

I-3 A Project Proposal for Japanese Grant Aid by BMG

A project proposal for Japanese
grand-in-aid

PETROLOGICAL, MINERALOGICAL AND
GEOCHRONOLOGICAL SERVICES
(PETROLAB)

by

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III. BACKGROUND AND JUSTIFICATION:

The rapid pace in the development of the country's mineral resources makes it urgent to improve the capability of the Bureau of Mines and Geo-Sciences (BMG) in servicing the demand of the Philippine mining industry in petrological, mineralogical and geochronological analysis which are basic in mineral exploration, particularly in the consideration of decisions to apply more expensive methods of ore search. The accompanying data on the supply-demand situation (Appendix I) for petrological, mineralogical and paleontological services in the Philippines clearly justify the need for the proposed Petrolab.

The Bureau of Mines and Geo-Sciences (BMG) has taken initial steps to improve the capabilities of its petrological, mineralogical and paleontological laboratories in the past. Active petrographers and mineragraphers have been increased to twelve (12), seven (7) of whom are in the central petrology-mineralogy laboratory in Quezon City. In addition, twenty three (23) other geologists assigned to field survey projects of the Bureau are now capable of petrographic and mineragraphic work, having undergone training in a six-week seminar workshop course on petrographic and mineragraphic techniques conducted by the Bureau in July and August, 1979. In the Paleontological laboratory, four (4) new geologists have been recruited and trained in micropaleontological analysis. One has been trained on nanofossils.

From the 1979 budget, about P6,000,000 has been used to purchase laboratory equipment for petrological, mineralogical and paleontological analysis. This includes a Shimadzu-ARL EMX-SM7 electron probe microanalyzer, a heavy-duty differential thermal analyzer, thirty (30) polarizing microscopes of various models, one (1) magnetic separator (table model), three (3) microscopic automatic point counters, one (1) heating stage, two (2) sample grinding-polishing machines, three (3) diamond saw cutting machines, and various other instruments used for petrological, mineralogical and paleontological work. Arrival of these instruments is expected to be completed in October, 1980.

IV. OBJECTIVES:

IV. A Primary:

To establish the Petrological, Mineralogical and Geochronological Services Laboratory (Petrolab) of the Philippine Bureau of Mines which will serve as a center for petrological, mineralogical and geochronological (age determination) analysis of rocks and minerals in the Philippines.

IV. B Secondary:

- B. 1 To improve the capability of the Philippines in petrological, mineralogical and geochronological investigations to the level of current knowledge thru acquisition of modern instruments,
- B. 2 To develop and establish local expertise, in petrology, mineralogy and geochronology, capable of self-sustained growth and advancement thru in-service and/or academic training.
- B. 3 To provide the mineral industry the basic data for the evaluation of mineral possibilities thru accurate mineralogical, petrological and geochronological determinations.
- B. 4 To utilize prospective aids from the government of Japan for the above purposes.

V. DURATION: Three (3) years:

V. A PHASE I (1st year)

Construction of building; organization; procurement of equipment and supplies; and installation of major equipment.

V. B PHASE II (2nd year)

Installation of equipment; trial runs; field surveys; and establishment of library.

V. C. PHASE III (3rd year)

Installation of additional equipment; initial year operation of all units.

VI. SCHEDULE OF ACTIVITIES

A C T I V I T Y	: PHASE I : : 1st year :	: PHASE II : : 2nd year :	: PHASE III : : 3rd year :
1. Organization	:0--2	:	:
2. Construction of building	:0-----5	:	:
3. Procurement of equipment and supplies; (including delivery in site)	: 2-----10	: 2----6	: 2----6
4. Installation of equipment	: 10--12	: 6--8	: 6--8
5. Trial runs	:	: 0--3 9--12	:
6. Fieldwork to collect representative standard samples of minerals, rocks and ores in the Philippines.	:	: 0-----12	:
7. Establishment of rock/mineral and book library	:	: 0-----	:-----6

VII. REQUIREMENT FOR JAPANESE AID FINANCING

VII. A. EQUIPMENT

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
A. 1. Mass Spectrometer (Gas)	60,000			60,000
2. Mass Spectrometer (Solid)	80,000			80,000
3. Cl ₄ Analyzer	10,000			10,000
4. Sr Isotope Separator	2,000			2,000
5. Sample preparation accessory for spectrometer analysis	6,000			6,000
6. Gas Chromatograph	10,000			10,000
7. X-ray diffractometer	10,000			10,000
8. Set of equipment for paleomagnetic determination including Spinner Magnetometer, A-C demagnetizer, Thermal demagnetizer; table type diamond drill & portable diamond drill	30,000			30,000
9. Five pieces Binocular microscopes and accessories for paleontological determination		2,000		2,000
10. Microhardness Tester		2,000		2,000
11. Sample crushing and grinding equipment	5,000			5,000
12. Three (3) units diamond cutting machine		1,000		1,000
13. One (1) unit Isodynamic magnetic separator		2,000		2,000

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
14. One (1) unit atomic Absorp-		4,000		4,000
15. Automatic thin sectioning machine		3,000		3,000
16. Ten (10) pcs. platinum crucibles with cover (30 ml. with reinforced bottom :		2,000		2,000
17. Ten (10) pcs. platinum dishes with stirrer (50 ml.)		2,000		2,000
18. Standard glasswares for wet chemical laboratory :		5,000		5,000
19. One (1) lot of standard chemical laboratory equipment including oven, hot plate, water bath & fume hood	7,000			7,000
20. One (1) pc. digital analytical balance		2,000		2,000
21. One (1) lot of semi-precious stone preparation equipment including gem-lab cabber, faceting machine, micro-calipers diamond wire hand saw, etc.		3,000		3,000
22. Microscopic reflectance meter		1,000		1,000
23. Copying machine (capable of reduction and enlargement and copying of large size maps	8,000			8,000
24. Four (4) portable electric typewriter		240		240

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
25. Two (2) electric type-writers with long carriage	:	540	:	540
26. Twenty (20) pcs. pocket calculators	:	300	:	300
27. Two (2) units polaroid cameras	:	90	:	90
28. Two (2) units underwater cameras	:	160	:	160
29. Four (4) units Nikon FE cameras	:	360	:	360
30. Two (2) units overhead projectors	:	148	:	148
31. Two (2) units slide projectors	:	100	:	100
32. One (1) unit refrigerator freezer	:	250	:	250
33. Ten (10) units 2Hp air-conditioners	2,400	:	:	2,400
34. One (1) lot wall clocks, timers, humidity meters, wall thermometers, pyrometers	:	1,000	:	1,000
35. One (1) lot dark-room equipment for photo-processing and printing	:	5,000	:	5,000
36. Four (4) units scuba diving gear	:	800	:	800
37. Four (4) units passenger sedan	10,000	10,000	:	20,000
38. Four (4) units Land Cruiser Jeep	16,000	:	:	16,000

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
39. One (1) unit 10-seater mini-bus		5,000		5,000
40. One (1) unit public sound system		1,000		1,000
41. One (1) unit offset printing machine			43,995	43,995
42. One (1) unit process camera			8,066	8,066
3. One (1) unit type setting machine			4,400	4,400
44. One (1) unit automatic cutter			2,640	2,640

T O T A L : 256,400 : 53,988 : 59,101 : 369,489

VII. B. SUPPLIES

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
B. 1 Standard chemicals for wet chemical analysis and geochemistry laboratory	:	3,000	4,000	7,000
B. 2 Mineral/rock fossil standards	1,000	1,000	1,000	3,000
B. 3 Standard book references	5,000	5,000	5,000	15,000
B. 4 Field paraphernalia	:	5,000	:	5,000
B. 5 Miscellaneous	1,000	2,000	2,000	5,000
TOTAL	7,000	16,000	12,000	35,000

VII. C. BUILDING

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
1 Construction and materials improvement	439,950	(0)	(0)	439,950
TOTAL	439,950	(0)	(0)	439,950

	1st year	2nd year	3rd year	TOTAL
GRAND TOTAL IN THOUSAND YEN	703,350	69,988	71,101	844,439

VIII. CASH FLOW OF JAPANESE AID

I T E M	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
IX. A. EQUIPMENT	: 256,400	: 53,988	: 59,101	: 369,489
B. SUPPLIES	: 7,000	: 16,000	: 12,000	: 35,000
C. BUILDING	: 439,950	: (0)	: (0)	: 439,950
GRAND TOTAL	: 703,350	: 69,988	: 71,101	: 844,439
IN THOUSAND PESOS	: 23,980.56	: 2,386.22	: 2,424.17	: 28,790.9

IX. REQUIREMENTS FOR THE PHILIPPINE GOVERNMENT

IX. A. ORGANIZATION

The Bureau of Mines and Geo-Sciences shall organize the "Petrolab" so that it may function in the most efficient way and that it may be able to continue on its own after the termination of the Japanese aid program. The Bureau shall assign from its regular pool of personnel capable persons to occupy the needed positions for the "Petrolab". The organization of the Petrological, Mineralogical and Geochronological Services Laboratory shall be more or less in accordance with the attached organization chart (Appendix II).

Approximate cost of organization expenses: P1,000,000

IX. B. EQUIPMENT COMPLEMENTATION

The Bureau of Mines and Geo-Sciences shall make available to the Laboratory the following equipment to complement the equipment provided under the Japanese aid:

1. One (1) Electron probe microanalyzer and standard accessories
2. Fifteen (15) units of petrographic and mineralogical microscopes
3. Two (2) sets of photomicrographic attachments for the microscopes
4. One (1) unit differential thermal analyzer
5. Two (2) units diamond saw cutting machine
6. Two (2) units sample melting device for polished sections
7. One (1) unit polisher-grinder
8. Five (5) units 1.5 HP air-conditioners

9. One (1) unit isodynamic magnetic separator
10. One (1) unit digital balance
11. One (1) unit ceramic ball mill
12. One (1) set sieve with shaker
13. One (1) unit centrifuge
14. One (1) unit oven
15. Five (5) pieces platinum dish
16. Two (2) pieces platinum crucible tong
17. Standard glasswares
18. Standard chemicals
19. Two (2) units filing cabinets
20. One (1) unit electric typewriter
21. Ten (10) units office tables
22. One (1) unit microslide steel cabinet
23. Two (2) units ultraviolet lamps
24. Five (5) pieces hand leveling press
25. One (1) unit hot plate
26. One (1) unit desk-type calculators

Total approximate cost of above equipment: P6,000,000

IX. C. PERSONNEL SERVICES

I T E M	ESTIMATED SALARY IN PESOS			
	1st year	2nd year	3rd year	TOTAL
One (1) Supervising Geologist II	: 18,636	: 18,636	: 18,636	: 55,908
Three (3) Supervising Geo- logists I	: 50,580	: 50,580	: 50,580	: 151,740
Three (3) Supervising Geo- logists I*	:	: 50,580	: 50,580	: 101,160
Three (3) Senior Geologists	: 29,064	: 29,064	: 29,064	: 87,192
Six (6) Senior Geologist*	:	: 87,192	: 87,192	: 174,384
Seven (7) Geologists	: 87,612	: 87,612	: 87,612	: 262,836
Seven (7) Geologists*	:	: 87,612	: 87,612	: 175,224
Three (3) Geologic Aides	: 15,336	: 15,336	: 15,336	: 46,008
Five (5) Geologic Aides	:	: 25,560	: 25,560	: 51,120
Two (2) Mineral Analysis	: 21,552	: 21,552	: 21,552	: 64,656
One (1) Research Chemist II*	:	: 13,152	: 13,152	: 26,304
Two (2) Research Chemist I*	:	: 23,808	: 23,808	: 47,616
Four (4) Paleontologists*	:	: 50,064	: 50,064	: 100,128
Two (2) Electrical Engineers*	:	: 25,012	: 25,012	: 50,024
One (1) Senior Laboratory Technician*	:	: 5,112	: 5,112	: 10,224
Six (6) Laboratory Techni- cians*	:	: 27,792	: 27,792	: 55,584
Two (2) Chemical Laboratory Technicians*	:	: 10,752	: 10,752	: 21,504
One (1) Shop Electrician*	:	: 5,376	: 5,376	: 10,752
One (1) Senior Librarian*	:	: 8,832	: 8,832	: 17,664

I T E M	ESTIMATED SALARY IN PESOS			
	1st year	2nd year	3rd year	TOTAL
One (1) Junior Librarian*	:	5,640	5,640	11,280
One (1) Librarian*	:	5,928	5,928	11,856
Two (2) Cartographer I*	:	11,280	11,280	22,560
One (1) Clerk II	5,640	5,640	5,640	16,920
Two (2) Clerk II*	:	11,280	11,280	22,560
One (1) Messenger*	:	4,680	4,680	9,360
Two (2) Janitors*	:	9,360	9,360	18,720
T O T A L	228,420	697,432	697,432	1,623,284

SUMMARY OF PERSONNEL SERVICES

Existing Positions - 20	223,420	223,420	228,420	685,260
Proposed Positions - 50	:	469,012	464,332	938,024
TOTAL COST	:	:	:	1,623,284

* Non-existing position

IX. D. MAINTENANCE

Maintenance of building, equipment, supplies and other assets of the Petrolab shall be on the account of the Bureau of Mines and Geo-Sciences.

Approximate cost : P10,000,000

TOTAL COST OF PHILIPPINE COUNTERPART : P18,623,284

X. ITEMIZATION OF PHILIPPINE COUNTERPART

APPROXIMATE COST IN PESOS

X. A. ORGANIZATION	:	1,000,000
B. EQUIPMENT COMPLEMENTATION:		6,000,000
C. PERSONNEL SERVICES	:	1,623,284
D. MAINTENANCE	:	10,000,000
<hr/>		
GRAND TOTAL	:	18,623,284
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XI. SUMMARY

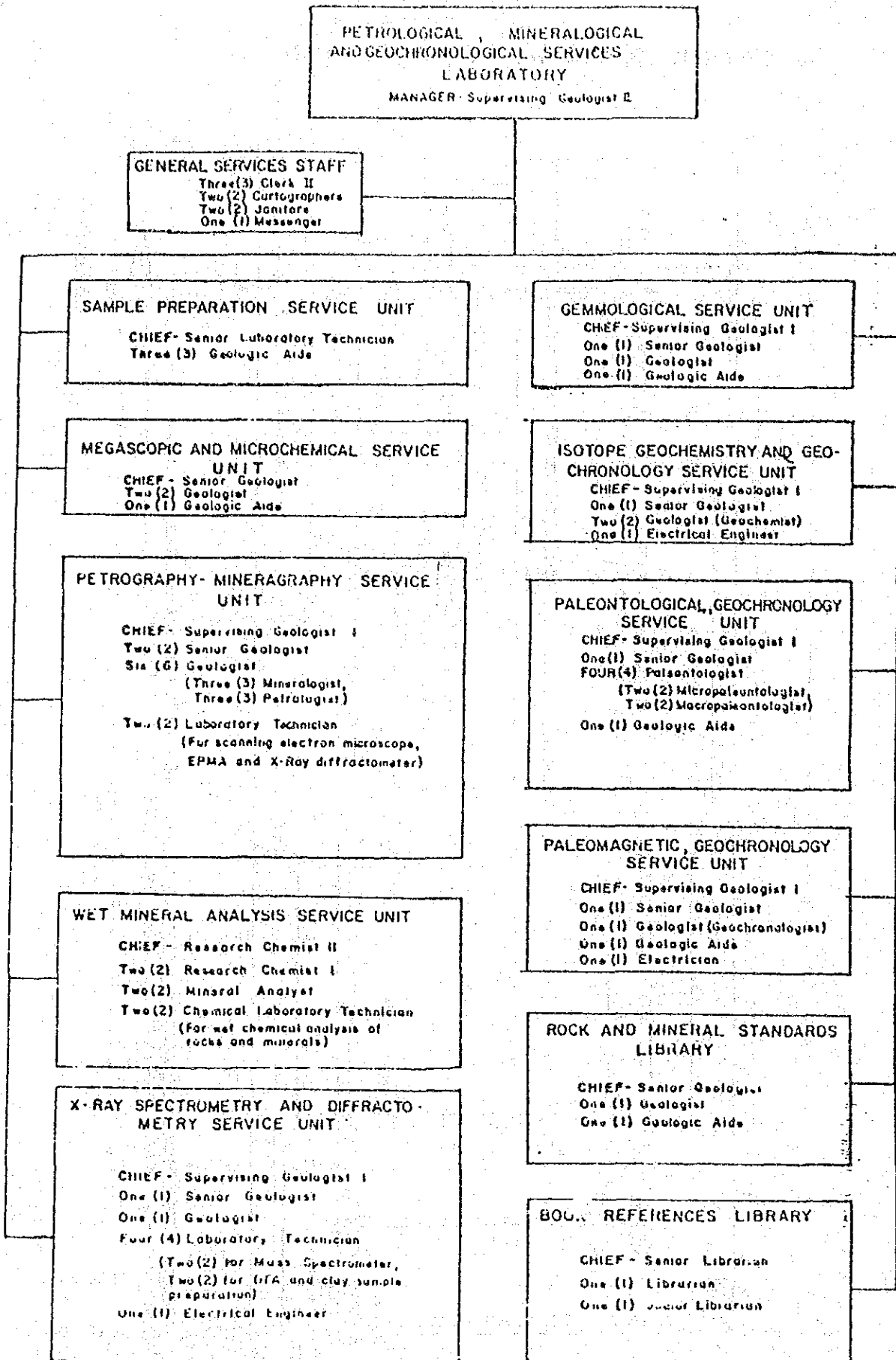
This project is proposed to establish a service laboratory to satisfy the demands of both government and private entities in the Philippines for petrological, mineralogical and geo-chronological analyses needed in mineral/energy resources exploitation and in environmental planning. Japanese aid amounting to 844,439,000 yen or 28,790,950 pesos is proposed to finance the project which would last for three years. The main components of the requested aid are equipment and building. Projected cash flow of the Japanese aid is as follows:

	ESTIMATED COST IN THOUSAND YEN			
	1st year	2nd year	3rd year	TOTAL
Equipment	: 256,400	: 53,988	: 59,101	: 369,489
Supplies	: 7,000	: 16,000	: 12,000	: 35,000
Building	: 439,950	:	:	: 439,950
GRAND TOTAL	: 703,350	: 69,988	: 71,101	: 844,439
IN THOUSAND PESOS	: 23,980.56	: 2,386.22	: 2,424.17	: 28,790.95

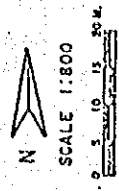
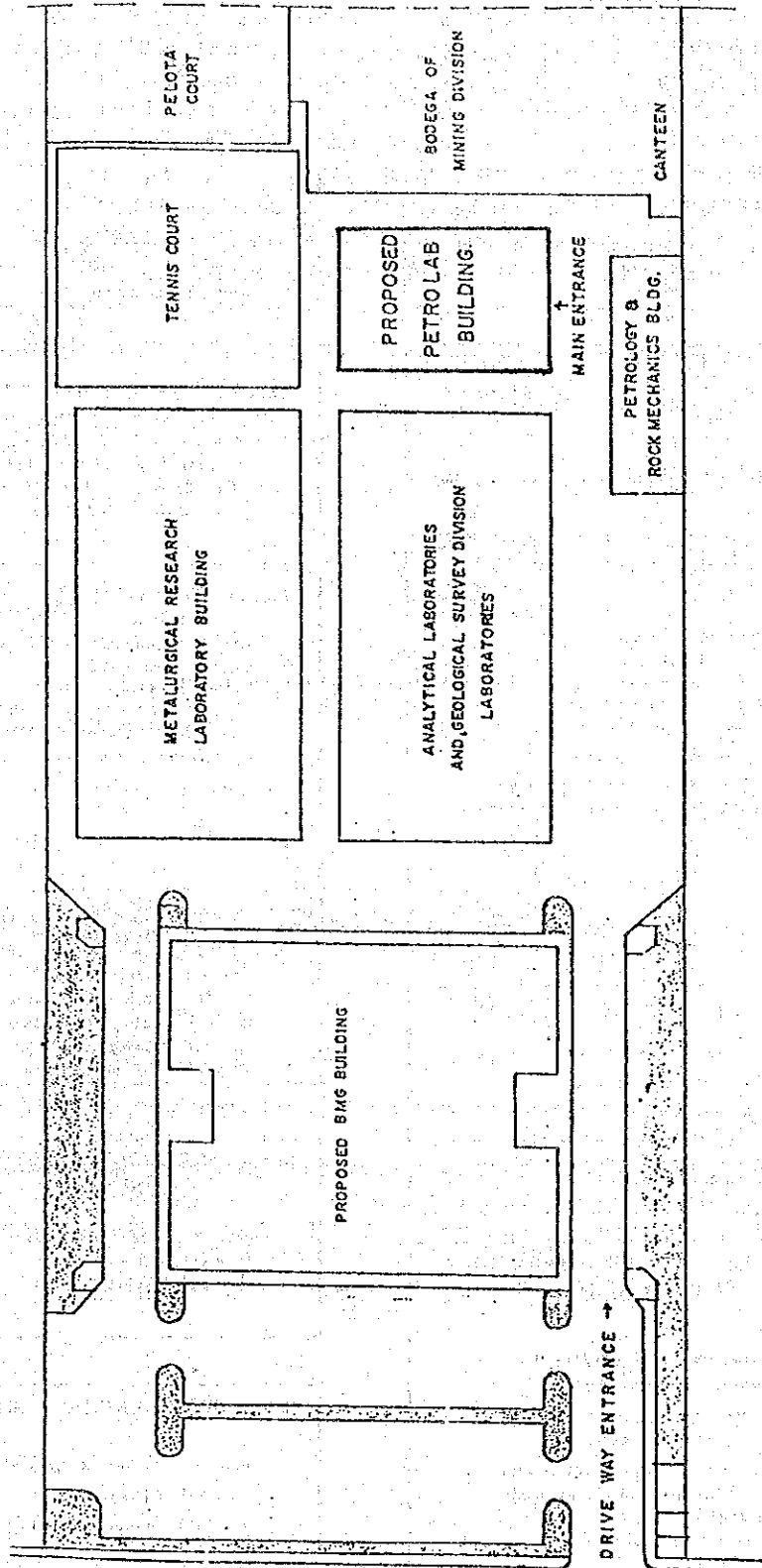
As counterpart, the Philippine Bureau of Mines and Geo-Sciences provides the following which amount to about P13,623,284.

1. Organization;
2. Existing equipment in the present Petrology-Mineralogy laboratory;
3. Personnel services, includes existing positions in the present Petrology-Mineralogy laboratory and proposed new positions to complete the staff of the proposed "Petrolab"; and
4. Maintenance of all assets of the "Petrolab".

A-11-2
 ORGANIZATIONAL CHART

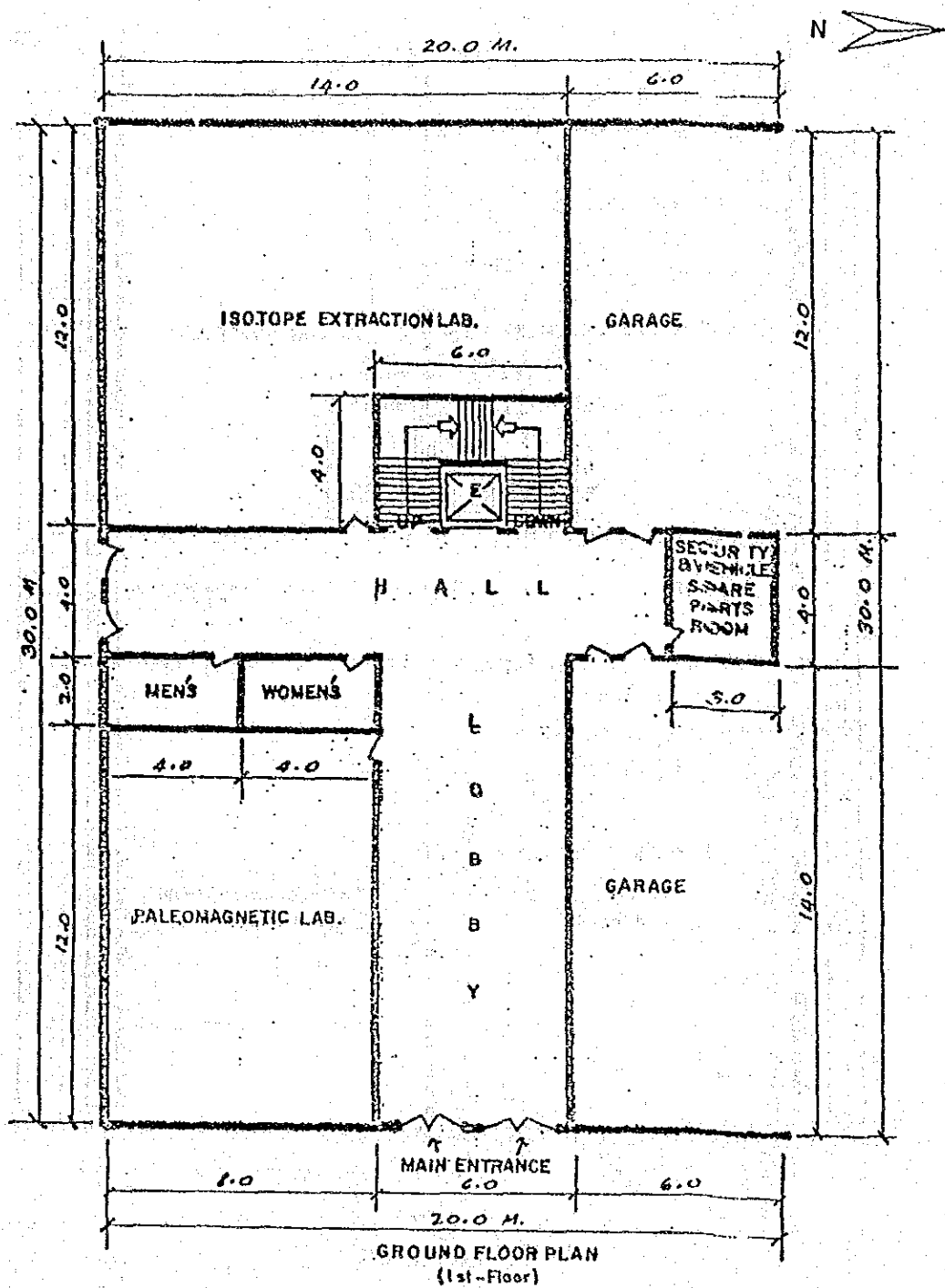


1.4 PETROLAB Building Proposed by BMG



PROJECT: PETROLOGICAL, MINERALOGICAL, & GEOCHRONOLOGICAL SERVICES LABRATORY (PETROLAB)
 LOCATION: BMG SITE, NORTH AVE, DILIMAN, QUEZON CITY, METRO MANILA, PHILIPPINES

North Avenue

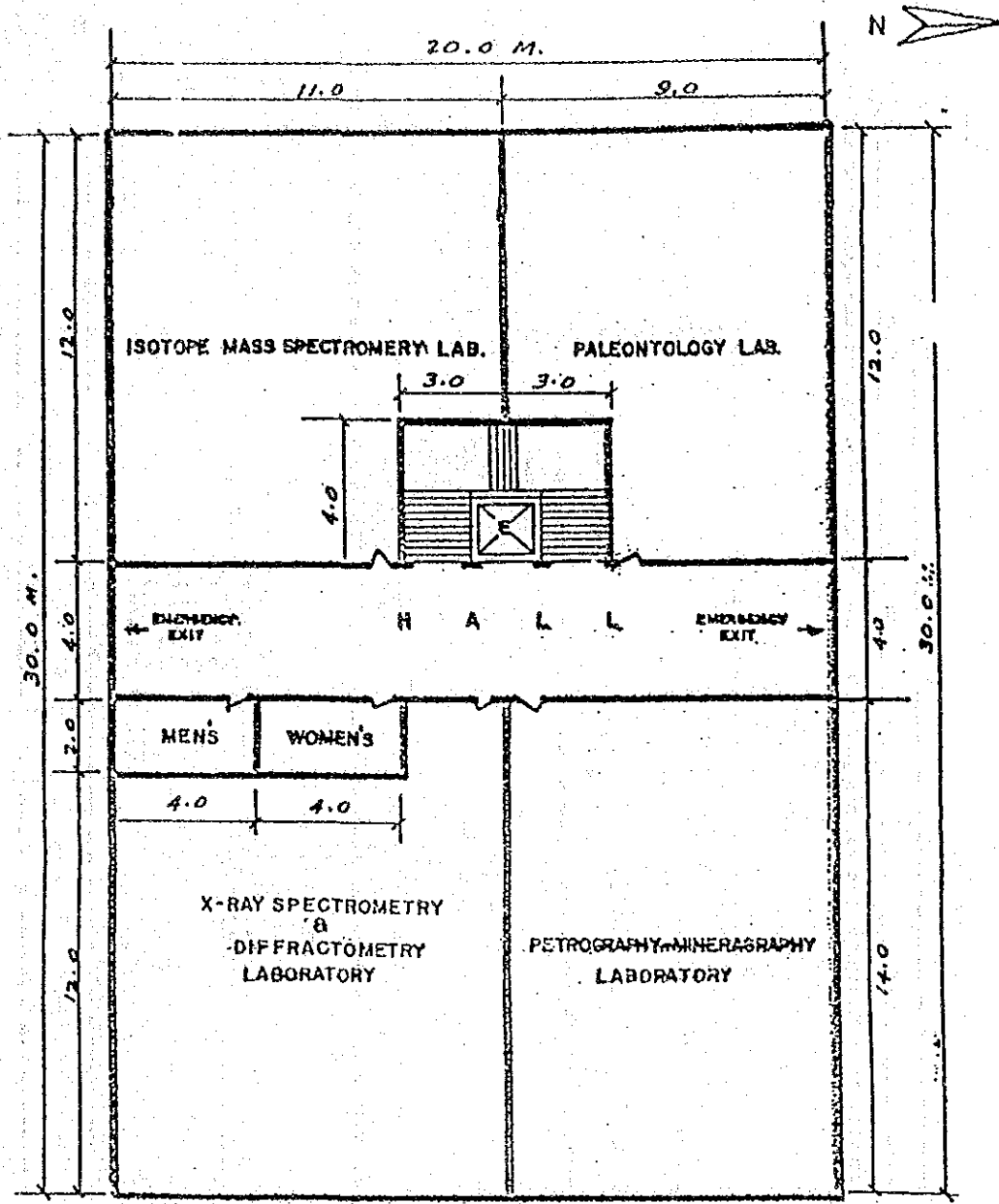


PROJECT: PETROLOGICAL, MINERALOGICAL,
GEOCHRONOLOGICAL SERVICES
LABORATORY (PETROLAB)

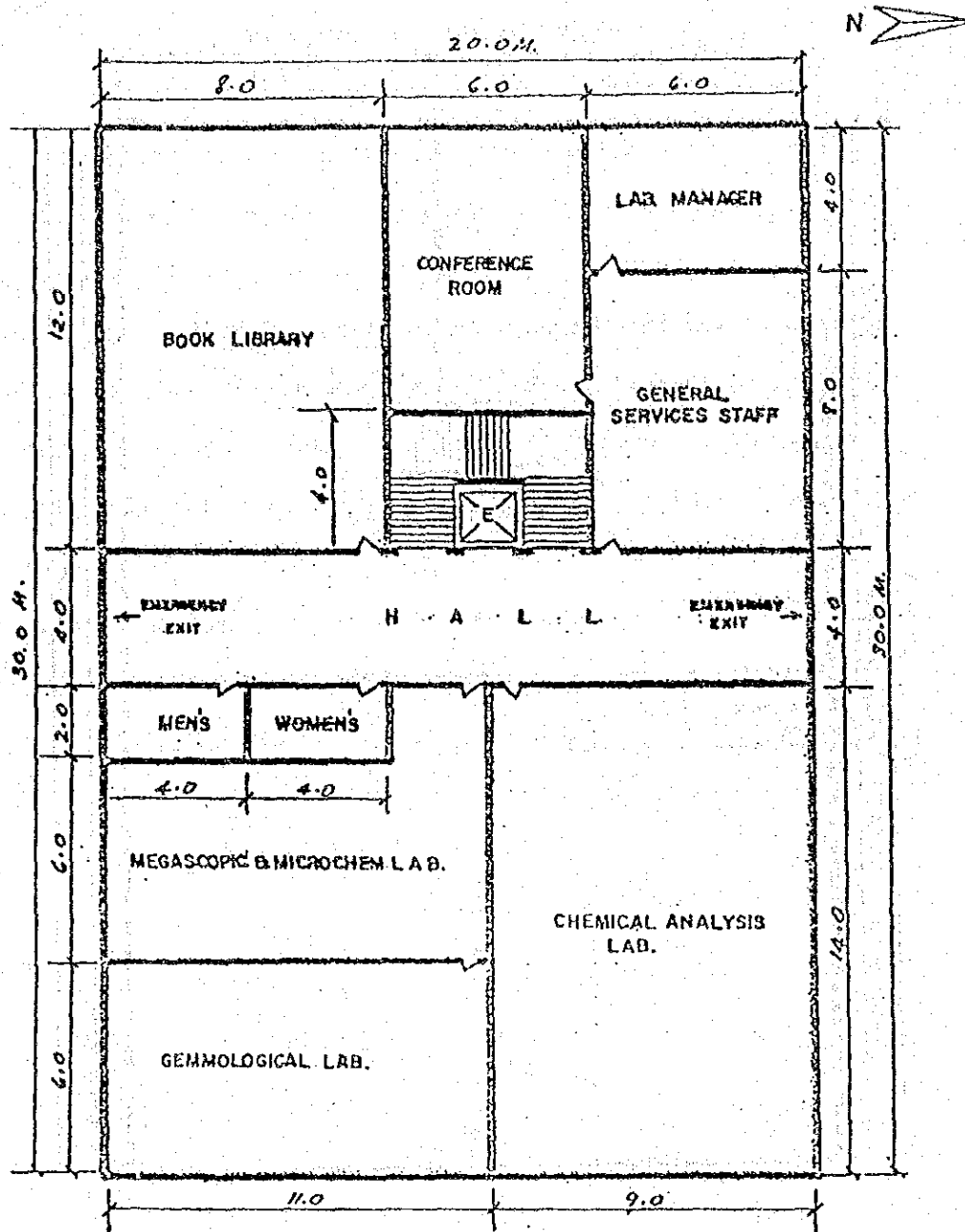
LOCATION: BMG, SITE, NORTH AVENUE,
DILIMAN, QUEZON CITY,
METRO MANILA, PHILIPPINES

SCALE: 1:200

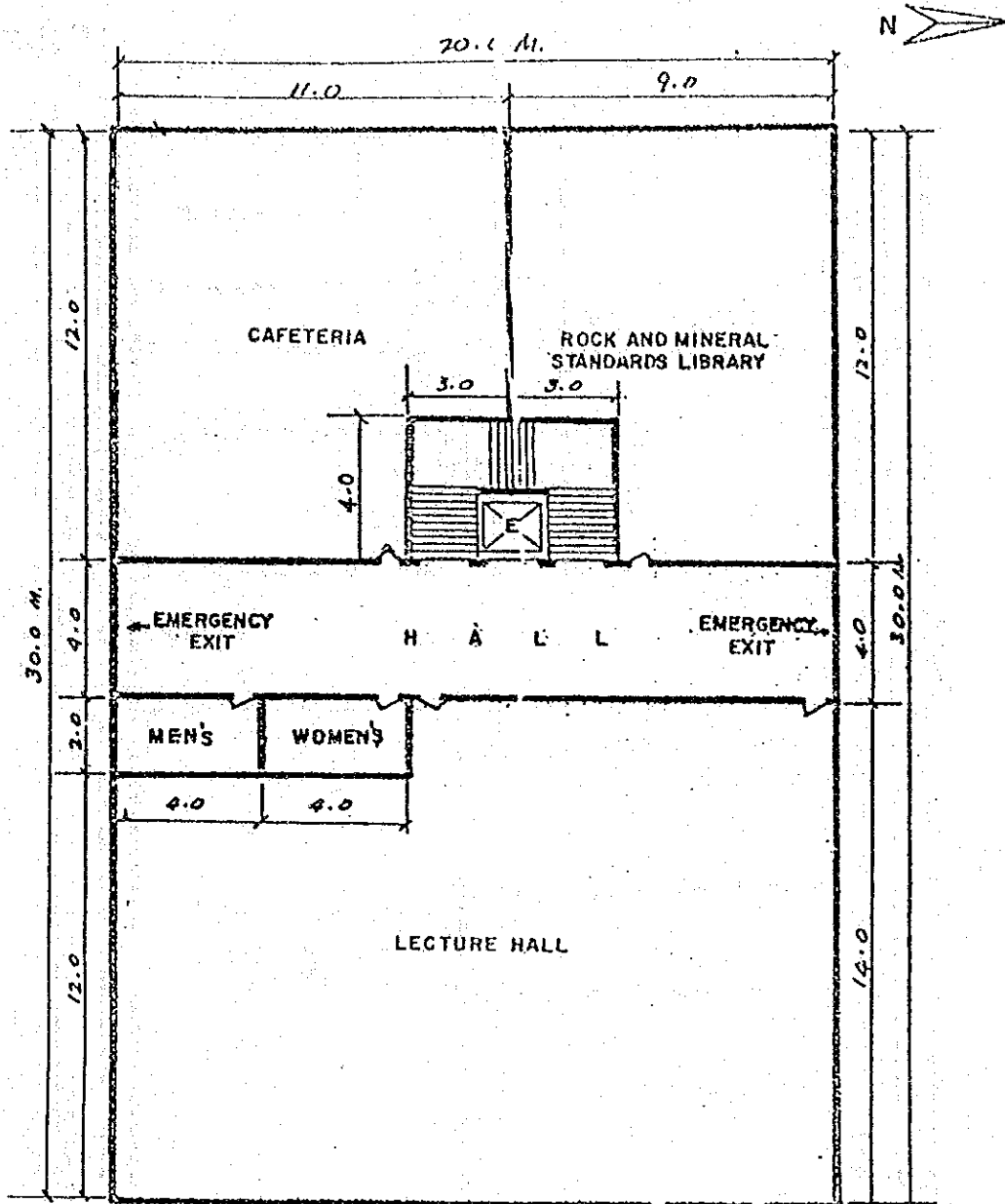
0 1 2 3 4 M.



SECOND FLOOR PLAN



THIRD FLOOR PLAN



TOP FLOOR PLAN
(4th Floor)

I-5 Manpower Program of BMG

MANPOWER FOR THE PETROLAB

Conceived as an institution that would enable the Philippines to keep apace with current technology in rock and mineral analyses, PETROLAB, since its initiation in 1977, has been supported by a program of manpower recruitment and development to ensure efficient operation and maximum utilization of its instruments. This program has made use of various training and scholarship programs, such as Colombo Plan, Nombusho Scholarship Program, CCOP Training Program, ESCAP-EMRDC Training Program, Bureau of Mines and Geo-Sciences Scholarship and Training Program and Bilateral programs with various countries.

So far, the program has made available the following manpower resources for the PETROLAB:

Field of Training	Educa- Level	Country of Training	Date Completed	No. of Personnel
1. Petrology, Mineralogy and Economic Geology	D. Sc.	Japan	1978	1*
2. Paleontology	Ph. D.	Japan	1982	1
3. Ore Petrology (Chromite)	Ph. D.	U.S.A.	1984	1
4. Paleomagnetism	M. Sc.	Japan	1980	1
5. Ore Mineralogy (Gold)	M. Sc.	Japan	1982	1
6. Ore Mineralogy (Massive Sulfides)	M. Sc.	Japan	1982	1
7. Petrography & Geochemistry	M. Sc.	Australia	1982	1
8. Isotope dating	M. Sc.	Australia	1982	1
9. Isotope dating	Post-Grad. Seminar	Korea	1980	1
10. Petrography	Post-Grad. Trainings	West Germany	1978	1
11. Petrography	Post-Grad. Trainings	Philippines	1979	5
12. XRF operation	Basic Trainings	Japan	1980	2
13. Petrology and Isotope dating	Post-Grad. Trainings	West Germany	1981	1
14. Petrology and Isotope dating	Post-Grad. Trainings	West Germany	1982	1
15. Quaternary Sedimentology	Post-Grad. Trainings	France	1981	1
16. Quaternary Sedimentology	Post-Grad. Trainings	Philippines	1980	1
17. Fossil dating	Post-Grad. Trainings	Malaysia	1980	1

Total 22

*Present head of PETROLAB, with additional training in management from the Asian Institute of Management, and the Development Academy of the Philippines.

The above personnel needs only brief orientation from equipment suppliers to allow them to operate the PETROLAB instruments. However, to hasten the manpower development program and maximize the output of PETROLAB, by 1984 a more extensive training program has been proposed for technical assistance from Japan, as a corollary to the grant-in-aid request for equipment and building. The proposal calls for Japanese experts to initially man the various units of PETROLAB and at the same time train an adequate number of Filipino personnel in the actual operation of the laboratory. To augment the number of Filipino personnel with well-rounded training on the theoretical and operational aspects of rock and mineral analyses, post-graduate studies, if possible degree-oriented, for some PETROLAB personnel are proposed to be carried out in Japan. The training program, as proposed, will last for three (3) years and should preferably commence immediately as the equipment and building from the grant-in-aid are provided.

Another project which is expected to help is the CCOP sponsored project on porphyry copper deposits in the Philippines. This project, which commences in 1981 and ends in 1983, will utilize facilities for isotope analysis and dating in the Institute of Geological Sciences of London, U.K. One or two personnel from PETROLAB will be sent to that institute in early 1982 to undertake on-the-job training in the isotopic analysis of the samples from the Philippines. Once they have learned the necessary techniques they will return to the Philippines and continue the analysis in the mass spectrometers and isotope extraction facilities of PETROLAB.

I-7 Boring Log

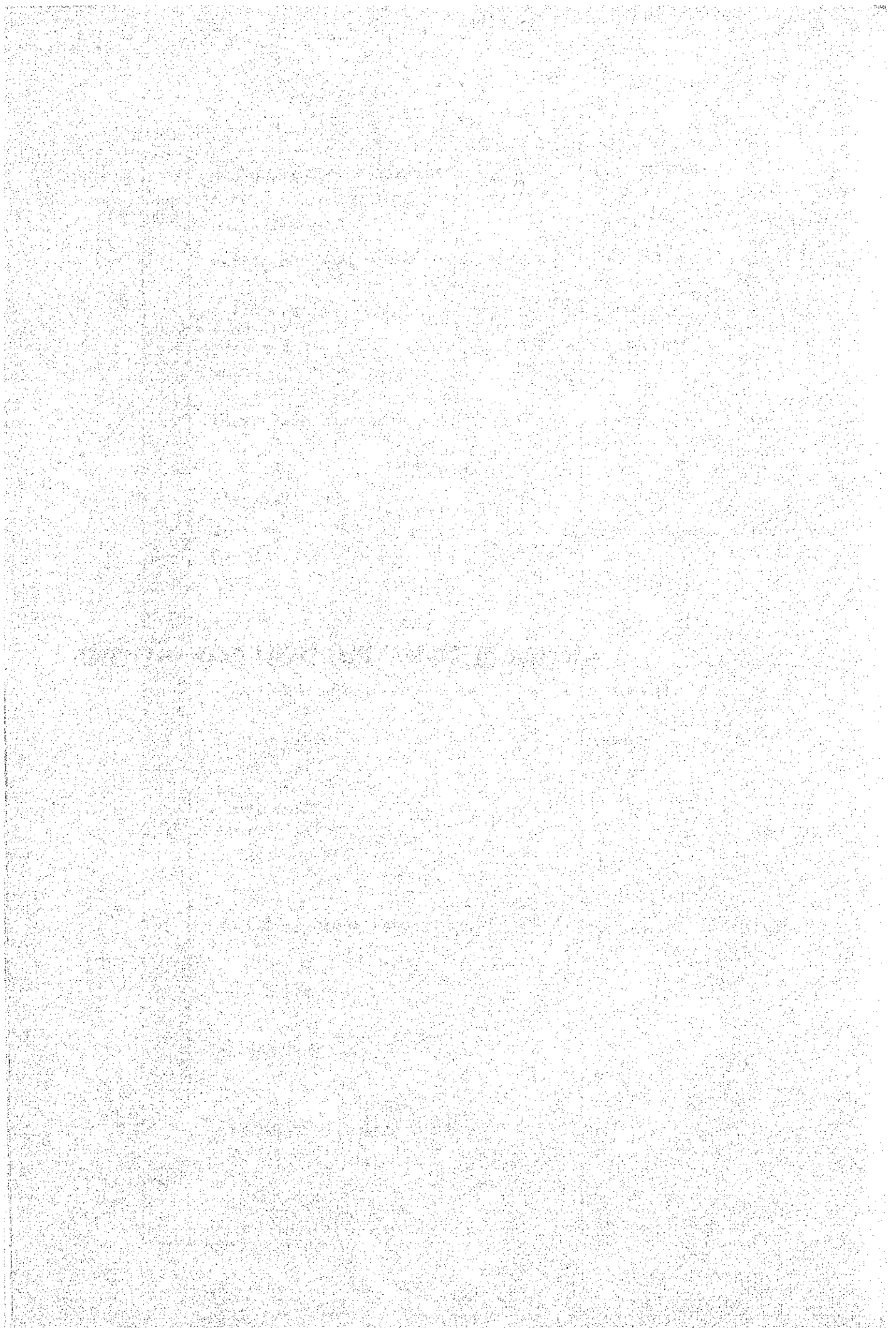
BORING No.1 Hole

DEPTH	DESCRIPTION OF MATERIALS	REMARKS
0.0	weathered soil	soft
	tuffaceous sand stone	hard
	tuff breccia	hard
	pisolitic tuff	hard
	clayed tuff	moderate
	fine sandy tuff	hard
	sandy tuff	hard
5.0	fine sand stone	hard
	sandy tuff	hard
	tuffaceous mud stone	hard
	sand stone	hard
	tuffaceous mud stone	hard
	sand stone	hard
	pisolitic tuff	hard
	clayed tuff breccia	hard
10.0	tuffaceous mud stone	hard
	pisolitic tuff	hard
	clayed tuff	moderate
	sandy tuff	hard
	tuff	hard
	tuff breccia	hard
	tuff	hard
	tuff breccia & tuff alternate	
	tuff	
	tuff breccia	
15.0	tuff	
	tuffaceous mud stone	
	tuffaceous sand stone	
	clayed tuffaceous sand stone	
	tuffaceous mud stone	
	tuff breccia	
	clayed tuff	
	clayed sandy tuff breccia	
20.0	sandy tuff breccia	

BORING No.2 Hole

DEPTH	DESCRIPTION OF MATERIALS	REMARKS
0.0	weathered soil	soft
	tuffaceous sand stone	hard
	tuffaceous mud stone	hard
	sandy tuff	hard
	clayed tuff	moderate
	tuff	hard
5.0	tuffaceous mud stone	hard
	pisolitic tuff	hard
	tuff	hard
	clayed pelitic tuff	hard
	tuffaceous mud stone	hard
10.0	clayed tuffaceous mud stone	moderate
	tuff breccia	hard
	sandy tuff	hard
	tuff	
	sandy tuff	
	clayed tuff	
	sandy tuff breccia	
15.0	soft tuffaceous sand stone	
	fine sandy tuff	
	clayed tuff	
20.0	clayed pelitic tuff breccia	

ANNEX II CONSTRUCTION CONDITIONS



ANNEX II CONSTRUCTION CONDITIONS

II-1 Present Construction Situation

II-1-1 Construction Situation

Looking only at metropolitan Manila, new construction projects seem to be started frequently, however, most of the more than 3,900 Philippine construction companies are suffering a business depression because of recent continual increases in construction material costs and labor costs. Only the major companies are able to receive orders from foreign countries on account of the government's policies encouraging the construction companies' business with foreign countries. They contribute to increase the total amount of orders received.

In Makati, which will probably be the center of Manila in the future, there are various skyscrapers over 20 stories, banks, office buildings, hotels, apartment houses, etc. They have all been constructed by local building companies. Since the steel frames are very expensive and earthquake force is rather weak, most of these skyscrapers are of reinforced concrete structure. There are only a few buildings of reinforced concrete construction with a structural frame. The pre-stressed concrete construction method is widely used such as for large-size beams or canopies.

Precast concrete curtain walls are seen but aluminum or steel curtain walls are rare as these materials are very expensive and unobtainable. As for exterior wall finishing, pebble wash out and tap finish with mortar plaster are commonly used; there are few exposed concrete walls or tiled walls.

Interior finishing in office construction, is usually vinyl chloride tiles and cast-in-site terrazzo for the floor; painted plywood, sound absorption board and painted mortar for the ceiling; mortar troweled finished and painted, and painted or varnished plywood for walls. In addition, for hotel buildings and memorial buildings, marble tiles, carpeted or parquet flooring for the floor;

wooden board, sprayed mortar or ceiling cloth for the ceiling; marbles, wall cloth or wooden board for walls, are also used.

As supporting pipes cost high, 2" x 4" wood are used for form studs. Plywoods of 12 mm thickness are used for form panels. Forms and studs are fixed with metal devices called little giant.

The construction schedule will be planned counting their construction speed as a little over half as that in Japan.

II-1-2 Construction Materials

Most of the construction materials are manufactured in the Philippines in almost sufficient quantity to satisfy the demand but there is not a wide selection in quality, colors or types of materials. Structural steels and reinforcing bars are manufactured under ASTM standards, importing iron from Japan or South Korea; however, as they are of rather poor quality with less variety of types, imported structural steels and reinforcing bars are also on the market. Bending processing and welding of the reinforcing steels will be carefully carried out because of their high carbon equivalent content.

There is no problem with cement, aggregates, concrete blocks, bricks, roofing tiles, lumber, plywoods, and asbestos cement sheets in quality or quantity. The price of lumber has been rapidly increasing recently.

In terms of interior finish materials, Philippine vinyl chloride tiles and sound absorption materials for ceilings are of poor quality with a poor selectivity of colors or shapes. Imported ones are also used. Gypsum boards are imported and are not easily obtainable. Glazed and unglazed ceramic tiles are domestically produced but there are problems with the cleanness of the surface and/or quality of the glaze and glazing methods. Since the light structural steels for sub-ceilings are high-priced, wood sub-ceilings are commonly used. Wood is a specialty product of the Philippines and provides an export of quality and sufficient quantity. Apitong, yakal and guiyo are popularly used for structural use. Tanguile and lauan for finish work and

narra for first-class furniture and interiors are commonly used.

Steel sashes and doors are manufactured but there are problems with precision and finish. A few aluminum sashes are produced but the imported ones are used in the main.

As for the building equipment, most sanitary ceramic equipment are imported from Japan or the United States except for simple instruments like wash basins. Piping materials and lighting equipment production is not sufficient in quantity. Sometimes the lighting equipment causes fire.

II-1-3 Structural Materials

(1) Concrete

As for cement, ordinary portland cement is produced domestically in plentiful quantity, but white cement is imported and very expensive. River sand is used for fine aggregates. Coarse aggregates are made by crushing river pebbles or mountain rocks. There are about 20 ready-mixed concrete companies in the Metropolitan Manila area, from where the ready-mixed concrete will be supplied to the PETROLAB site. This ready-mixed concrete will be made according to the following procedure. The materials like cement, aggregates and water will be put into the truck mixers at the plant and will be transit mixed on the way to the Site. The concrete thus produced is usually of fairly good quality. The companies supply the standard proportioning concrete, 3,000 psi, 4,000 psi and 5,000 psi. 360 kilograms (nine bags) of cement is used for proportioning one cubic meter of concrete. It sets quite hard, with a slump of 2 - 6 inches for foundation concrete, 2 - 3 inches for slabs or beams, and 4 - 6 inches for columns. Cast concrete hardens quite rapidly. It sometimes reaches 28-day-strength in about two (2) weeks.

(2) Reinforcing bars

The reinforcing bars manufactured in the Philippines are grade 33, 40 and 60 of the ASTM standards; grade 30 for thin bars and grade 40 for thicker ones. Grade 60 bars are usually custom made. These bars are fragile and may be fractured during the bending process. The bars will be spliced with lap-joint splices.

(3) Structural steels

The structural steels and steel boards are manufactured under the ASTM code but not in variety. This may cause difficulty in selecting members economically. Though the survey team did not have sufficient time to conduct research on the technology of steel manufacturing, from the field survey at a minor structural steel processing plant (with five (5) qualified welders), their knowledge of steel structure system and technological level of processing and welding were not very high.

II-1-4 Construction Labor Situation

Labor supply exceeds demand on account of the large young population. The Philippine construction labor costs are low and the technical level high. Following the government's policy of encouraging personnel export, 1.3 million workers were working overseas as of 1978. This causes an outflow of skillful workers but the government carries on a training program for technical workers. Labor supply is sufficient to satisfy demand both in quality and quantity around the metropolitan Manila area. The number of water-proofing workers, tinsmiths, and mechanical engineers is not enough, however.

The construction workers are categorized as common laborers, carpenters, concrete workers, reinforcing-bar placers, plasterers (tiling, block laying workers, bricklayers, terrazzo workers concurrently), painters, welders, plumbers, electricians, machine-operators, etc. They are paid according to their skill rating.

From a report on a construction site, the framing workers accomplished 1.5 - 3 m²/day and the reinforcing-bar placers 80 - 100 kg/day. They are diligent workers if proper instructions and work schedules are appropriately supplied them. They are efficient at accomplishing work within their own sphere but not so much so in cooperating in other work. It is necessary to arrange cooperative work. They do not refuse over-time, holiday or rush work.

II-1-5 Related Regulations and Design Codes

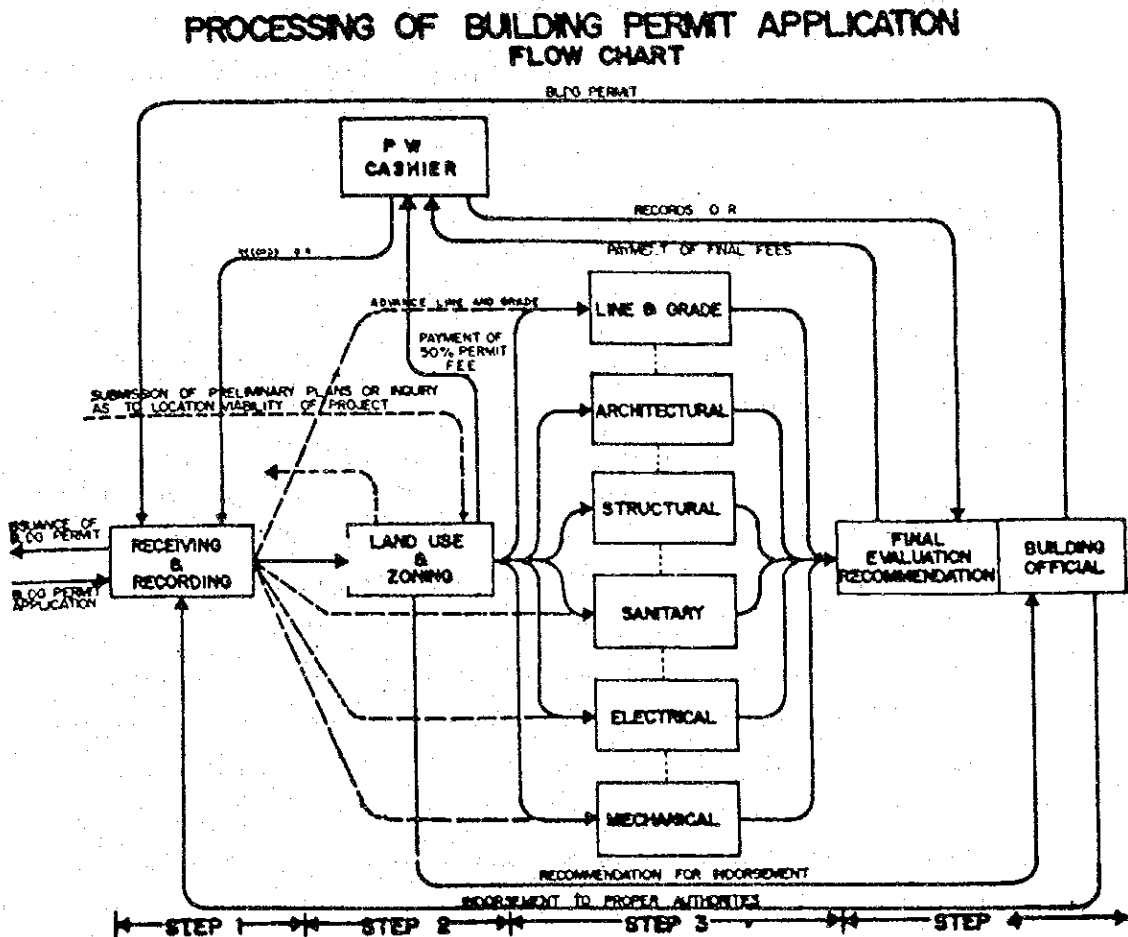
The laws and regulations relating to construction work and design codes are based on those of the United States.

U. S. regulations and design codes are applicable in situations not covered by the Philippine regulations. The following are related regulations and codes:

- National Building Code of the Philippines
- National Structural Code of the Philippines
- Philippine Fire Code (or NFPA)
- Philippine Plumbing and Sanitary Code (or NPC)
- Philippine Electrical Code
- Building Telephone Facilities Standards
- ACI Code
- AISC
- ANSI
- ASHREA
- UBC
- ASTM

II-1-6 Application for Building Permit

Before construction begins, the required permits will be applied for and obtained concerning architecture (including city zoning and neighborhood effects), structure, plumbing electricity and building equipment. Only Philippine license holders are qualified to apply for these permits. The process of application and granting of permits is shown in the following chart:



The authorities concerned are as follows:

- Building Structure: Office of the Building Official
- Fire Protection: Fire Department
- Septic Tank: Pollution Control Agency
- Water Drainage: Metropolitan Waterworks and Sewage System
Highway District Engineers Office

The applications to the following authorities are also required:

- Electric: Manila Electric Company
- Telephone: Philippine Long Distance Telephone

II-2 Construction Cost Conditions

II-2-1 Construction Material Costs

Construction material costs in the Philippines are extremely high compared to labor costs. Especially steel, cement, vinyl chrolide tiles, and burnt bricks are very expensive. A price list of materials is attached below. (See table II-2-1)

According to the data issued by the Philippine Central Bank on the price trends in the Philippines (see table II-2-2), various prices rapidly increased soon after the world wide price rise of petroleum because the Philippines has little petroleum production. The construction material price index stood counts 394.1 as of December 1980 based on a standard of 1972 = 100. It is considerably high compared to the overall price index of 319.9. Asphalt (1,156.6), wood (601.7), cement (535), and reinforcing bars (431) show especially high indexes. Among these items, the price of wood suddenly started rising in 1979.

A Philippine construction engineer said in March 1981 that most of the construction material prices would be raised from April.

TABLE II-2-1

<u>Materials Description</u>	<u>Price</u>
Cement, 40 kg.	28.00/bag
White Cement	103.00
Washed Sand S1	55.00/M ³
Crushed Gravel G1	80.00/M ³
Crushed Gravel 3/4	120.00/M ³
Form Lumber x 8' - up	1.50/bf
Reinforcing Bars	
a. Structural (PS Grade 33) Plain 6mm	4,500.00/ton
b. Intermediate (PS Grade 40) Deformed	
10 mm	3,500.00/ton
12 mm	3,420.00/ton
c. PS Grade 60	
6 mm	3,780.00/ton
10 mm	3,780.00/ton
12 mm	3,780.00/ton
Steel Plate (ASTM) A 36	3,900.00/ton
Angular Bar	
1/4" x 2" x 20'	101.00/pc.
1/4" x 1" x 20'	55.40/pc.
1/8" x 1" x 20'	29.00/pc.
1/8" x 2" x 20'	69.40/pc.
3/16" x 1" x 20'	42.21/pc.
Channels	4,750.00/ton
H-Shape	6,000.00/ton
Plywood Lauan 1/4" x 4" x 8'	40.00/pc.
3/16" x 4' x 8'	38.00/pc.
3/4" x 4' x 8'	120.00/pc.
1/2" x 4' x 8'	80.00/pc.
Asbestos Board 3/16" x 4' x 8'	76.72/pc.
1/4" x 4' x 8'	102.51/pc.
3/8" x 4' x 8'	148.09/pc.
1/2" x 4' x 8'	197.86/pc.
Concrete Blocks 4" x 8" x 16"	2.40/pc.
6" x 8" x 16"	2.55/pc.
8" x 8" x 16"	3.05/pc.

Cement Tile (Tegula)		8.00/pc.
Clay Tile	Roof Tile	15.00/pc.
Glazed Tiles, 4-1/4"		.60/pc.
Unglazed Tile, 4-1/4"		.80/pc.
Ceramic Tiles 4" x 8"	Floor or Wall Tiles	2.50/pc.
	8" x 12"	9.20/pc.
Vinyl Asbestos Tile 1/16"		2.50/pc.
	1/8"	5.60/pc.
Hollow Brick		3.40/pc.
Solid Brick		4.30/pc.

CENTRAL BANK OF THE PHILIPPINES
Department of Economic Research
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TABLE II-2-2

Price Relatives of Selected Materials Used in Construction Activities
in Metro Manila, 1973-1980
(1972 = 100)

Period	Gasoline, regular (liter)	Diesel oil, auto- motive (liter)	Fuel oil, bunker (liter)	Asphaltic materials (liter)	Lumber, 2nd group (1,000 bd. ft.)	Plywood, lauan 1/2" (piece)	Portland cement (40 kgs.)	Reinforcing steel bars 3/4" (kilo)	Structural steel (metric ton)
1973	122.6	118.3	119.0	123.9	113.7	143.8	107.4	217.9	132.4
Jan	104.2	100.0	100.0	107.8	103.3	97.6	102.9	106.2	102.7
Feb	110.8	107.6	112.3	120.0	104.9	115.1	102.9	158.0	102.7
Mar	110.8	107.6	112.3	120.0	105.3	115.1	101.9	170.4	102.7
Apr	110.8	107.6	112.3	120.0	105.3	115.1	101.9	181.5	102.7
May	110.8	107.6	112.3	120.0	105.3	115.1	101.9	181.5	119.2
Jun	110.8	107.6	112.3	120.0	105.3	115.1	101.9	181.5	119.2
Jul	110.8	107.6	112.3	120.0	105.3	175.4	101.9	181.5	119.2
Aug	110.8	107.6	112.3	120.0	105.3	175.4	101.9	209.5	164.1
Sep	110.8	107.6	112.3	120.0	128.9	175.4	101.9	227.2	164.1
Oct	127.1	123.7	118.5	126.0	128.9	175.4	101.9	227.2	164.1
Nov	176.7	167.6	155.4	137.5	128.9	175.4	133.7	395.1	164.1
Dec	176.7	167.6	155.4	155.0	137.5	175.4	133.7	395.1	164.1
1974	319.7	291.8	337.1	274.8	217.2	175.4	228.6	337.5	195.4
Jan	176.7	167.6	155.4	155.0	163.3	175.4	141.6	395.1	194.4
Feb	296.7	278.1	315.1	204.1	163.3	175.4	141.6	395.1	194.4
Mar	296.7	278.1	315.1	280.0	184.8	175.4	260.3	395.1	194.4
Apr	320.0	294.3	340.1	280.0	249.3	175.4	260.3	395.1	194.4
May	343.3	310.5	365.0	280.0	249.3	175.4	260.3	395.1	194.4
Jun	343.3	310.5	365.0	280.0	249.3	175.4	246.9	355.6	194.4
Jul	343.3	310.5	365.0	292.9	249.3	175.4	246.9	355.6	194.4
Aug	343.3	310.5	365.0	305.0	249.3	175.4	246.9	296.3	194.4
Sep	343.3	310.5	365.0	305.0	232.1	175.4	246.9	276.5	194.4
Oct	343.4	310.5	365.0	305.0	218.3	175.4	230.5	276.5	194.4
Nov	343.3	310.5	365.0	305.0	199.9	175.4	230.5	256.8	200.6
Dec	343.3	310.5	365.0	305.0	197.7	175.4	230.5	256.8	200.6
1975	370.0	329.8	388.5	344.6	188.0	205.1	232.4	274.9	204.5
Jan	343.3	310.5	365.0	305.0	197.7	191.9	230.5	256.8	200.6
Feb	343.3	310.5	365.0	305.0	197.7	191.9	230.5	237.0	200.6
Mar	343.3	310.5	365.0	330.0	193.4	191.9	230.5	237.0	200.6
Apr	343.3	310.5	365.0	355.0	193.4	191.9	230.5	276.5	200.6
May	383.3	339.4	400.3	355.0	193.4	191.9	230.5	276.5	200.6
Jun	383.3	339.4	400.3	355.0	193.4	191.9	230.5	281.5	207.3
Jul	383.3	339.4	400.3	355.0	193.4	208.3	230.5	288.9	207.3
Aug	383.3	339.4	400.3	355.0	193.4	224.8	232.5	288.9	207.3
Sep	383.3	339.4	400.3	355.0	184.8	219.3	235.6	288.9	207.3
Oct	383.3	339.4	400.3	355.0	180.5	219.3	235.6	288.9	207.3
Nov	383.3	339.4	400.3	355.0	167.6	219.3	235.6	288.9	207.3
Dec	383.3	339.4	400.3	355.0	167.6	219.3	235.6	288.9	207.3
1976	440.9	405.2	462.0	412.6	214.6	253.4	266.5	295.1	209.1
Jan	414.3	374.8	433.5	386.0	167.6	219.3	244.9	288.9	207.3
Feb	443.3	408.0	464.6	415.0	177.3	235.7	257.2	288.9	209.2
Mar	443.3	408.0	464.6	415.0	197.7	235.7	263.8	296.3	209.2
Apr	443.3	408.0	464.6	415.0	210.6	235.7	263.8	296.3	209.2
May	443.3	408.0	464.6	415.0	214.9	235.7	263.8	296.3	209.2
Jun	443.3	408.0	464.6	415.0	214.9	235.7	263.8	296.3	209.2
Jul	443.3	408.0	464.6	415.0	214.9	235.7	263.8	296.3	209.2
Aug	443.3	408.0	464.6	415.0	214.9	235.7	275.3	296.3	209.2
Sep	443.3	408.0	464.6	415.0	214.9	239.0	275.3	296.3	209.2
Oct	443.3	408.0	464.6	415.0	214.9	296.1	275.3	296.3	209.2
Nov	443.3	408.0	464.6	415.0	266.5	296.1	275.3	296.3	209.2
Dec	443.3	408.0	464.6	415.0	266.5	339.9	275.3	296.3	209.2

CENTRAL BANK OF THE PHILIPPINES
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Price Relatives of Selected Materials Used in Construction Activities
in Metro Manila, 1973-1980
(1972 = 100)

Period	Gasoline, regular (liter)	Diesel oil, auto- motive (liter)	Fuel oil, bunker (liter)	Asphaltic materials (liter)	Lumber, 2nd group (1,000 bd. ft.)	Flywood, Lauan (piece)	Portland cement (40 kgs.)	Reinforcing steel bars 3/4" (kilo)	Structural steel (metric ton)
1977	502.3	427.0	479.8	467.0	272.2	314.3	272.8	264.1	222.7
Jan	443.3	408.0	464.6	415.0	266.5	339.9	275.3	296.3	209.2
Feb	443.3	408.0	464.6	415.0	266.5	339.9	272.6	296.3	209.2
Mar	443.3	408.0	464.6	415.0	266.5	339.9	272.6	296.3	209.2
Apr	471.7	417.1	471.9	440.0	266.5	339.9	272.6	296.3	209.2
May	528.3	435.4	486.5	490.0	266.5	339.9	272.6	296.3	209.2
Jun	528.3	435.4	486.5	490.0	266.5	339.9	272.6	265.4	209.2
Jul	528.3	435.4	486.5	490.0	266.5	296.1	272.6	237.0	236.2
Aug	528.3	435.4	486.5	490.0	266.5	296.1	272.6	237.0	236.2
Sep	528.3	435.4	486.5	490.0	283.7	296.1	272.6	237.0	236.2
Oct	528.3	435.4	486.5	490.0	283.7	296.1	272.6	237.0	236.2
Nov	528.3	435.4	486.5	490.0	283.7	274.1	272.6	237.0	236.2
Dec	528.3	435.4	486.5	490.0	283.7	274.1	272.6	237.0	236.2
1978	528.3	435.4	486.5	490.0	300.9	291.5	279.8	306.8	266.0
Jan	528.3	435.4	486.5	490.0	300.9	274.1	272.6	217.3	236.2
Feb	528.3	435.4	486.5	490.0	300.9	274.1	272.6	217.3	244.6
Mar	528.3	435.4	486.5	490.0	300.9	274.1	272.6	276.5	244.6
Apr	528.3	435.4	486.5	490.0	300.9	274.1	272.6	335.8	248.0
May	528.3	435.4	486.5	490.0	300.9	274.1	272.6	335.8	256.4
Jun	528.3	435.4	486.5	490.0	300.9	285.1	272.6	335.8	256.4
Jul	528.3	435.4	486.5	490.0	300.9	307.0	287.0	335.8	256.4
Aug	528.3	435.4	486.5	490.0	300.9	307.0	287.0	335.8	256.4
Sep	528.3	435.4	486.5	490.0	300.9	307.0	287.0	335.8	256.4
Oct	528.3	435.4	486.5	490.0	300.9	307.0	287.0	316.0	312.0
Nov	528.3	435.4	486.5	490.0	300.9	307.0	237.0	316.0	312.0
Dec	528.3	435.4	486.5	490.0	300.9	307.0	287.0	323.5	312.0
1979	735.1	534.9	608.4	605.8	383.2	469.7	404.5	401.8	318.2
Jan	528.3	435.4	486.5	490.0	318.0	307.0	287.0	323.5	312.0
Feb	528.3	435.4	486.5	490.0	318.0	307.0	287.0	323.5	312.0
Mar	658.7	507.0	573.8	514.5	339.5	422.1	432.1	395.1	312.0
Apr	658.7	507.0	573.8	575.0	339.5	537.3	432.1	404.9	320.2
May	658.7	507.0	573.8	575.0	361.0	504.4	432.1	404.9	320.2
Jun	658.7	507.0	573.8	575.0	361.0	509.9	432.1	404.9	320.2
Jul	658.7	507.0	573.8	575.0	361.0	509.9	432.1	404.9	320.2
Aug	894.3	602.7	691.7	695.0	481.4	509.9	432.1	432.1	320.2
Sep	894.3	602.7	691.7	695.0	481.4	509.9	432.1	432.1	320.2
Oct	894.3	602.7	691.7	695.0	412.6	509.9	432.1	432.1	320.2
Nov	894.3	602.7	691.7	695.0	412.6	504.4	411.5	432.1	320.2
Dec	894.3	602.7	691.7	695.0	412.6	504.4	411.5	432.1	320.2
1980	1,403.9	899.4	987.4	1,034.7	570.2	522.6	523.0	432.1	345.1
Jan	894.3	602.7	691.7	695.0	412.6	504.4	411.5	432.1	320.2
Feb	1,383.7	857.1	941.5	929.4	412.6	504.4	514.4	432.1	320.2
Mar	1,383.7	857.1	941.5	1,004.0	601.7	526.3	535.0	432.1	320.2
Apr	1,383.7	857.1	941.5	1,004.0	601.7	526.3	535.0	432.1	320.2
May	1,383.7	857.1	941.5	1,004.0	601.7	526.3	535.0	432.1	320.2
Jun	1,383.7	857.1	941.5	1,004.0	601.7	526.3	535.0	432.1	320.2
Jul	1,383.7	857.1	941.5	1,004.0	601.7	526.3	535.0	432.1	320.2
Aug	1,530.0	1,009.5	1,101.5	1,146.6	601.7	526.3	535.0	432.1	327.3
Sep	1,530.0	1,009.5	1,101.5	1,156.5	601.7	526.3	535.0	432.1	386.4
Oct	1,530.0	1,009.5	1,101.5	1,156.5	601.7	526.3	535.0	432.1	386.4
Nov	1,530.0	1,009.5	1,101.5	1,156.5	601.7	526.3	535.0	432.1	400.0
Dec	1,530.0	1,009.5	1,101.5	1,156.5	601.7	526.3	535.0	432.1	400.0

II-2-2 Labor Costs

A minimum wage guarantee system is enforced in the Philippines. Wages are separated into BR (Basic Rate), ELA (Employee Living Allowance) and FB (Fringe Benefits). BR has several levels according to the job category or level of skill. The ranking is different in each construction company. Minimum wages for construction workers were revised in August 1980 to BR: ₱ 1.75/h, ELA: ₱ 1.293/h, FB: ₱ 0.373/h, and total ₱ 3,416/h x 8 h = ₱ 27,328 per day.

Various construction workers' minimum wages are as follows:

<u>Category</u>	<u>Grade</u>	<u>B.R.</u>	<u>Hourly F.B.</u>	<u>ELA</u>	<u>Daily Total</u>
Foreman		5,750	0.897	1.005	61.2
Semi-skilled Labor	A	2.625	0.471	1.292	35.104
	B	2.250	0.373	1.292	31.32
Carpenter	A	3.750	0.592	1.005	42.776
	B	3.375	0.545	1.005	39.40
	C	3.000	0.508	1.005	36.104
Plasterer	A	3.750	0.592	1.005	42.776
	B	3.375	0.545	1.005	39.40
	C	3.000	0.508	1.005	36.104
Re-bar Placer	A	3.375	0.545	1.005	39.40
	B	3.000	0.508	1.005	36.104
Painter	A	3.375	0.545	1.005	39.40
	B	3.000	0.508	1.005	36.104
Welder	A	4.500	0.773	1.005	50.224
	B	4.000	0.665	1.005	45.36
	C	3.750	0.592	1.005	42.776
Plumber	A	4.000	0.665	1.005	45.36
	B	3.500	0.616	1.005	40.968
Electrician	A	4.000	0.665	1.005	45.36
	B	3.500	0.616	1.005	40.968
Operator Heavy		4.000	0.665	1.005	45.36
Driver Service		2.625	0.471	1.292	35.109
Over-time Wage					
	week day	+25 percent			
	holiday	+30 "			
	legal holiday	+100 "			

II-2-3 Transportation from Japan

Various costs and fees as of January 1981 required for the transportation of materials, laboratory equipment from Japan to the construction site are listed below. The actual shipping charges may rise once or twice by the time of construction. Other fees may also rise.

1. Packing general ¥12,000 - 13,000/FT(freight ton)
 equipment ¥18,000/FT
2. Shipping charge in Japan (including warehouse cost) ¥4,000/FT
3. Shipping cost \$74
 BAF 43.8% 32.4
 CAF 26% 19.2
 \$125.6 ¥27,632/FT
4. Unloading at the Manila Port
 and inland transportation ¥ 6,300/FT
5. Supervising and handling charge ¥ 2,300/FT
6. Insurance

$$\text{insurance: } X = (A + X) \times 1.1 \times r$$

$$C \ \& \ F: \quad A$$

$$\text{insurance rate: } r = \text{about } 0.38\%$$

where

C: cost

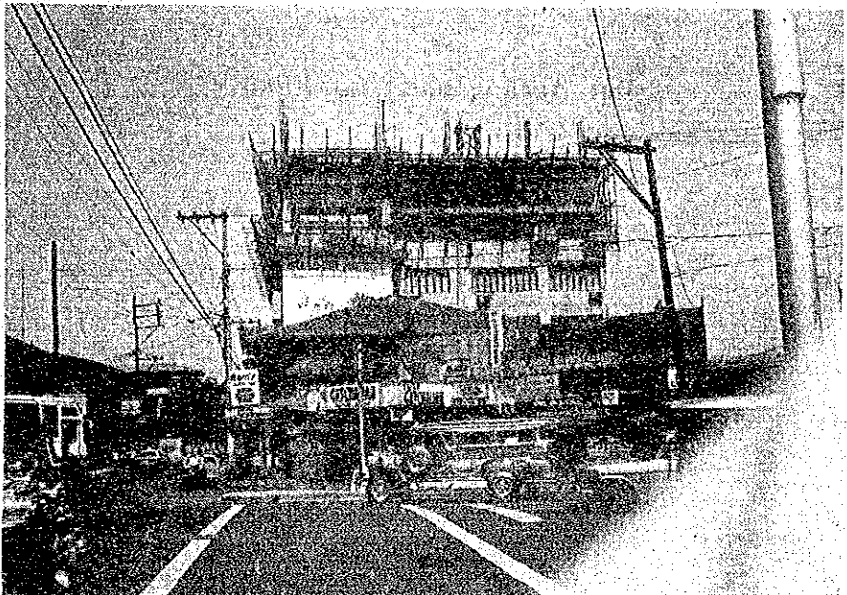
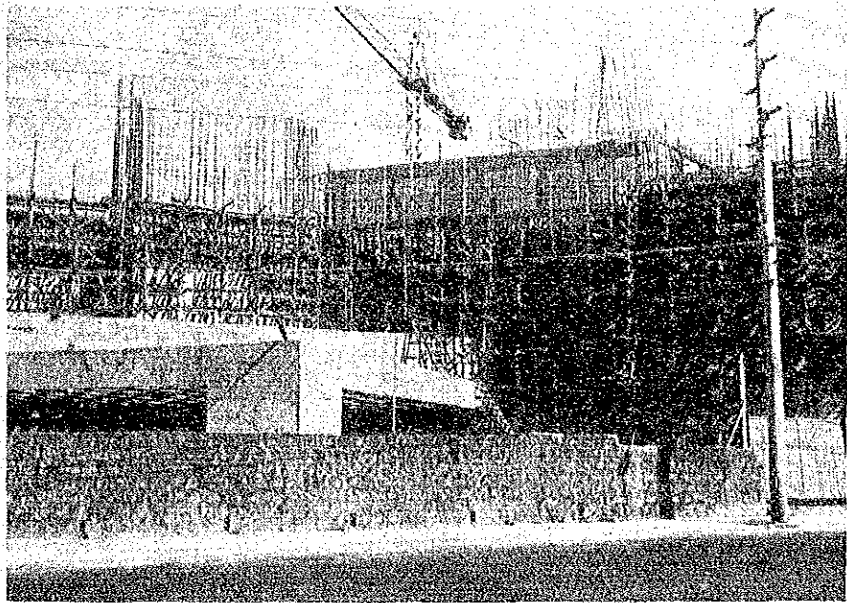
F: freight

X: insurance

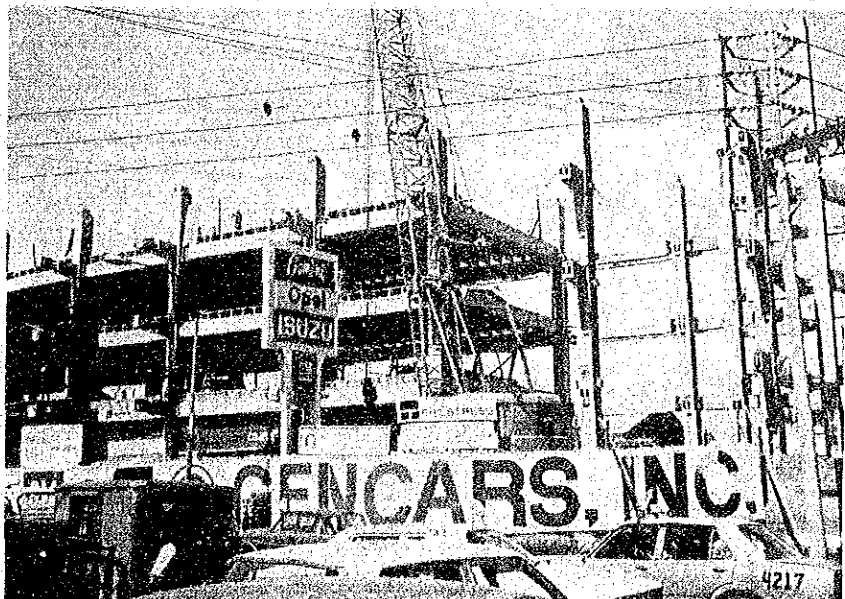
II-2-4 Customs (as of December 1980)

Customs on construction materials in the Philippines are as follows. Duties are imposed at the following rates based on 110% of the invoice price.

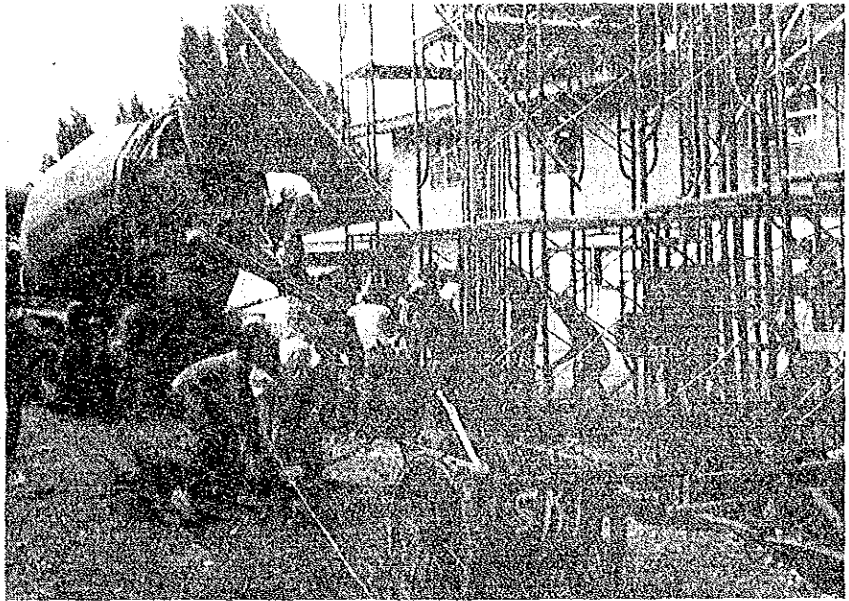
cement		50%
reinforcing bars		50%
structural steel		70%
paint		100%
glass		70%
pumps		30%
electric goods	A	100%
	B	70%
	C	50%
vehicles		100%
bolts, nuts		30%



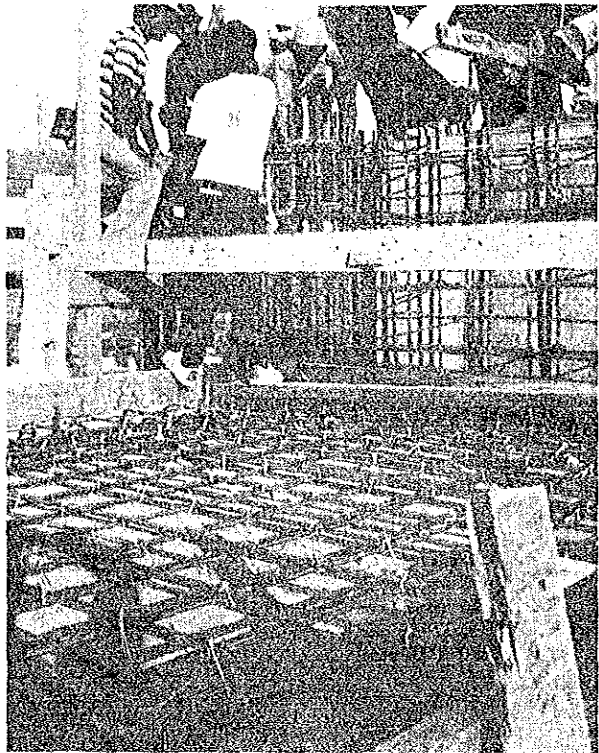
**Buildings under
Construction in
Manila**



**Casting of
Concrete**



**Bar Arrangement for Floor
and Wall**



Erection of Forms



**Construction in
Manila**

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