the necessary feeder connections:

Radio Equipment Room
Staff Study and Research Room
Offices (3rd and 4th floors)
Electronic Training Room
Snack & Lounge

(6) Fire Alarm Equipment

Fire alarm equipment consisting of alarm buttons and bells are to be provided adjacent to fire hydrants on each floor in accordance with local codes and regulations.

B. Water Supply, Drainage, Sanitary and Fire Hydrant Equipment

(1) Water Supply

Water supply is to rely upon the city water supply system. Water is to be pumped to an elevated water supply tank from a receiving tank.

(2) Hotwater Supply

Sink in the kitchen is to be supplied with domestic hotwater generated by an instantaneous gas hotwater generator. Hotwater for drinking purposes is to be furnished by a gas hotwater storage generator.

(3) Drainage

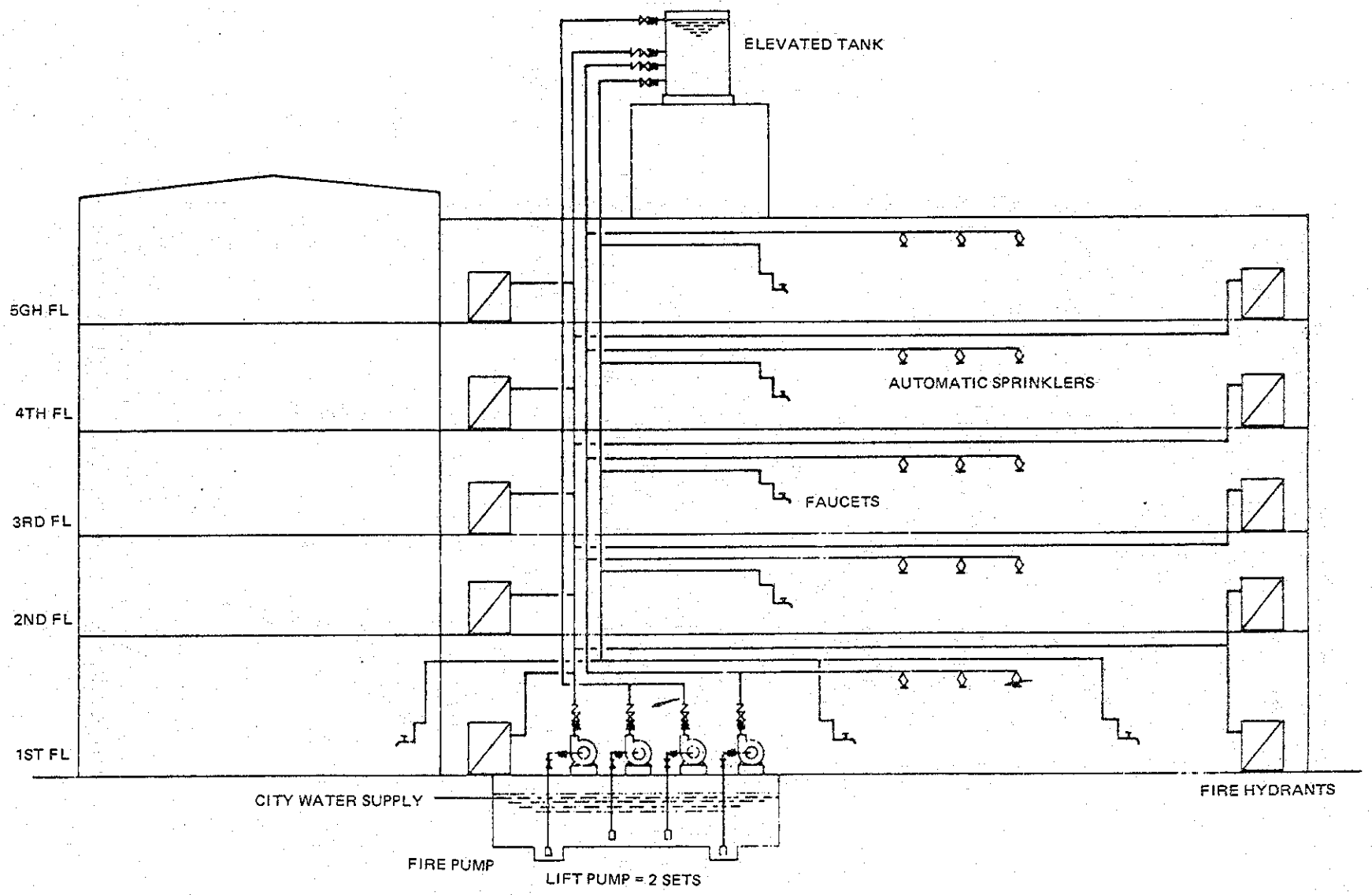
Drainage system is to be divided into the four (4) systems of toilet sewer, ordinary waste drainage from kitchen and others, drainage containing oil from training areas and a storm drainage system. Toilet sewer and ordinary waste drainage will be combined and discharged together from the premises. Drainage from training areas is to be discharged together with the former drainage system after it has been freed from oil and gasoline. Storm drainage is to be an individual system of its own.

(4) Fire Hydrant

Fire hydrant system is to be provided within this Center building. A common receiving tank is to be used for fire water and the domestic water supply system.

(5) Gas Supply

Supply piping system for gas is to be provided for usage in the kitchen and for hotwater generators.



WATER SUPPLY AND FIRE HYDRANT SYSTEM DIAGRAM

C. Cooling and Ventilation Equipment

(1) Cooling

The following rooms are to be cooled:

1st Floor
- Snack & Lounge

2nd Floor
- Classrooms (3)
- Test Room

3rd Floor
- Classrooms (3)
- Precision Measuring Room

4th Floor
- Offices (2)
- Radio Equipment Room
- Electronic Training Room
- Simulator Training Room
- Printing & Publication Room
- Design & Product Development Room

5th Floor
- Audio Visual Room
- Library Reference & Materials Room
- Staff Study & Research Room
- Conference Hall
- Production Studio Recording Room

Other than the Conference Hall which is to be cooled with air-cooled package-type air conditioner through overhead ducts and diffusers in the ceiling, all other rooms to be cooled are to be equipped with air-cooled window-type air conditioners.

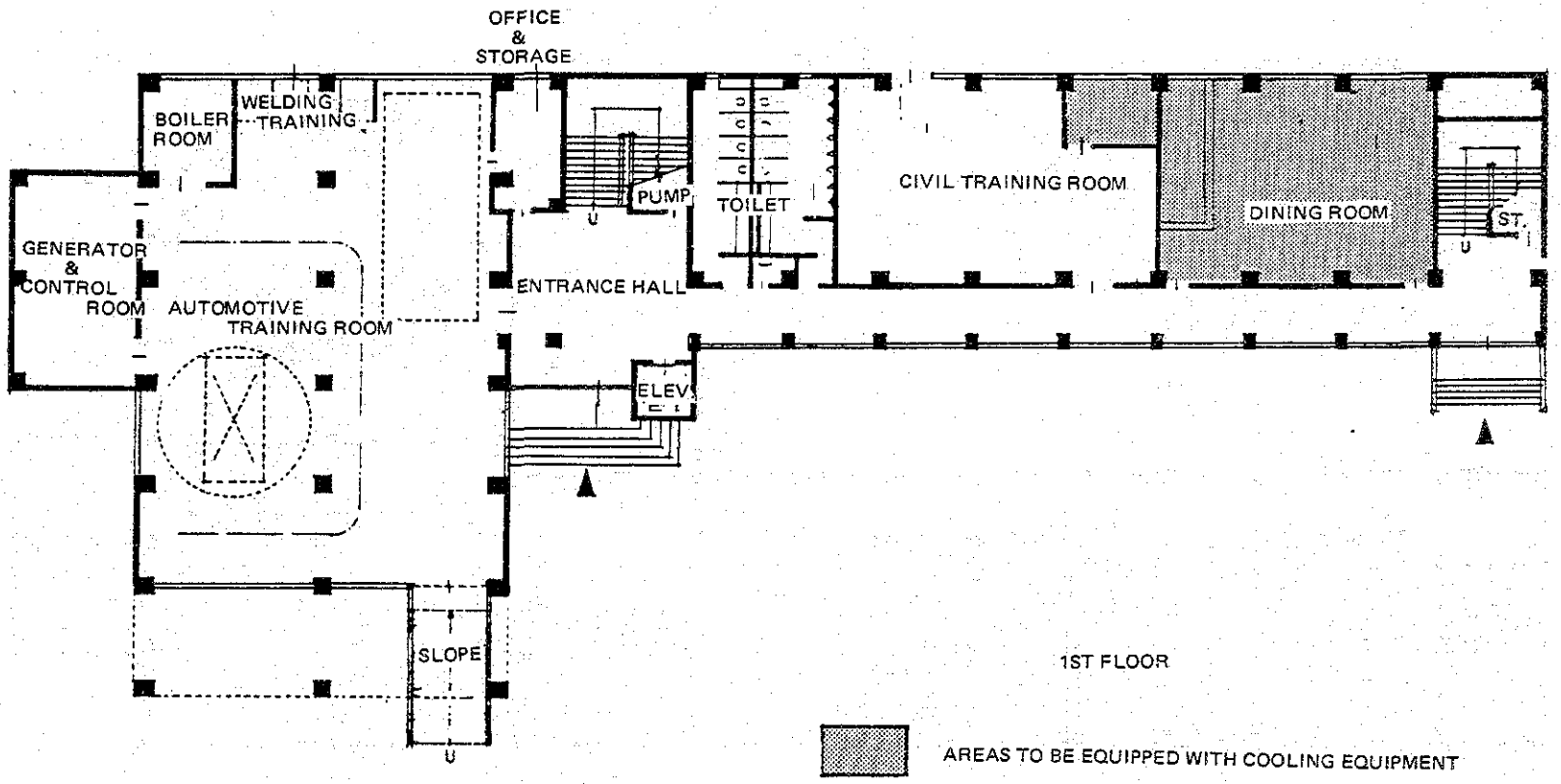
(2) Ventilation

Natural ventilation through windows is to be the primary means of ventilation. The following areas however are to be equipped with mechanical ventilation:

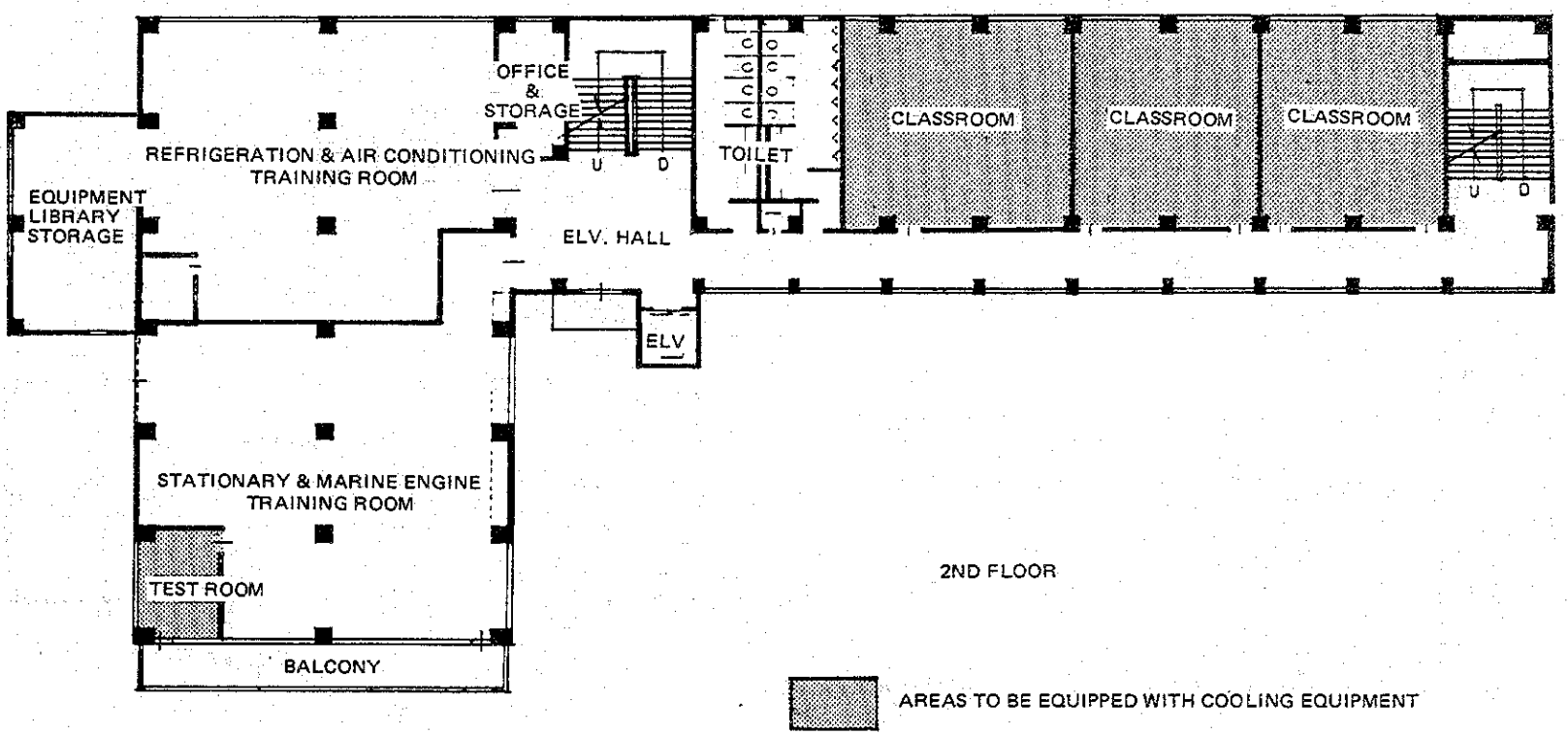
- Toilets
- Ventilation hoods in Kitchen
- Automotive Training Room
- Welding Booths
- Stationary & Marine Engine Training Room

D. Elevator

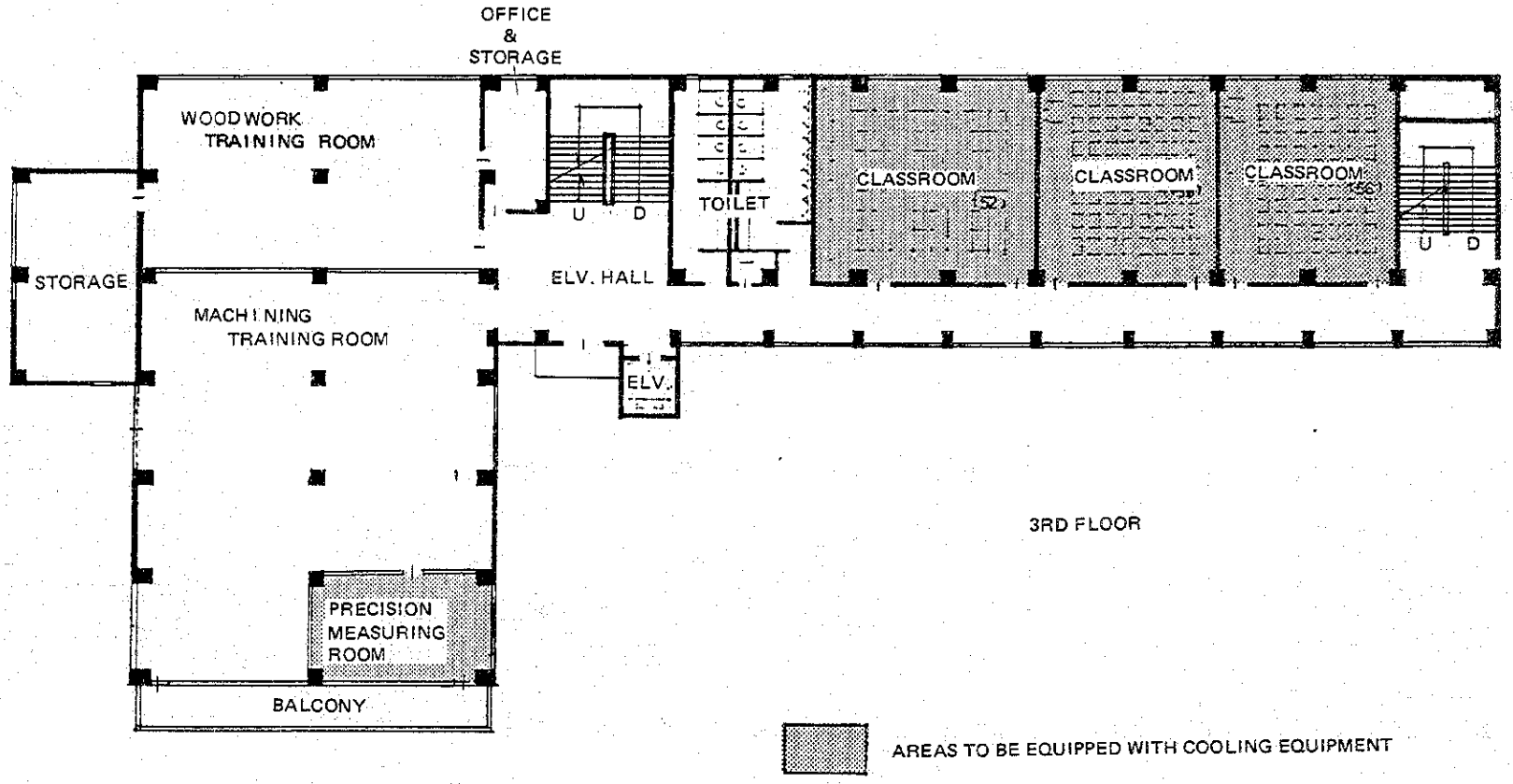
A stock-type 1,000 kg 15 person 60 m/min freight/personnel elevator is to be provided mainly for vertical transportation of heavy training material and products.



DESIGNATION OF AREAS TO BE COOLED



DESIGNATION OF AREAS TO BE COOLED



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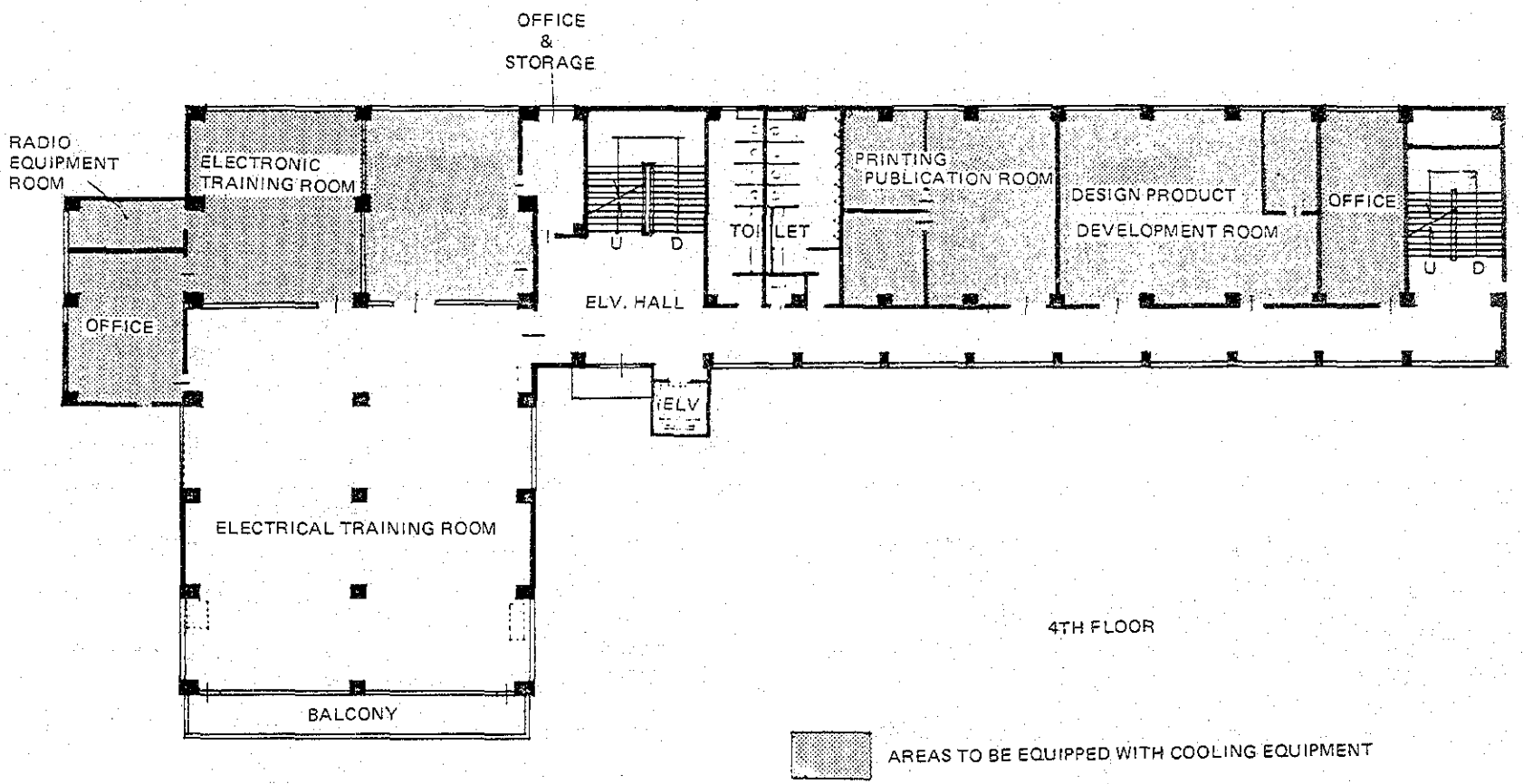

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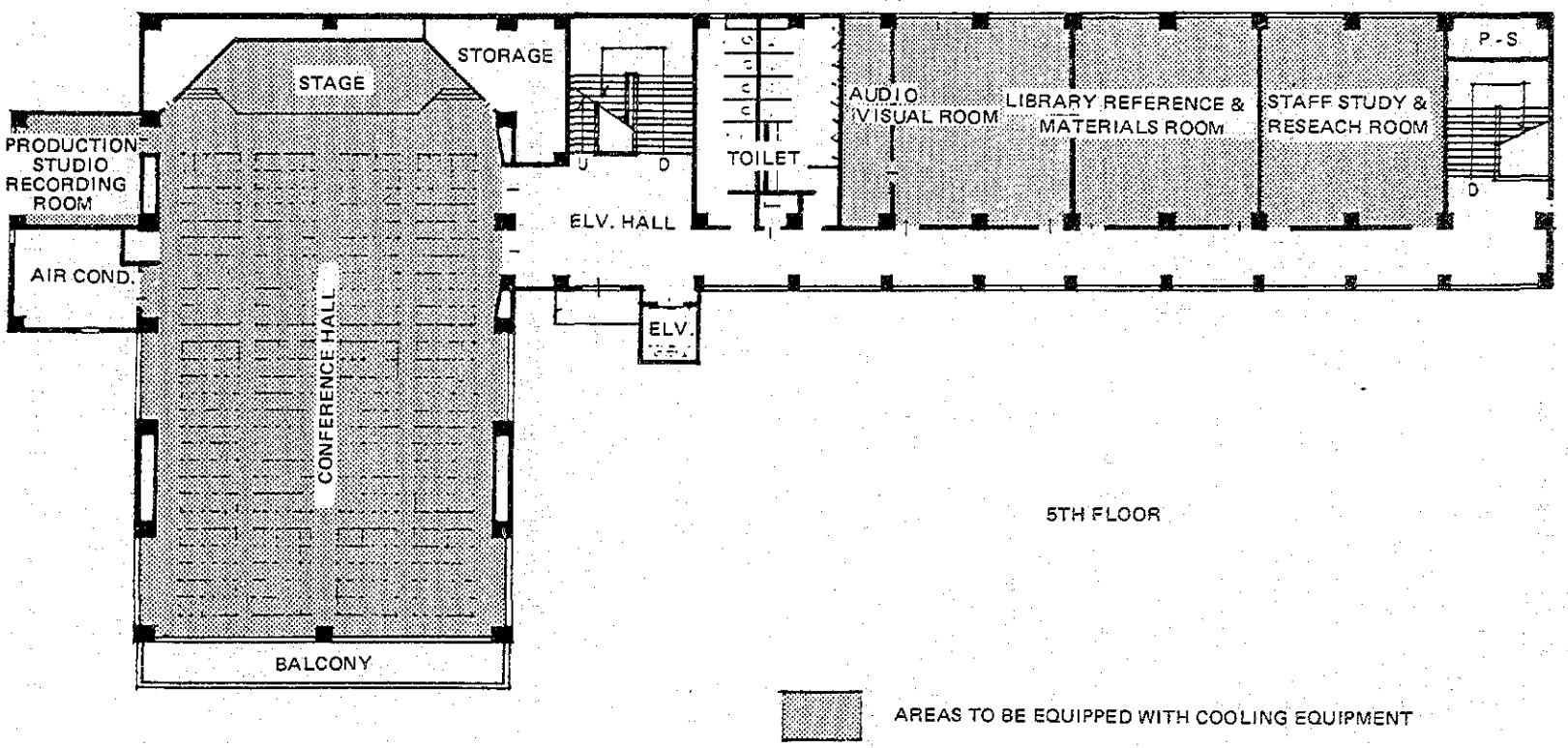

DESIGNATION OF AREAS TO BE COOLED