CHAPTER 6 PLAN FOR DISPOSITION OF PERSONNEL

CHAPTER 6 PLAN FOR DISPOSITION OF PERSONNEL

The appropriate disposition of personnel for each division to secure the proper operation of the Quaternary Geology Laboratory is as follows:

(1) Administration and Service Division (total 8 persons)

A supervising geologist will superintend the Laboratory as the manager who will assume the entire responsibility for the operation.

Under the manager, two (2) cartographers for geologic mapping, one (1) librarian, two (2) clerks, one (1) guard and one (1) messenger will be required. Building engineers for the maintenance of the building facilities will be shared with another laboratory ward which is planned to be completed at the same time with the Quaternary Geology Laboratory by GRDC.

(2) Research and Analysis Division (total 30 persons)

1) Pollen Analysis Unit

One (1) paleontologist and two (2) assistants under him.

2) Micro-Fossil Study Unit

One (1) micro-fossil scientist and two (2) assistants under him.

3) Mammalian Fossil Study Unit

One (1) paleontologist and two (2) assistants under him.

4) Nanno Fossil Study Unit

One (1) paleontologist and one (1) assistant under him.

5) Fluorine Study Unit

A person in charge needs to be newly trained. Two (2) assistants under him.

6) Fission Track Study Unit

Two (2) geologists and two (2) assistants under them.

7) Sedimentology Study Unit

Two (2) geologists and two (2) assistants under them.

8) Paleomagnetic Study Unit

One (1) geophysist and two (2) assistants under him who will also be in charge of studies in the Astatic Magnetometer Building.

9) Radiocarbon Dating Unit

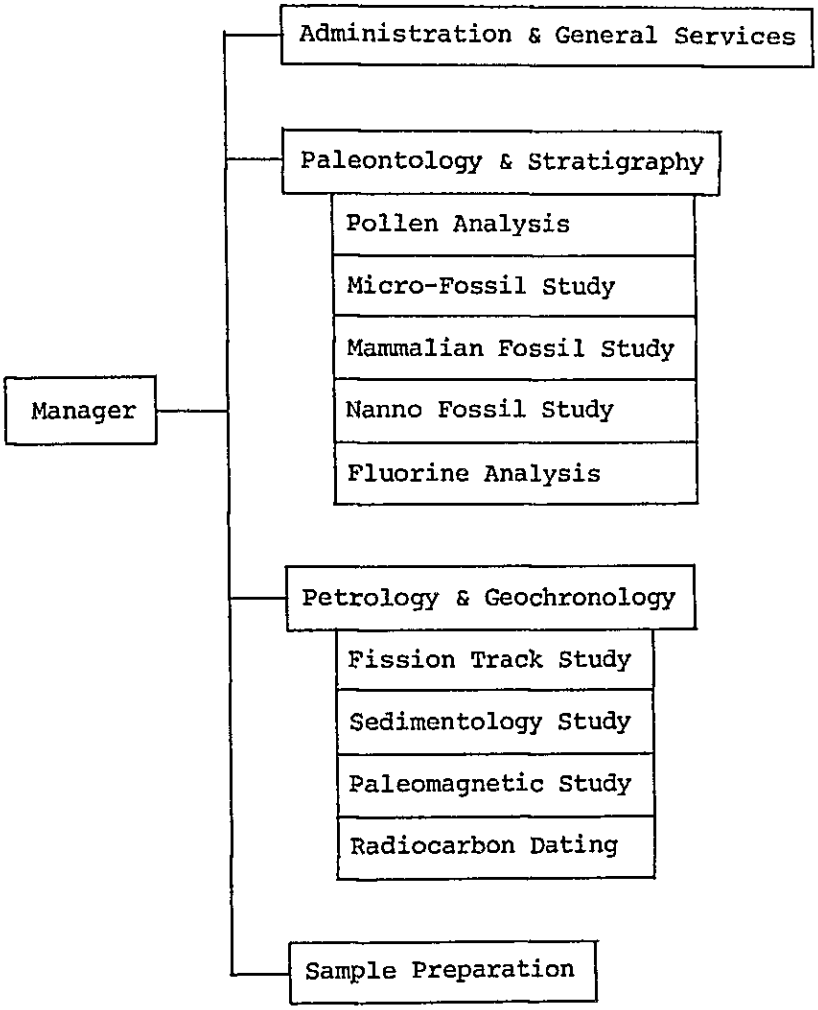
A person to take charge needs to be newly trained. Two (2) assistants under him.

Of the above research and analysis units, the heads of each unit except for the Fluorine Study Unit and Radiocarbon Dating Unit have already been determined and they have been continuing their studies since the CTA-41 Project. The Radiocarbon Dating Unit, which is to use the ^{14}C analyzer requested in this Project, is a geochronological study new to Indonesia and a scientist for this unit needs to be newly trained. Fluorine study is the only one that did not continue from the CTA-41 Project in Indonesia. Further training should be provided in this Project and technical assistance from Japan is anticipated in these fields.

10) Sample Preparation Unit

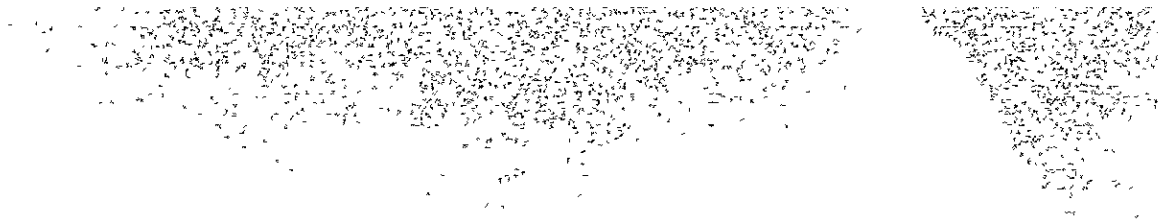
One (1) supervisor and one (1) assistant are required for seperation, stocking and the preparation of samples in the Unloading Building.

A total of eight (8) persons for the administration and service division and 30 persons for the research and analysis division will be needed. The organization will be approximately as follows:



ORGANIZATION CHART OF QUATERNARY GEOLOGY LABORATORY

CHAPTER 7 MAINTENANCE COSTS



CHAPTER 7 MAINTENANCE COSTS

The director of GRDC will superintend the prosecution of the Project, the head of the General Service Division will administrate finances and the head of the Laboratory Analysis Division will supervise as the Indonesian Counterpart in the Project.

After its completion the Quaternary Geology Laboratory will belong to the Laboratory Analysis Division. All labor costs and research and analysis costs will be covered by the general expenditure of this division. Maintenance costs for the laboratory equipment and the building and the costs for miscellaneous consumption or chemical reagents will be covered by the ordinary expenditure.

As income from research and analysis commissioned by private enterprises will be supplied to the national treasury, they cannot be estimated to pay for the costs.

The annual cost for the maintenance of the equipment and various expenditures rages approximately between 1,600,000 yen and 2,600,000 yen per laboratory at the various geological and mineralogical laboratories in Japan. Considering that most of the laboratory equipment requested for the Laboratory is Japanese made, the unit prices of the spare parts and chemical reagents are more or less the same as those in Japan. However, since they are assumed to be imported from Japan and the engineers and technicians for maintenance to be dependent on Japan, the annual cost may increase considerably. Therefore the annual cost is estimated of approximately 1,900,000 yen per laboratory even if the laboratory unit is assumed to be rather small. As nine (9) laboratories are now planned in the Quaternary Geology Laboratory as stated in Chapter 6, the annual cost is estimated at approximately 17,000,000 yen in all.

Of the annual electric, gas and water consumption of the Quaternary

Geology Laboratory, electricity will be covered by the entire receiving system of the GRDC grounds including the buildings under construction by GRDC. Therefore, electric cost is difficult to estimate at present as it is influenced by the total contract electricity. LPG is in the same situation. Water is to be supplied from the deep wells that GRDC is planning to dig considering the total size of the grounds. Water consumption cost will mostly be included in electric cost.

The annual consumption of the Quaternary Geology Laboratory is estimated as follows under a full operation load (approximate amounts):

electricity	140,000 KW
LPG	1,750 m^3
water	5,000 m^3

CHAPTER 8 SCOPE OF WORK

CHAPTER 8 SCOPE OF WORK

(1) The following arrangements are within the Japanese scope of work.

1) Construction of the Main Laboratory Building, the Unloading Building and the Astatic Magnetometer Building on the grounds after the finish grading work which is within Indonesia's scope of work.

2) Providing the usual building facilities, such as water supply, drainage, plumbing, LPG, hot water supply, ventilation and electric systems such as the main feeder, lighting, receptacle outlets, interphones and fire alarms.

3) Pavement work around the building to one (1) meter from the exterior wall; construction of the courtyard.

4) Installation and adjustment of the laboratory equipment provided by grand aid.

5) Providing the electric power system, water supply, drainage and LPG as far as the receptacle outlets, which are necessary for the existing equipment to be moved into the Laboratory. (Connection to the outlets will be Indonesia's responsibility.)

(2) The following arrangements are to be within Indonesia's area of responsibility.

1) Securing a lot of land necessary for construction of facilities.

2) Completing the finish grading work indicated the Basic Drawings in Ch. 5 by one (1) month before the commencement of the construction work.

3) Completing construction work of temporary road for site transportation from Terusan Pasteur St. to the construction site by one (1) month before the commencement of the construction work.

4) Incoming of electric power to room No. 20, the Power Distribution Room. (see the figure in Sec. 4-9-3)

5) Incoming of a telephone wiring system to room No. 5, office.

6) Providing a water main for potable water of designated diameter to the designated point (one meter from the exterior wall of the project building). (These designations are to be made in the working design stage.)

7) Bearing all the expenses necessary for construction of the facilities other than those to be borne by the grant such as roads within the site to one (1) meter from the exterior wall, gates, gate houses, parking lots, planting and exterior lighting.

8) Bearing all the responsibilities and expenses necessary for the purchase, movement, installation and adjustment of the laboratory equipment except for that which will be provided under grant aid.

9) Purchase and installation of all the furniture, utensils and accessories except for that which will be provided under grant aid.

10) Supply of temporary electricity and water free of charge during construction. However, the temporary wiring and pipe installation from the point designated by Indonesia to the point necessary for construction will be within the Japanese area of responsibility.

11) Permit to use pay telephones installed at the site.

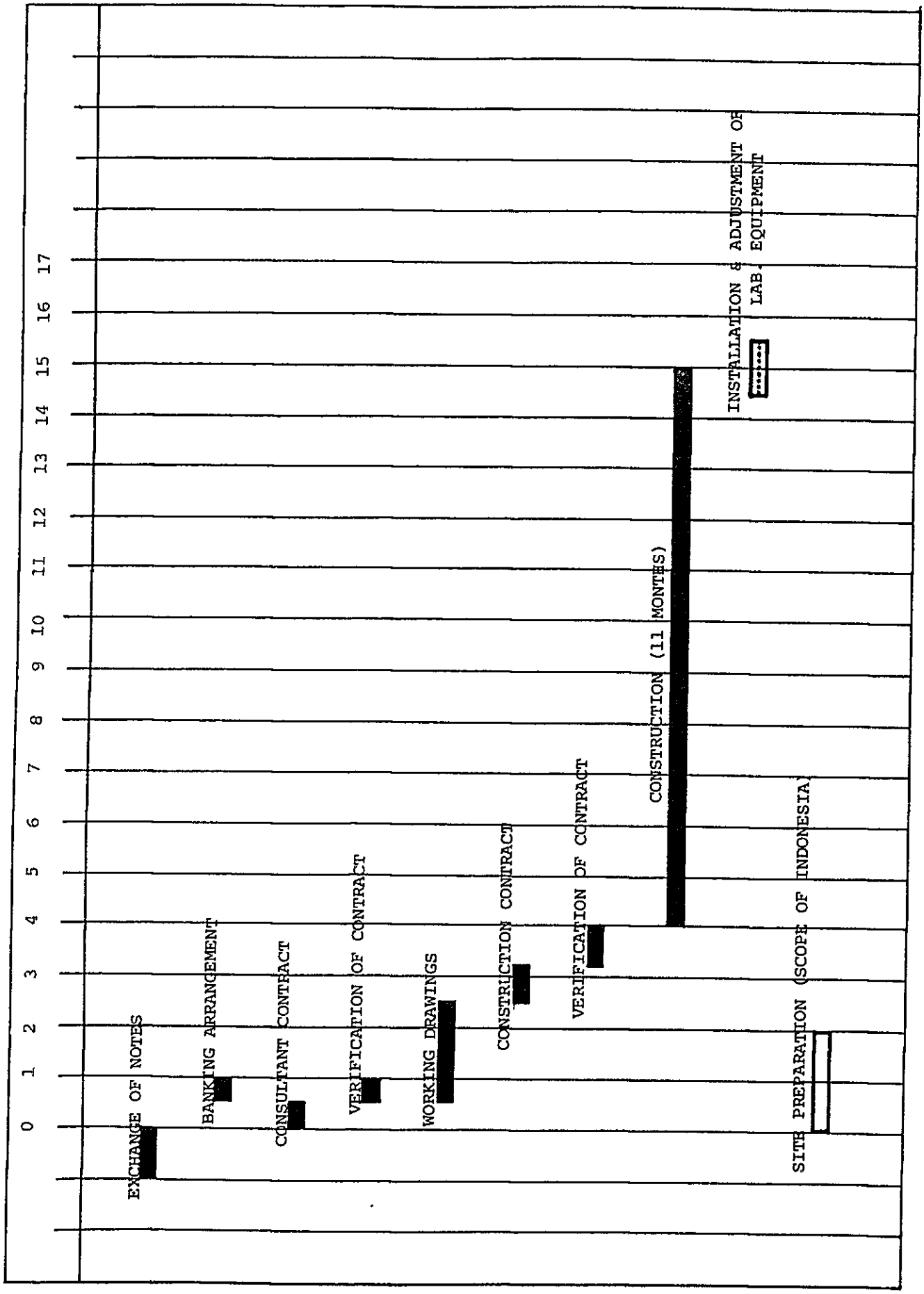
12) Placement of the storm water drainage in the site based on the entire ground drainage plan with the storm water drain of the laboratory to connect to it.

CHAPTER 9 TENTATIVE CONSTRUCTION SCHEDULE

CHAPTER 9 TENTATIVE CONSTRUCTION SCHEDULE

A tentative construction schedule after the exchange of notes is shown in the following page. It is expected to take about four (4) months before the commencement of the work; two (2) months for furnishing working drawings after the consultant contract, one (1) week for submission and approval of all the tender documents by the Indonesian authorities concerned, three (3) weeks for cost estimation and bidding by the tender construction companies, and three (3) weeks for the construction contract and its verification. Application for the construction permit, which takes about three (3) months, will also be carried out during this period. The construction period is expected to take not less than eleven (11) months. Since Indonsia's rainy season lasts from November to March and thunderstorms are frequent especially in December and January, the construction period may have to be extended one (1) more month if the concrete casting of the structure is done in this season. In any case, at least the foundation work has to be completed by November considering the clayey soil of the site.

TENTATIVE DESIGN AND CONSTRUCTION SCHEDULE



CHAPTER 10 PROJECT EVALUATION

CHAPTER 10 PROJECT EVALUATION

Indonesia is one of the world's volcanic countries with about 400 volcanos, 100 of which are active. The country and life of the people are strongly influenced by the volcanos. Indonesia yields petroleum, 40 percent of which is exported to Japan. However, development of new energy resources is urgent in Indonesia because most of the good quality oil fields have been exhaustively developed, the drilling of new oil fields is delayed, and the demand for petroleum in the country is increasing. In this situation, electric generation plants using geothermal energy from volcanic activities are welcomed. Geothermal electric generation potential is estimated at 5,000 MW to 10,000 MW in all Indonesia and at present the Kemaojang Plant, with 30 MW capacity, is in the planning stage in West Java.

The Volcanological Survey of Indonesia administrates volcanic study including protective studies in Indonesia. The Quaternary Geology Laboratory is expected to contribute greatly in elucidating quaternary geological basic conditions by cooperating with VSI, especially for preventing disasters caused by volcanic sediments.

Indonesia is well known for its ample mineral resources; it used to be called "the Necklace of the Dutch Queen". The mineral resources belonging to the quaternary sediments are heavy minerals like cassiterite which is commonly found in Indonesia, magnetite as iron sand, hematite , chrome, rutile, and gem stones like zircon, monazite, garnet, etc. Tin diposits especially, second only to those in Malaysia and Thailand, yielded 27,000 tons in 1978, and 90 percent of the tin mined is exported to acquire foreign currencies. The aluminium refinery project in Asahan using bauxite mined in Bintang is also well known.

However, it is expected that there are unexplored mineral resources in this largest archipelago nation, five (5) times larger than Japan extend-

ing 5,100 kilometers east to west. The government of Indonesia's policy is to make mining a major exporting industry by increasing varieties and production of mineral products. The Quaternary Geology Laboratory is responsible for providing basic information for the investigation of mineral resources embedded in the quaternary sediments as the exclusive geological laboratory in the country.

Countermeasures for preventing disasters that threaten peoples' lives directly such as landslides, subsidence, floods, and land sinking, etc., as well as the construction of dams, rivers projects, roads, bridges and urban infrastructure are mostly based on the quaternary sediment. They are under the administration of the Directorate of Environmental Geology to which the Quaternary Geology Laboratory is also responsible for providing basic geological information.

The fact that the Quaternary is called the era of mankind means that quaternary geology studies provide the background to man's present existence. For example in Japan, geological investigation reports in the Tokyo-Yokohama region after the Kanto earthquake compiled by the department of redevelopment have made tremendous contributions to protective designs of all the public facilities including buildings, roads and streets, harbors, bridges, etc. Quaternary geology is, directly or indirectly, deeply influences our lives, such as the quaternary geology study along with the reclamation projects in the Ariake-Shiranui area, alluvium study along with the construction project of the new Tokaido line and to prevent land settlement in the Tokyo and Niigata regions. The Quaternary Geology Laboratory is expected to serve as the only special laboratory of quaternary geology for the demands of research and analysis commissioned by governmental organizations and private industries.

Indonesia plays an important role in quaternary study because of the discovery of Pithecanthropus Erectus in 1891. Since then hominid fossils

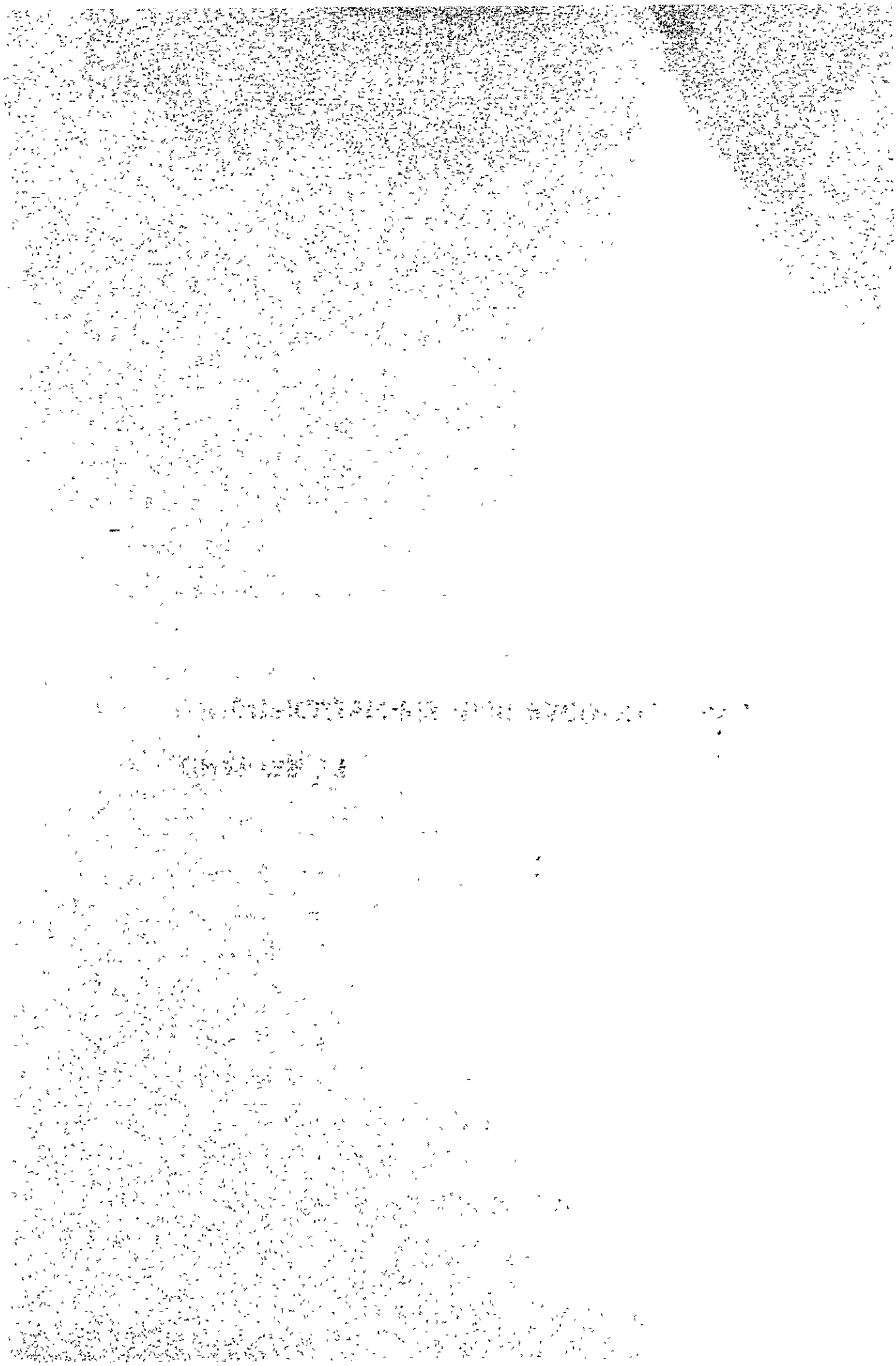
have been excavated several times in Indonesia. Present activities are mainly concentrated on elucidating the ecological environment of anthropoids through stratigraphic study of the area where the hominid fossils were discovered, and study of mammalian fossils, botanical fossils or pollen micro-fossils that were discovered along with the hominid fossils. It is characteristic of the comprehensive nature of quaternary study to cover all these subjects and here lies the essential purpose of the Quaternary Geology Laboratory, with a staff of specialists on various subjects.

Quaternary study has just started in Indonesia, and it may take a while until the results are clearly visible. However, improvement of the level and development of the subjects of quaternary study will offer practical suggestions on how to treat the natural environment. At present the most important responsibility of the Quaternary Geology Laboratory is to improve the academic level of quaternary geology in Indonesia and then to function as a central training center for quaternary geology scientists to widen the academic base.

The effects of the Quaternary Geology Laboratory Project academicly, socially and economicly will be fully felt by carrying out the above purposes.

CHAPTER 11

CONCLUSIONS AND RECOMMENDATIONS



CHAPTER 11 CONCLUSIONS AND RECOMMENDATIONS

The Quaternary Geology Laboratory is to improve the academic level of quaternary geology as the exclusive laboratory for quaternary sediments in Indonesia. Also, the results acquired and methods fostered in the geological study of the quaternary, which is the richest in the subjects for the study, can be expanded to and utilized in the entire area geological study, including the Tertiary. The improvement of academic level has social and economic effects such as contribution to exploitation of oil and mineral resources, to development of volcanic energy, to countermeasures for preventing disasters and to environmental engineering, which is meaningful as the object of grant aid by the government of Japan.

The government of Indonesia will be requested to take the following arrangements for the realization of the Quaternary Geology Laboratory.

1) To ensure prompt unloading and customs clearance at ports of disembarkation in Indonesia of the products purchased under the grant.
2) To exempt Japanese nationals from customs, duties, internal taxes, and other fiscal levies which may be imposed in Indonesia with respect to the supply of products and the services under the verified contracts.
3) To provide Japanese nationals participating in the Project under the verified contracts such services and facilities as may be necessary to ensure their safety for entry, exit, movement and stay in Indonesia for the performance of their work.

Finally, the basic design survey team presents the following indispensable recommendations to the Indonesian authorities concerned regarding the construction project of the Quaternary Geology Laboratory:

1) Care in the maintenance after completion as well as setting aside adequate funds for maintenance of the laboratory equipment, building and building facilities,

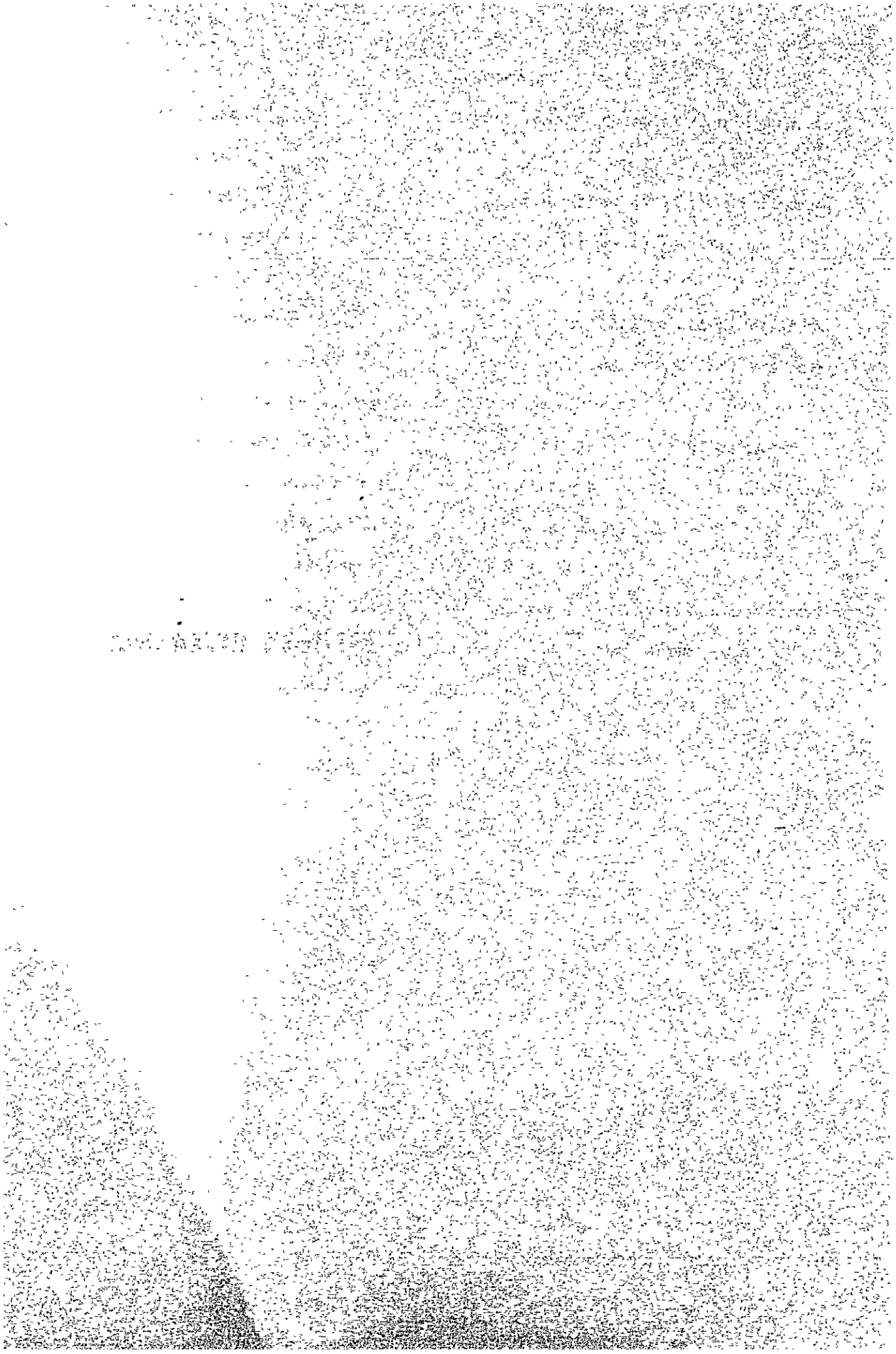
2) Ensuring the procurement of the required number of administration and service staff, scientists and assistants, and assigning them to appropriate positions,

3) Planning and carrying out a long-term general and technical training program for young scientists who will carry on research and analyses using the laboratory equipment and for assistant scientists,

4) Taking appropriate steps to ensure an adequate number of permanent personnel, including the scientists and assistants who finish training or are in training, because the proper management of the laboratory will greatly depend on their knowledge and skills, and

5) Providng ample opportunity for training to all Indonesian quaternary geologists and contributing to development of quaternary geology in Indonesia and accomplishing the objectives of establishing the Quaternary Geology Laboratory.

ANNEX REFERENCES



1 BASIC DESIGN SURVEY TEAM

1-1 Member List of the Mission

Mr. Yutaka Hosono	Leader Head of Grant Aid Planning Div., Grant Aid Dept., JICA
Dr. Naotsune Watanabe	Technical Advisor (Geologist) Professor Emeritus, The University of Tokyo
Mr. Katsuhiko Oshima	Project Coordinator Officer, Basic Design Div., Grant Aid Dept., JICA
Mr. Shoji Yamamoto	Architecture Deputy Head, Architecture and Engineering Dept. Yokogawa Architects & Engineers, Inc.
Mr. Ryoichi Kibe	Mechanical Engineering and Laboratory Equipment Chief Engineer of Overseas Project Yokogawa Architects & Engineers, Inc.
Mr. Kisen Misawa	Cost Estimation Engineer, Yokogawa Architects & Engineers, Inc.

1-2 Representatives of Indonesia

Bereau of Foreign Cooperation, Dept. of Mines and Energy

Mr. Soebadie

Representatives of GRDC

Director Drs. H. M. S. Hartono

Manager of General Services Division

Ir. H. M. D. Djuri Rosidi

Secretary of the Director

B.Sc. A. S. Yono

Manager of Laboratory Analysis Division

Drs. R. Wikarno

Staff of Paleontology Laboratory

M.Sc. Sudijono

B.Sc. Fauzie Hasibuan

Ir. Budisantoso

B.Sc. Ijep Saefudin

B.Sc. Fachroel Aziz

Secretary of Manager of General Services Laboratory

Mr. Muslim Monoarfa

1-3 Schedule of the Survey Team Activities

	Date	Jakarta	Bandung
1st	Nov/11/Wed	Watanabe, Oshima, Yamamoto, Kibe & Misawa, leave Narita for Jakarta	
2nd	Nov/12/Thu	visit JICA Jakarta office, Japanese Embassy, Bereau of Foreign Cooperation, Dept. of Mines and Energy	
3rd	Nov/13/Fri	Leader Hosono leaves Narita	Jakarta to Bandung visit the Chihea Agriculture Development Training Center
4th	Nov/14/Sat	Hosono arrives at Jakarta	visit GRDC site survey
5th	Nov/15/Sun		Hosono arrives at Bandung
6th	Nov/16/Mon		1st meeting with GRDC
7th	Nov/17/Tue		2nd meeting with GRDC
8th	Nov/18/Wed		3rd meeting with GRDC
9th	Nov/19/Thu	Hosono, Watanabe, Osima & Yamamoto leave Bandung for Jakarta	Kibe & Misawa research on GRDC
10th	Nov/20/Fri	Signing of the minutes of discussions at DGM interim report to JICA Jakarta office and Japanese Embassy	research on GRDC
11th	Nov/21/Sat	Hosono, Watanabe & Oshima leave Jakarta	Yamamoto returns to Bandung field survey of infrastructure
12th	Nov/22/Sun	Arrive at Narita	
13th	Nov/23/Mon		Yamamoto, Kibe & Misawa 4th meeting with GRDC
14th	Nov/24/Tue		5th meeting with GRDC
15th	Nov/25/Wed		6th meeting with GRDC
16th	Nov/26/Thu	Yamamoto, Kibe & Misawa return to Jakarta site investigation	

	Date	Jakarta	Bandung
17th	Nov/27/Fri	site investigation collect reference data	
18th	Nov/28/Sat	visit Bogor University of Agriculture (FATEMETA), the Indonesia Crops Research Laboratory (LPPTP) & Nurse Training Center	
19th	Nov/29/Sun	collect reference data	
20th	Nov/30/Mon	collect reference data report to JICA Jakarta office of the survey	
21th	Dec/1/Tue	leave Jakarta for Narita	

2 MINUTES OF DISCUSSIONS

MINUTES OF DISCUSSIONS

ON

THE ESTABLISHMENT PROJECT OF QUATERNARY GEOLOGY

LABORATORY IN THE

REPUBLIC OF INDONESIA

In response to a request made by the Government of the Republic of Indonesia for the basic design study on the establishment project of quaternary geology laboratory in the Republic of Indonesia (hereinafter referred to as "the Project"), the Government of Japan has dispatched, through Japan International Cooperation Agency (JICA), a survey team headed by Mr. YUTAKA HOSONO, Head of Planning Div., Grant Aid Dept., JICA, to carry out the basic design survey from November 11, 1981.

The team has conducted field survey and held a series of discussions and exchanged views with the Indonesian authorities concerned as to the Project.

As a result of the survey and discussions, the Japanese Survey Team and the Indonesian Authorities Concerned agreed to recommend to their respective governments to examine the results of the discussions attached herewith toward the realization of the Project.

November 20, 1981

YUTAKA HOSONO

Leader of the Japanese

Basic Design Survey Team

H.M.S. HARTONO

Director, Geological Research

and Development Centre

M I N U T E S

1. The objective of the Project is to establish a new building and install facilities as well as equipment for the Quaternary Geology Laboratory (hereinafter referred to as "The Laboratory") to enhance the capabilities of research in Quaternary Geology and training of Indonesian Geologist and thus assume a centre in this field in Indonesia.

2. The Geological Research and Development Centre (GRDC), Directorate General of Mines is responsible for the implementation of the Project on Indonesian side.

3. The Government of the Republic of Indonesia has already acquired the land as the proposed site for the Laboratory as attached in Annex I, and address of the proposed site is : Jalan Terusan Pasteur, Kecamatan Cicendo, Kota Madya Bandung.

4. The principal composition and description of the Laboratory requested by the Indonesian Authorities Concerned is as given in Annex II.

5. The Japanese Survey Team will convey the desire of the Indonesian Authorities Concerned to the Government of Japan that the Government of Japan will take necessary measures to cooperate in implementing the Project and provide the Government of Indonesia with building and other items as listed in Annex III within the scope of Japan's Economic Cooperation Programme in Grant form.

6. The Japanese Survey Team will complete the Basic Design Survey Report on the Project.

7. The Indonesian Authorities Concerned have confirmed that the Indonesian Government will take necessary measures such as those listed in Annex IV in the course of implementing the Project.

8. The Indonesian Authorities Concerned expressed its desire to send young scientists to Japan to get training in various field of study and to receive Japanese specialists in the cooperative work under Technical Cooperation Programme.

REMARKS :

THE SITE FOR THE LABORATORY INDICATED BELOW IS SUBJECT TO CHANGE BASED ON MUTUAL AGREEMENT IN THE STAGE OF MORE DETAILED ANALYSIS.

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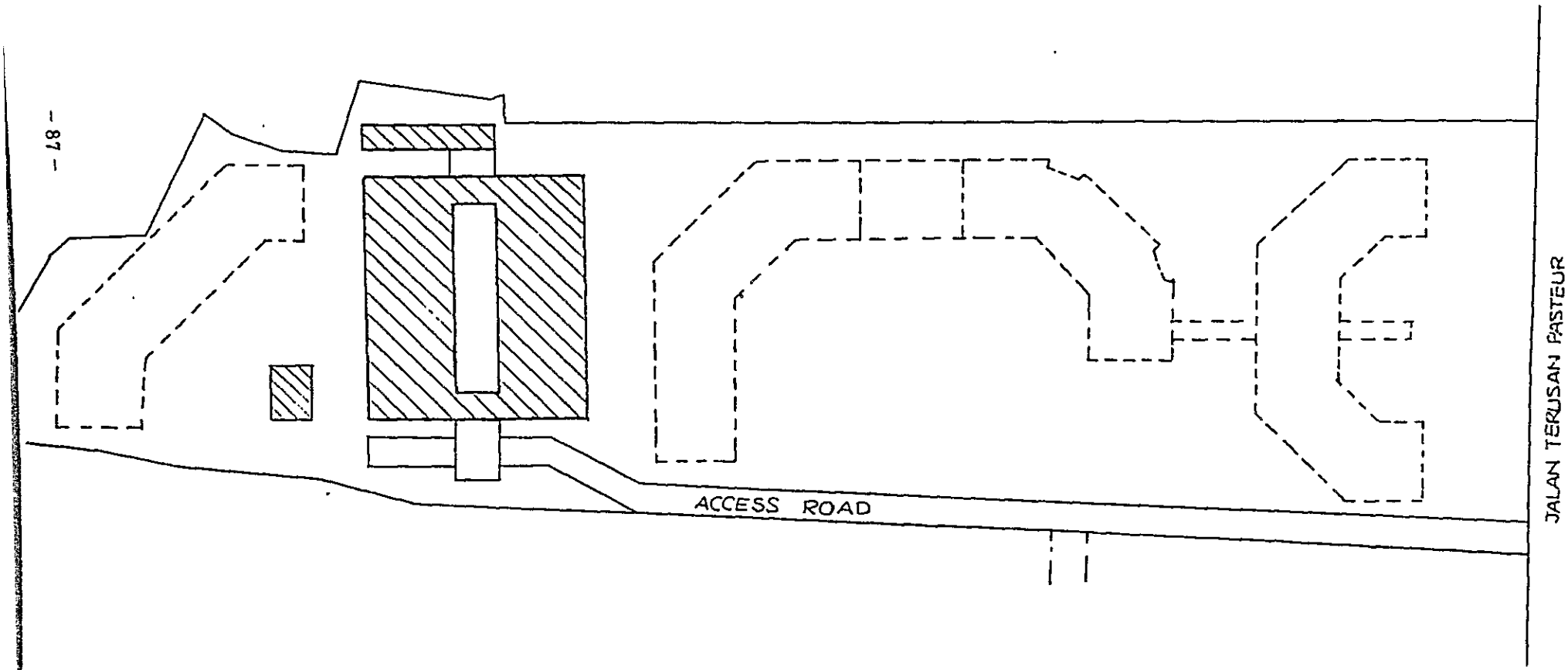


SITE PLAN

ANNEX II

1. The Laboratory consists of the following :

Research section

1) Mammalian fossil study
2) Micro-fossil study
3) Pollen analysis
4) Fluorine analysis
5) Fission track study
6) Paleomagnetic study
7) Pedological study

Administration and Utility section

1) Drilling core stock room
2) Unloading room with entrance for Jeep
3) Drawing room
4) Workshop
5) Dark room
6) Library
7) Conference room
8) Office room
9) Dining room
10) Guard room
11) Power distribution room
12) Store room
13) Toilet rooms
14) Corridor, entrance hall, etc.

ANNEX III

1. Building

One (1) - store reinforced concrete building

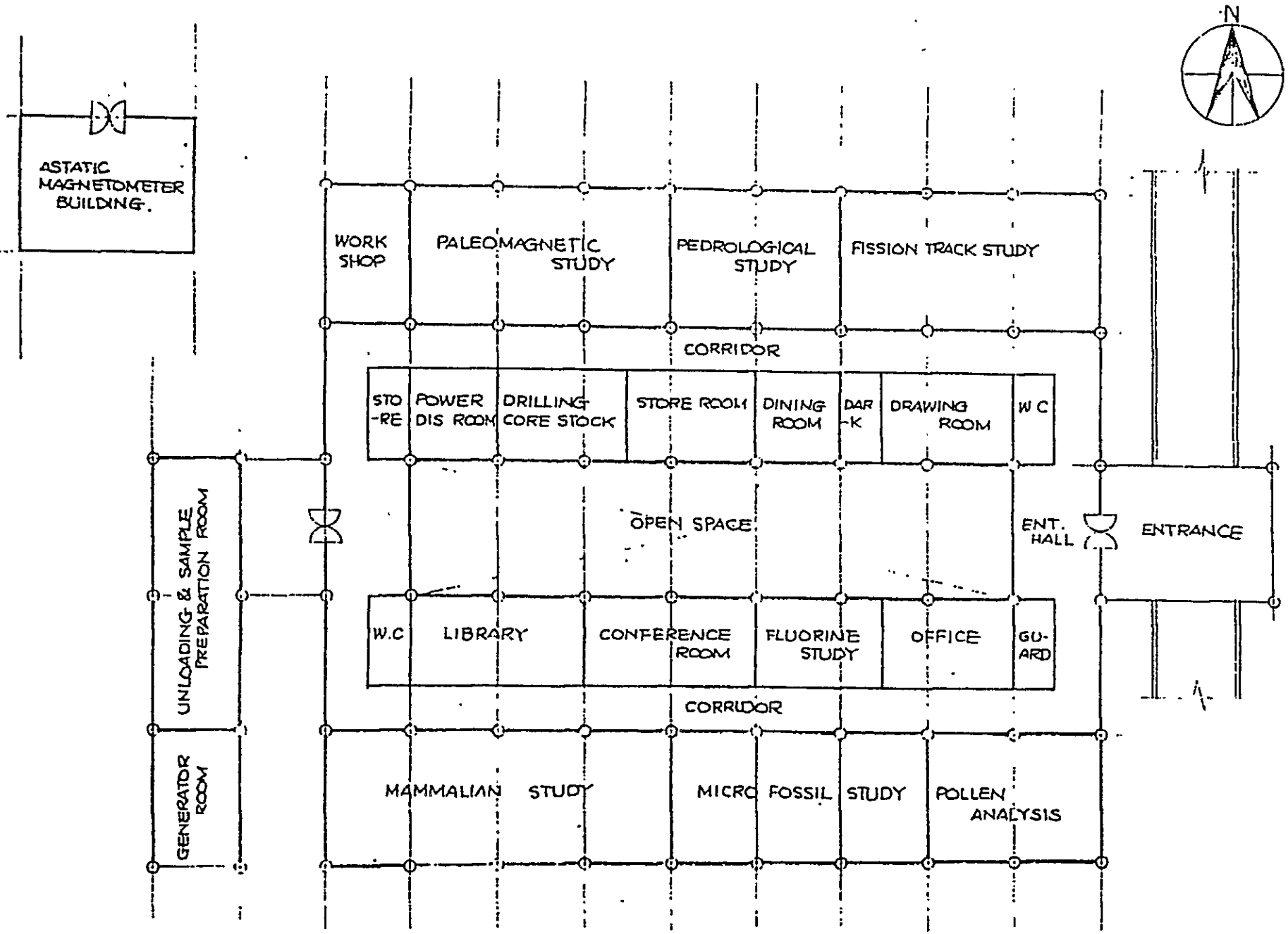
One (1) - store annex buildings

The concept plan of the building is as attached

2. Equipment

Items requested by the Government of Indonesia, whose costs are to be borne by the Government of Japan, are indicated in priority order as follows :

- Equipment for Radio-Carbon Dating
- Equipment for Paleomagnetism.



CONCEPT PLAN

ANNEX IV

Following arrangement are required to be taken by the Government of Indonesia :

1. To carry out site preparation such as clearing, leveling, etc. before commencement of construction.
2. To provide facilities for distribution of electricity, water supply, drainage, telephone lines, and other incidental facilities to the Laboratory.
3. To ensure prompt unloading and customs clearance at ports of disembarkation in recipient country and prompt internal transportation thereof of the products purchased under the grant.
4. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in recipient country with respect to the supply of the products and the services under the verified contracts.
5. 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 recipient country and stay therein for the performance of their work.
6. To maintain and use properly and effectively the facilities constructed and equipment provided under the grant.
7. To bear all the expenses, other than those to be borne by the grant, necessary for construction of the facilities as well as for the internal transportation of the products and services under the grant and for moving the equipment donated under the Japanese technical cooperation programme from GRDC to the Laboratory.

8. To undertake incidental civil works such as planting, roads within the site, gates, gate offices, parking lots and exterior lighting, if needed.
9. To furnish furnitures except those which are of laboratory use, such as experimental tables, draft chambers, etc.

3 REPORT OF SOIL INVESTIGATION BY GRDC

REPORT OF SOIL INVESTIGATION	PROJECT : LOCATION : DATE :

REPORT I-A

OF SOIL INVESTIGATION

P3G BUILDING

JALAN TERUSAN PASTEUR

BANDUNG

I. PREFACE.

The Soil Investigation was carried out in the land which are proposed for P3G laboratories at Jl. Terusan Pasteur, Bandung.

There are two building locations which have to be investigated; those are at the location for building D and at the location for building B.

As the shape of building D is not fixedly determined, the investigated points are arranged to that the conclusion will always valid for any building shape in that specified area.

Report I will cover the results of tests in Building D area, i.e. Soundings S_1, S_2, S_3, S_4 and Deep Boring B_1 and B_2. This report I-A covers the results of tests which had been completed before November 25, 1981, i.e. sounding tests at S_1, S_2, S_3, S_4 and boring B_1 (lab tests of the samples taken from boring B_1 are not included yet).

Hopefully that this report I-A can give a good figure for the foundation systems of building D.

REPORT OF SOIL INVESTIGATION	PROJECT : LOCATION : DATE :

II. SUBSURFACE CONDITIONS.

Sounding diagrams (Cone Penetration diagrams) show a little variation on the upper layer, i.e. the layer between ground surface and the hard layer.
Boring result shows that layer consists of medium stiff to very stiff silt with N values between 9/30 to 11/30 (9 blows per foot to 11 blows per foot), and cone penetration resistances of 10 to 20 kg/cm2.

Some jumps in the sounding diagrams are the indications of the softer and harder soil bulk, as those do not uniformly exist in all sounding diagrams.

The hard layer, i.e. the layer with cone penetration resistance of higher than 200 kg/cm2, is found at almost uniform elevation at all sounding and boring points.

the hard layers at sounding points are as follows :

- at S_1(+ 595,80), the hard layer is at elev. + 589,60 m
- at S_2(+ 595,15), the hard layer is at elev. + 587,55 m
- at S_3(+ 594,20), the hard layer is at elev. + 587,20 m
- at S_4(+ 594,80), the hard layer is at elev. + 587,20 m

From the boring result B_1 (+ 595,15), which is close to S_2) it is shown that the hard layer from 7,50 m to the end of bore hole 12,50 m depth (+ 587,65 m to + 582,65 m) consists of gravelly very hard silt (gravelly silt stone), with boulder, with N (SPT) equal to 83/25; 97/23 and 70/6 at 7,50 m; 10,00 m and 12,50 m depth respectively. This kind of layer is hard and thick enough to resist heavy load.

REPORT OF SOIL INVESTIGATION	PROJECT : LOCATION : DATE :

III. FOUNDATION SYSTEMS.

1. Shallow footing

The original ground surface is sloping, so that grading to reach horizontal flat surface is needed.
Because of that , shallow footing is possible to rest on cut and on fill area.
If the final elevation of ground surface is + 595,00 m and the elevation of the base of shallow footing is + 594,00 m, the allowable bearing capacities are too low; at S_1 and S_2 are high enough, i.e. 1,53 and o,86 kg/cm2 respectively, and at S_3 and S_4 are very low i.e. only 0,20 kg/cm2.
If the base of shallow footing is at elevation 592,80 m. The allowable bearing capacities can be taken to be 1,55 kg/cm2.

2. Deep footing on hard layer

In case that the column load is very high, the load has to be transfered to the hard layer by mean of deep footing.
The deep footing may be in the form of

- bored pile Ø 30 - 40 cm (Strauss pile)
- well foundation Ø 80 - or higher.

The end allowable bearing capacity of such deep footing can be taken to be 15 - 20 kg/cm2.

REPORT OF SOIL INVESTIGATION	PROJECT : LOCATION : DATE :

The friction resistance of such foundation can be taken to be, 20 kg/cm' (per linear centimeter of the perimeter of the foundation section).

For a higher safety, deept footing is recommended to rest in the hard layer, on the elevation of + 587,00 m (see section II of this report).

Bandung, November 25, 1981.

P.T. Encona Engineering

ENCONA ENGINEERING INCORPORATED BANDUNG

Ir. Suyud R. Karyasuparta
Soil Engineer

SRK/n

SUBSURFACE EXPLORATION BORING-LOG

BORING NO: 1

SHEET NO: 1. OF 2.

PROJECT : KOMPLEX PENELITIAN P3G. FEATURE:

LOCATION : JL. TERUSAN PASTEUR BANDUNG DATE : 20-11-81 to 22-11-'81

REF. ELEVATION : DATUM : TOTAL DEPTH: 12.56

DRILL : LONG YEAR. DRILLER: SUKIRYONO INSPECTOR:

Depth(M)	Blow per 6" 0"-6"	6"-12"	12"-18"	S.P.T.	Type of sample	Graphic Log	Soil Descriptions or Rock Lithology	Remarks
1.00					C		Soil Surface TANAH PERMUKAAN, COKLAT TUA, GAMBUT. dark	
2.00					C		dk gray LEMPUNG, COKLAT.	-2.00
2.50					UP		LEMPUNG, TRAS. COKLAT.	
2.95	3	3	6	9	—		gravel soft TRAS, KERIKIL, LUNAK	
					C		COKLAT MUDA. light	
3.50					C		IDEM, KEKUNING-AN Yellow	
4.50					C		IDEM, no TAKADA KERIKIL COKLAT KEABUAN. grayish	
5.00					UP		LEMPUNG, gray ABUK. Gray	
5.50	3	5	6	11	—			
5.95					C		LEMPUNG, BERKERIKIL, COKLAT KEKUNING-AN.	
7.00								

Sample type : D = dry C = cored W = wasted UP = undisturbed, piston
TP = test pit A = auger V = vane test

SUBSURFACE EXPLORATION
BORING - LOG

BORING NO : 1

SHEET NO : 2 OF 2

PROJECT : KOMPLEX PENELITIAN P3G FEATURE :

LOCATION : JL. TER. PASTEUR. BANDUNG DATE : to

REF. ELEVATION : DATUM : TOTAL DEPTH :

DRILL : LONG YEAR DRILLER : INSPECTOR :

Depth(M)	Blow per 6" 0" - 6"	6" - 12"	12" - 18"	S.P.T.	Type of sample	Graphic Log	Soil Descriptions or Rock Lithology	Remarks
							grey / chocolate sand ... gravel	
7.00					C		TRAS, LEMPUNG, KERIKIL,	
7.50							ABU2, COKLAT KEMERAHAN.	
	22	761		783			TRAS COMPACT, ABU2 COKLAT	83/25cm
7.75							KEHITAMAN · black	
					C		TRAS, KERIKIL, BOULDER,	
8.60							COKLAT ABU2	
					C		IDEM	
9.25								
							IDEM	
10.00								
	32	765		797	—		IDEM	97/23cm
10.23								
							IDEM, DIWARNAI SEDIKIT	
11.00							KEMERAHAN.	
							IDEM, KUNING.	
12.00								
							IDEM	
12.50								
12.56	770						BOULDER, COKLAT, ABU2 KE-	70/6cm.
							MERAHAN.	

Sample type : D = dry C = cored W = wasted UP = undisturbed, piston
TP = test pit A = auger V = vane test

CONE - PENETRATION

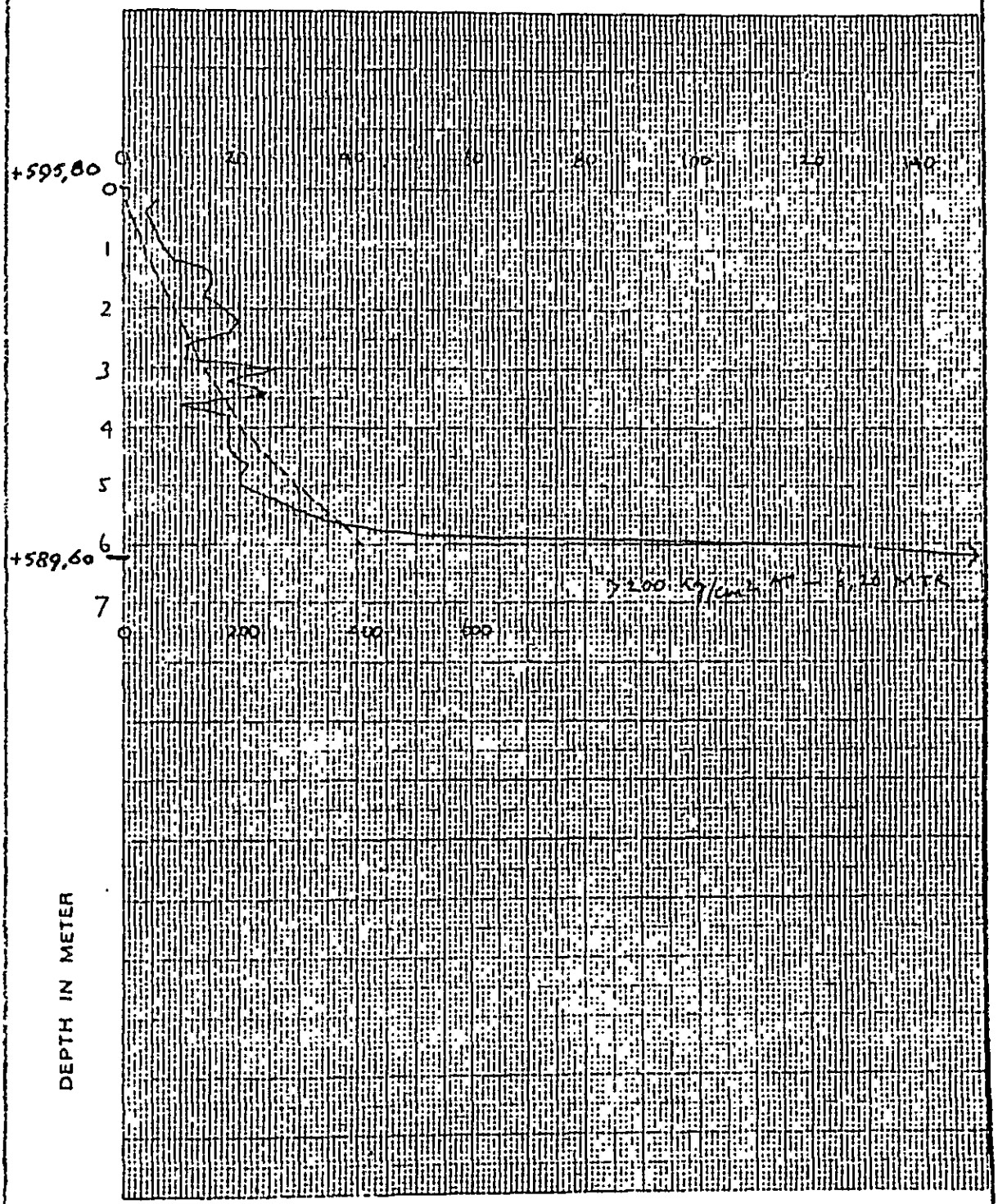
TYPE : DUTCH CONE PENETROMETER

PROJECT : KOMPLEK GEDUNG PENELITIAN. P-3.-G

LOCATION BANDUNG

DATE : NOV. 17 1981

SOUNDING NO: S_1 (BARU)



——— : CONE PENETRATION RESISTANCE , KG/CM^2

– – – – – – – : TOTAL FRICTION , KG/CM^1

CONE - PENETRATION

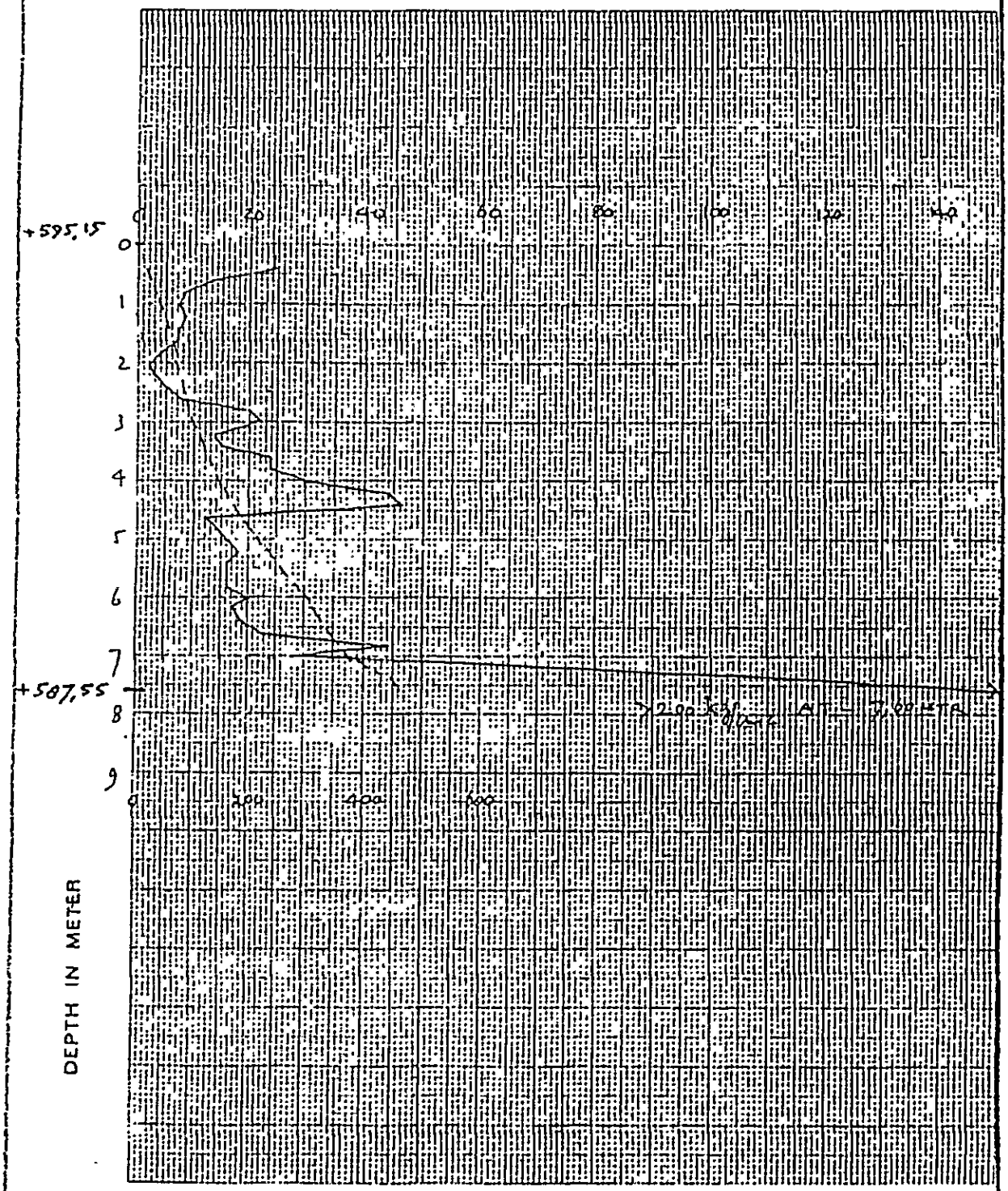
TYPE : DUTCH CONE PENETROMETER

PROJECT : KOMPLEK GEDUNG PENELITIAN P-3-G

LOCATION BANDUNG

DATE : NOV 18 - 1981

SOUNDING NO : S_2



——— : CONE PENETRATION RESISTANCE , KG/CM^2

– – – – – – – : TOTAL FRICTION , KG/CM^1

CONE - PENETRATION

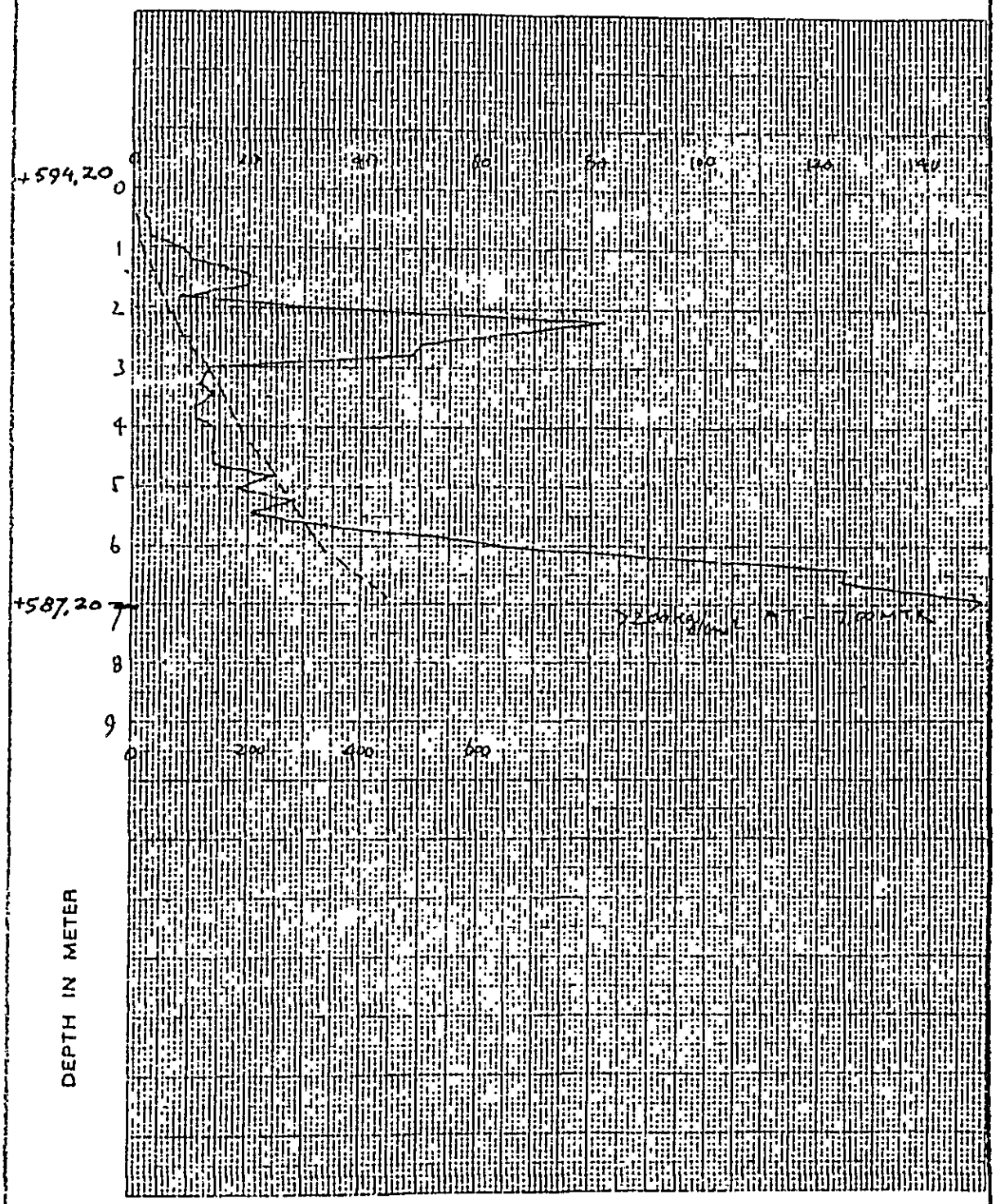
TYPE : DUTCH CONE PENETROMETER

PROJECT : KOMPLEK GEDUNG PENELITIAN I-3-6

LOCATION BANDUNG

DATE : NOV 17 - 1981

SOUNDING NO: S_3



——————— : CONE PENETRATION RESISTANCE , KG/CM^2

– – – – – – – : TOTAL FRICTION , KG/CM^1

CONE - PENETRATION

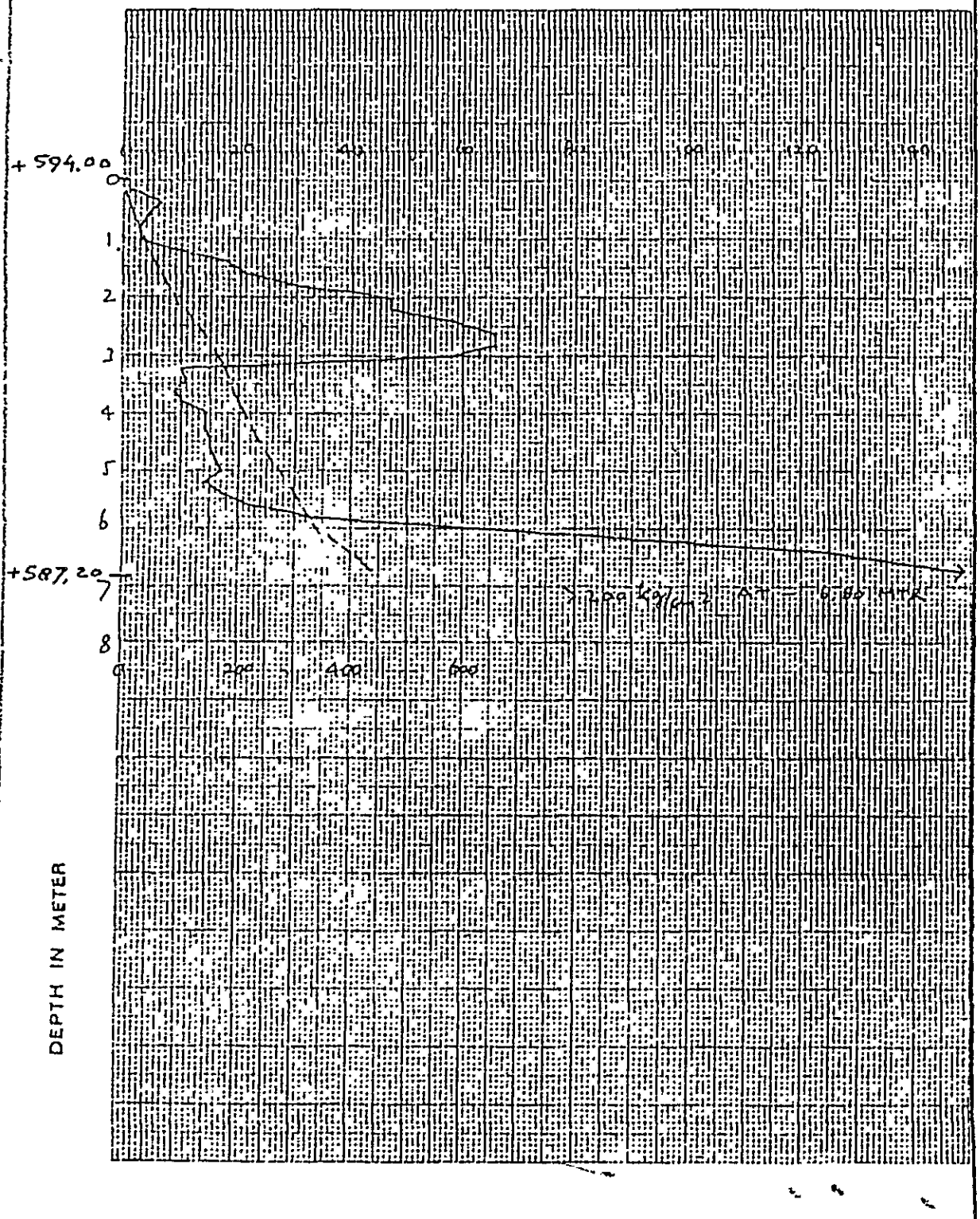
TYPE : DUTCH CONE PENETROMETER

PROJECT : KOMPLEK GEDUNG PENELITIAN P-3-G

LOCATION BANDUNG

DATE : NOV 18 - 1981

SOUNDING NO: S_4



——————— : CONE PENETRATION RESISTANCE , KG/CM^2

– – – – – – – : TOTAL FRICTION , KG/CM^1

CONE - PENETRATION

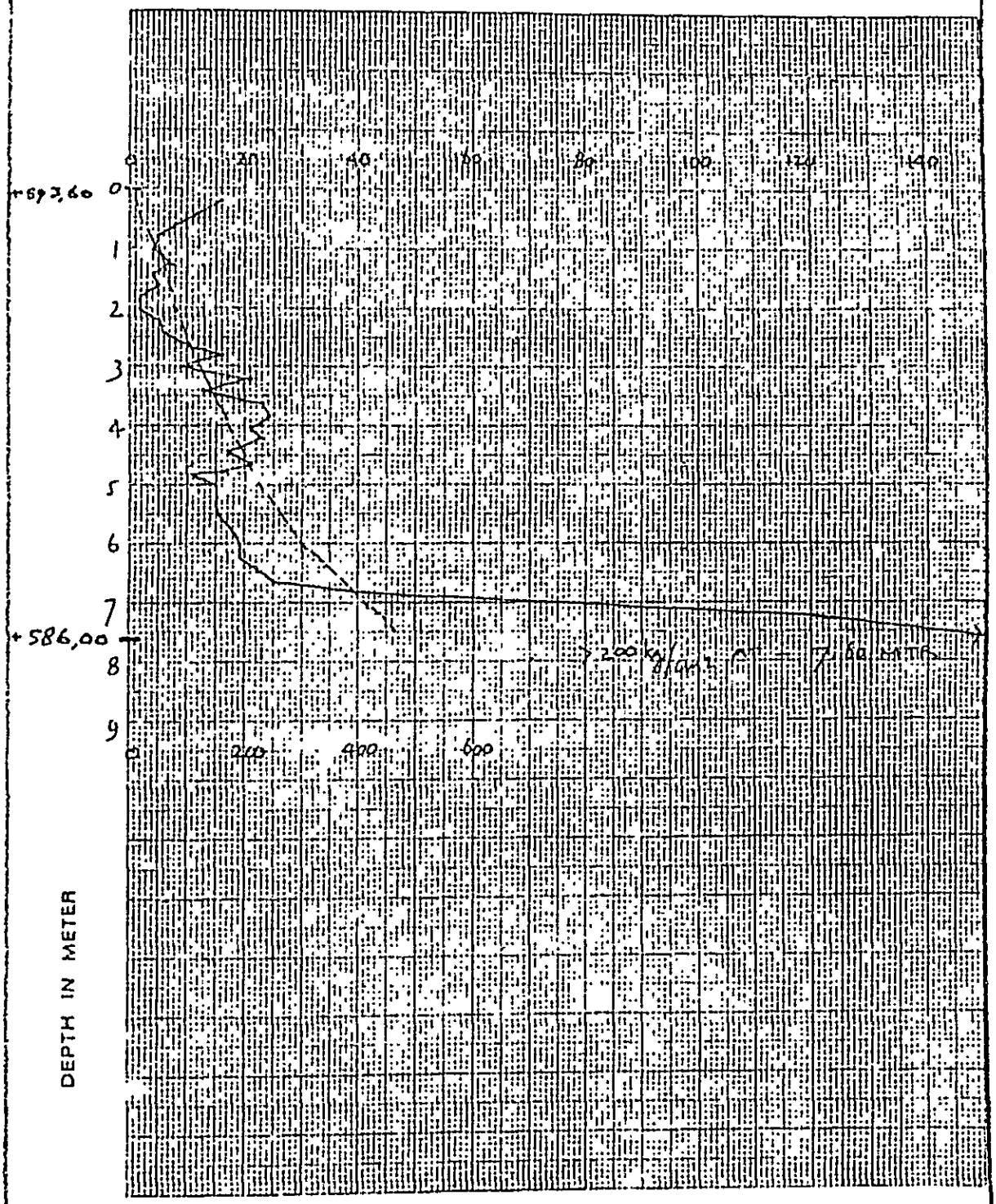
TYPE : DUTCH CONE PENETROMETER

PROJECT : KOMPLEK GEDUNG PENELITIAN P-3-G

LOCATION BANDUNG

DATE : NOV 18 - 1981

SOUNDING NO: Ex S_1



——————— : CONE PENETRATION RESISTANCE , KG/CM^2

– – – – – – – : TOTAL FRICTION , KG/CM^1

JALAN TERUSAN PASTEUR
ACCESS ROAD
DRY FIELD
RICE FIELD
S1
S2
S3
S4
EXS1
N

4 CONSTRUCTION SITUATION

4-1 Construction Materials

Most of the construction materials are manufactured in Indonesia in sufficient quantity to satisfy the requirements, but some of them are of poor quality compared to those of Japanese make. For instance, joints of exterior aluminium windows are not so precisely made that rain water may not leak through the windows. There are problems with the glass more than 6 mm thick, so that Japanese glass is often used there where thick glass is needed.

Cement, aggregates, roofing tiles, lumber, plywoods and tiles are sufficient in quality and quantity; lumber especially is to be used for every part such as roofing trusses, fittings, louvers, scaffoldings and supports. As there is no concrete plant in Bandung, concrete is always cast at the site. It will not cause any problem as long as the quality of the concrete is appropriately controlled. As for structural steels, JIS steels and ASTM steels are on the market. Steel products are planned to be produced in Jakarta and fabricated in Bandung. There is no problem with the finishing of the products unless they are to be used in large quantity. However, consideration shall be made of a construction method to do away with welding at site because of the level of the welders' skill.

As for the building facilities, there is not a wide variety of cooling tanks and panel tanks produced there, though sanitary ceramic equipment and water faucets are adequate. Room coolers and fans are available as local knockdown products. Electrical work materials such as cables, vinyl conduits, casings of transformers and distribution boards can be obtained. Lighting fixtures are also available as local knockdown products.

As there is not a wide selection in types or sizes due consideration is necessary for working designs. Note that the import of some of the materials like fluorescent tubes, incandescent lamps and galvanized steel is prohibited.

4-2 Labor Situation

Indonesian laborers usually proceed to their work on the scaffoldings without using cranes for the low building construction, and can deal with steel fabrication work at high places like the roof of a gymnasium at a school only with scaffoldings. Their technical skill is high except for detailed finish work. Labor supply is sufficient to satisfy demand for both skilled workers and ordinary workers. Those working in new fields such as welders, water-proofing workers, machine operators, etc. are insufficient in quality and quantity.

The work day is usually from 7 to 15 o'clock, however overtime work is not refused. Many laborers work at sites ever on holidays. A minimum wage guarantee system is enforced, under which the daily wage is 1,250 rupiah as of November 1981. For overtime work time and a half is paid for week day overtime, double time for daytime holiday work and 2.5 times for holiday night work. Labor wages rose by 15 to 20 percent during 1980 and 1981 in Bandung.

4-3 Construction Cost

Many of the buildings in Indonesia are two (2) or three (3) storey ones except in part of Jakarta. The common method is to construct columns, beams and floors with reinforced concrete and walls with brick work. Wall finishing is usually painting on a mortar troweled surface, terrazzo tiles for floor finish, wood for window or door openings, and asphalt finish for roof waterproofing. Houses are usually made with slender reinforced concrete columns and beams, brick walls and wooden truss roofs with roofing-tiles.

Construction materials for the above building styles are mostly produced in Indonesia except for synthetic resin, aluminium and gypsum board materials. Material costs, however, are extremely high compared to labor costs. For example, the price of one (1) ton of reinforcing bars is equivalent to a head carpenter's wages for about 100 days. As the construction costs, including labor and material costs, are rather expensive, it is common in Indonesia to order building construction devided into several stages.

According to the data issued by the government on price trends in Indonesia, the construction material price indexes as of July 1981 count 259 for asphalt, 178 for wood, 176 for cement and 173 for steel, based on a standard of 1975 = 100. The inflation rate from December 1980 to June 1981 is around 10 percent.

The construction cost indexes comprising labor and material costs are 535 for houses and 497 for other buildings based on a 1971 standard. The construction cost increase rate from August 1980 to July 1981 registered 12 percent for houses and around 11 percent for other buildings.

During the compilation of this report, on January 4 1982, the price of petroleum products was raised by an average of 60 percent after two (2) years' interval. Since then, inflation has started increasing and construction material costs as well as labor costs have started climbing as well. It is difficult to anticipate now at what level this price rise will stabilize.

4-4 Framework Construction

(1) Design Codes and Regulations

For the design of reinforced concrete structures, Peraturan Beton Bertulang Indonesia 1971 is applied with reference to ACI Code of the U. S. A., British Standards and VB Standards of Holland. AISC (U. S. A.) and JIS (Japan) are used for steel structures. As for loading conditions, Peraturan Muatan Indonesia 1971 specifies dead load, live load, wind load and seismic load.

(2) Materials

1) Concrete

Ordinary portland cement is produced in Indonesia, but white cement is imported and is three (3) times more expensive. There are no ready-mixed concrete companies in Bandung, and all the concrete is proportioned and mixed at the site.

Of three (3) kinds of proportioning strength, K125, K175 and K225, K175 concrete (allowable compressive strees $\sigma e' = 60$ kg/cm^2) is usually applied. 300 kilograms of concrete is used for proportioning one (1) cubic meter of concrete. River sand is used for fine aggregates and crushed stones of two (2) to three (3) centimeters diameter for coarse aggregates. Concrete sets quite hard with a slump of 5.0 to 15 centimeters.

2) Reinforcing Bars

U22, U24, U32, U39 and U 48 reinforcing bars of Indonesian Standards are produced and U24 bars (allowable tensile stress $\sigma all = 1400$ kg/cm^2) are usually used. They are plain bars with a size range of 6 ϕ to 32 ϕ, the commonly used bars being 6 ϕ to 25 ϕ. None of the construction sites were using deformed bars in Bandung. Those equivalent to SR 24 or SR 30 bars by JIS are also produced and used. Bars are spliced with lap-joint splices.

3) Structural Steels

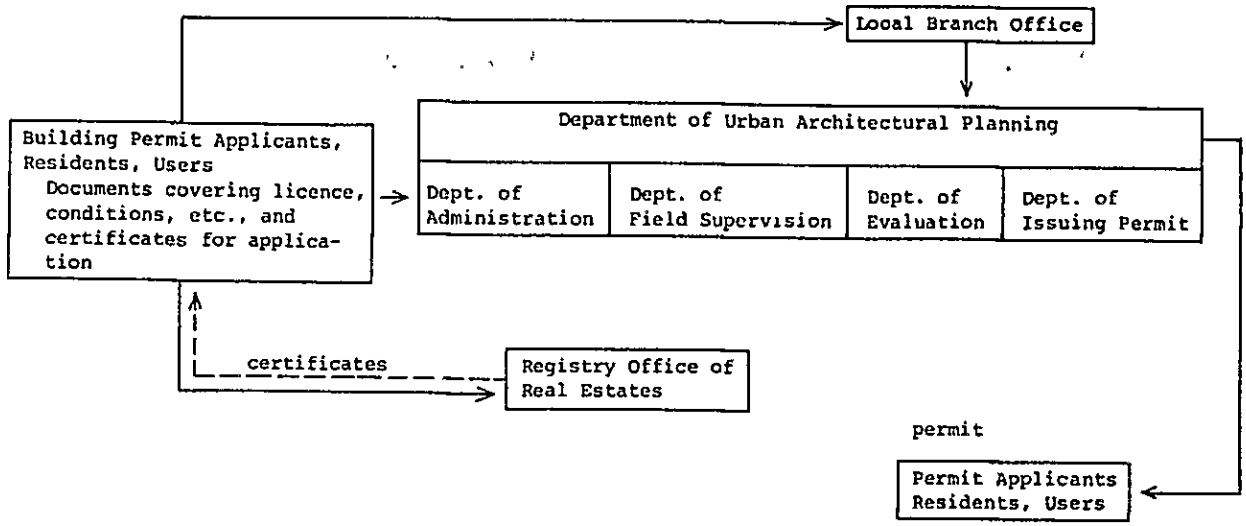
As is mentioned in Annex 3-4-(1) Design Codes and Regulations, structural steels complying to ASTM and JIS are available. L-beams and channel steels are produced. Steel structure buildings are limited to those with large spans like factories or warehouses because of the high material cost. But it will not be excessively expensive to use structural steels for roofing trusses or in single storey buildings.

4-5 List of Related Regulations and Design Standards

Building	:	BAPPENAS REGULATION
Fire Protection	:	REGULATION FROM "DINAS PEMADAM KEBAKARAM KODYA"
Safety, Labor	:	HIPERKES (DEPARTMENT OF HEALTH)
	:	JAWATAN KESELAMATAN KERJA DEPNAKERTRANSKOP
Pollution	:	DEPT./MINISTRY OF HEALTH (1975), (1977)
Vessel, Boiler	:	JAWATAN KESELAMATAN KERJA DEPNAKERTRANSKOP
Telephone	:	PERUM TELEKOMUNIKASI
Electric Supply	:	WATER QUALITY STANDARD
		EFFLUENT STANDARD FOR INDUSTORIAL, MINES & DOMESTIC
		DEPT. OF HEALTH, REPUBLIC OF INDONESIA
		REGULATION FROM PAM
Septic Tank	:	DEPT. OF PUBLIC WORKS
Reinforced Concrete	:	PERATURAN BETON BERTULANG INDONESIA TAHUN '71 (NI 2)
Steel Construction	:	AMERICAN INSTITUTE OF STEEL CONSTRUCTION, J.I.S.
Loading	:	PERATURAN MUATAN INDONESIA TAHUN '70
Air-Conditioning	:	ARI, ASHRAE, ASTM, ASME
Sanitary	:	PEDOMAN PERATURAN PLUMBING INDONESIA
Electricity	:	J.I.S., P.U.I.L, V.D.E, N.E.C. (NATIONAL ELECTRIC
		CODE), B.S. (BRITISH STANDARD)
Telephone	:	PERUM TELEKOMUNIKASI

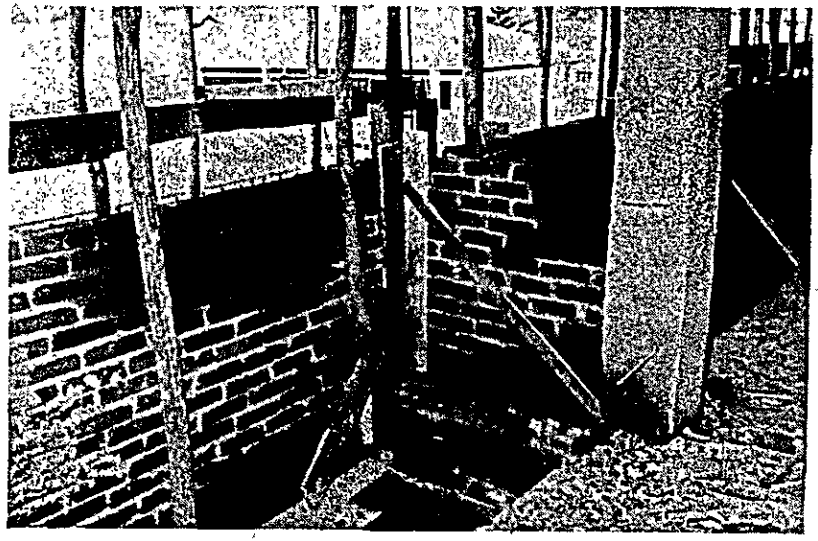
4-6 Application for Building Permit

In Indonesia, construction approvals have to be obtained from the authorities concerned at the design development stage and after completing working designing, official building permits are granted. It usually takes about three (3) months from application to grant of a permit. The process of application and granting of permits is shown in the following chart:

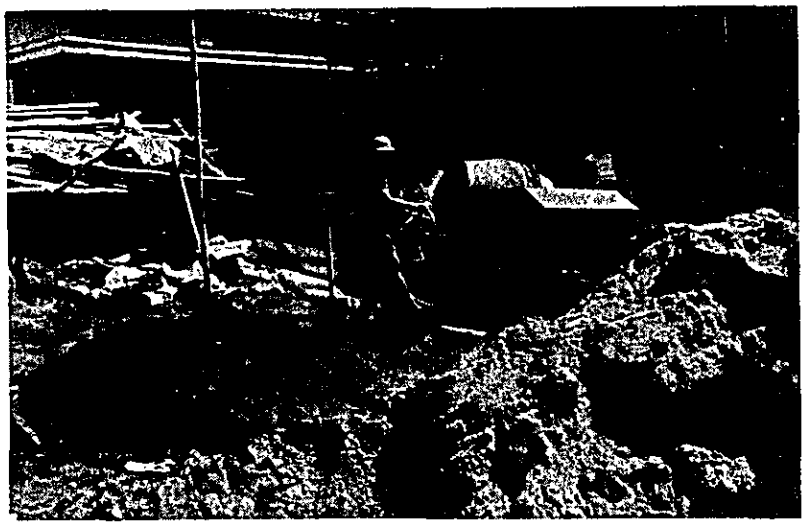


PROCESSING of BUILDING PERMIT APPLICATION
FLOW CHART

EXTERIOR SCAFFOLDINGS



BRICK EXTERIOR WALL



CONCRETE MIXING

CEILING FINISHING

BUILDING CONSTRUCTION

CONSTRUCTION MATERIAL COST

- Cement		Rp. 1950	/40 kg
- Fine Aggregate (River sand)		6000 ~ 8000	/m^3
- Coarse Aggregate (Gravel)		6000 ~ 8000	/m^3
- Coarse Aggregate (Crushed stone)		8000 ~ 12000	/m^3
- Wooden Panel for form		27000/m^3, 810	/m^2
- Plywood for form	t = 12 mm x 1200 x 2400	8000	/sheet
- Reinforcing Steel Bars (Jakarta)			
Round Bar strength (SR24)	6 mm ø	298000	/ton
	8 mm ø	273000	/ton
	10 mm ø --12 mm ø	230000	/ton
	16 mm ø --19 mm ø	220000	/ton
Deformed Bar strength (SD30)	D10 mm ø	255000	/ton
	D13 mm ø	250000	/ton
	D16 mm ø --D25 mm ø	240000	/ton
- Steel			
Steel Plate strength (SS41)	t = 4.5 mm -- 32 mm	375000	/ton
Angles		Rp. 285000 ~ 300000	/ton
Channels		325000 ~ 350000	/ton
H-shape		350000 ~ 400000	/ton

		W	L		
- Ply-wood	t = 4 mm	1200 x	2400	3200	/piece
	6 mm	" x	"	4600	/piece
	9 mm	" x	"	6500	/piece
	12 mm	" x	"	8000	/piece
	18 mm	" x	"	12000	/piece
- Gypsum Board	t = 6 mm	300 x 600		350 ~ 1200	/sheet
- Asbestos Board	t = 6 mm	1080 x 3000		Rp. 12750	/sheet
	t = 5 mm	920 x 2500		7700	"
	t = 4 mm	1050 x 3000		8760	"

	W	L	t		
- Concrete Block	200 x	400 x	100	210	/piece
	200 x	400 x	150	330	"
- Hollow Brick	110 x	240 x	50	130	/pcs.
	110 x	240 x	70	190	/ "
- Terrazzo Tile	300 x	300	(white)	525	/pcs.
	" x	"	(colour)	550	"
- Porcelain Tile	108 x	108	(white)	58	/pcs.
	" x	"	(Colour)	65 80	/ "
- Vinyl Asbestos Tile					
	300 x	300 x	2	300 500	/sheet
- Steel Sash					
	Frame 3" x	1 1/2"		7200	/m
	4" x	1 3/4"		9000	/m
- Baseboard (Vinyl)					
(Terrazzo block)					
(Ceramic tile)					
(wood)					

LABOR COST

Category	per day (=7 Hours)
Common Laborer	Rp. 1,750
Carpenter (foreman)	3,500
Common Carpenter	2,500
Fixing Carpenter	2,500
Assistant Carpenter	2,250
Reinforcing-bar Placer	2,250
Assistant Placer	2,000
Scaffolding Man	2,500
Block Worker (foreman)	3,500
"	2,500
" (assistant)	2,000
Plaster Worker (foreman)	3,500
"	2,500
" (assistant)	2,000
Painter (foreman)	3,500
"	2,500
" (assistant)	2,000
Welder	4,000
Black Smith	3,500
" (assistant)	2,500
Mason	2,500
Assistant Mason	2,000
Tinsmith	3,000
Assistant Tinsmith	2,500
Terrazzo Worker	4,000
Glazier	3,000
Bricklayer	Rp. 2,500
Assistant Bricklayer	2,000
Tiling Worker	3,000
Assistant Tiling Worker	2,500
Waterproofing Worker	3,500
" (assistant)	2,500
Sashing Worker	3,000
Roofing-tile Layer	3,000
" (assistant)	2,500
Machine Operator	3,000
Plumber (foremen)	4,000
"	3,000
" (assistant)	2,500
Machine Installation Worker	4,000
Duct Placer	4,000
Electrician (foreman)	5,000
"	3,500
" (assistant)	2,500

NOTE

Overtime Wage (week day) Basic ÷ 7 hours x 1.5

(Sunday & holiday) Basic ÷ 7 x 2.0

(Legal holiday) Basic ÷ 7 x 2.0

Allowance daily variable

Minimum Wage Rp. 1,250

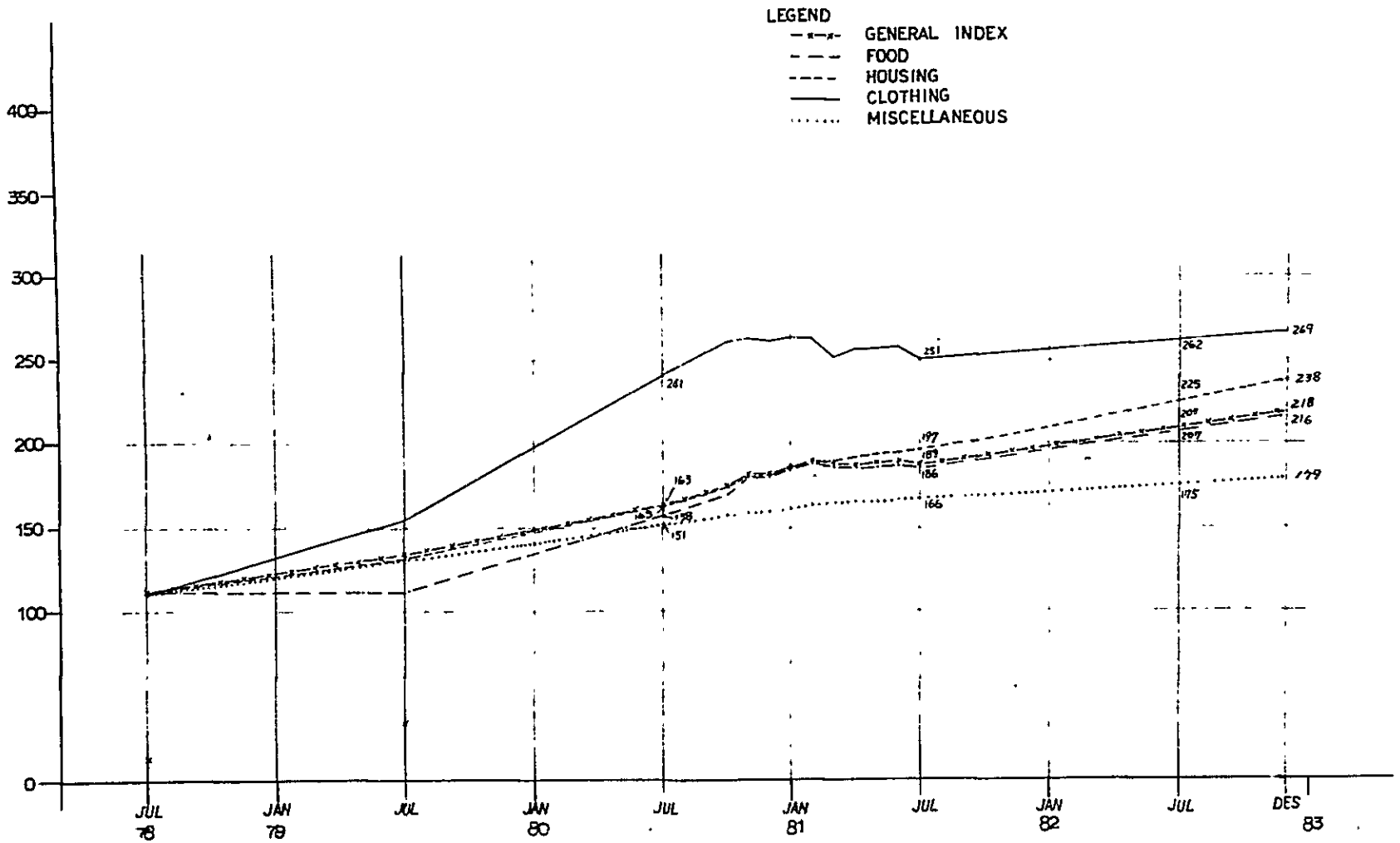
CONSTRUCTION COST

no mark: material plus labor cost

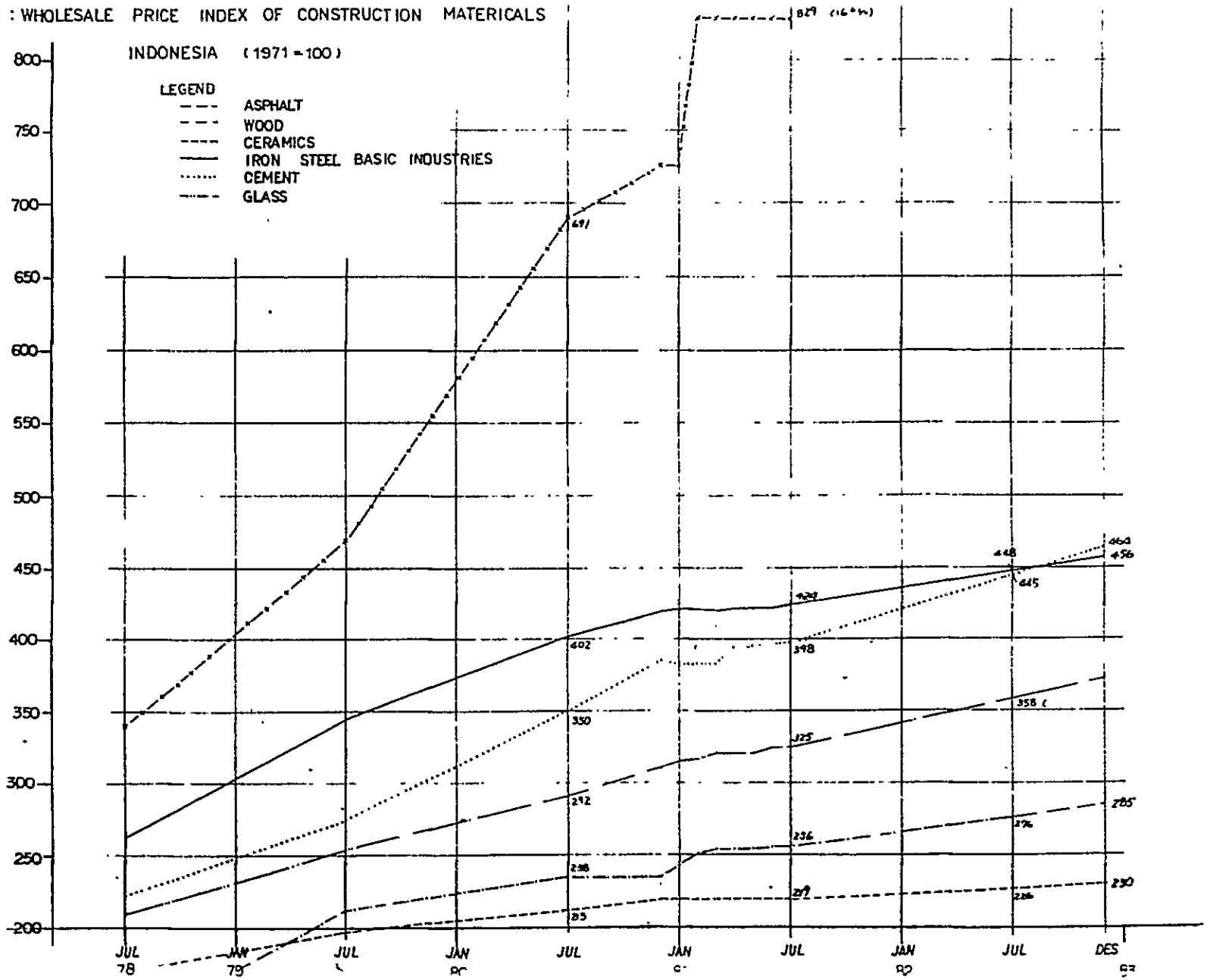
Excavation	H<1m Rp 700 /m3, H<2m 1,000	/m3
Backfilling (labor cost only)	500	/m3
Gravel Placing t = 150 mm	100	/m2
Plain Concrete 150 kg/cm2	40,000	/m3
Reinforced Concrete (Concrete Grade 210) (Re-bar & form not included)	45,000	"
Form Work (including removal) (Ground beam, foundation)	2,500	/m2
Bend and Placing of Reinforcing Steel Bar (labor cost only)	45,000	/ton
Concrete Block	4,500	/m2
Brick Masonry	4,000	"
Cement Mortar with Steel Trowel Finish		
for wall t = 15~20 mm	1,400	"
for floor t = 30 mm	1,800	"
Cement Mortar with Brush for wall		"
Terrazzo (including brass joint) cast-in-place	17,650	"
Vinyl Asbestos Tile t = 2 mm	4,000.~7,000	"
Ceramic Tile (with back setting) for wall	8,500~10,000	"
Porcelain Tile (") for floor	8,500~10,000	"
Panel Ceiling (frame, aluminum furring, acoustic board)	4,000~10,000	/m2
Panel Ceiling (frame, wood furring, asbestos board 4mm)	3,750	"
Steel Sash		
Steel Door 900 x 2100, 1200 x 2100, 1700 x 2100	50,000	/m2
Glass t = 3.0 mm	5,000	/m2
t = 5.0	9,000	"
Exterior Wall Painting (E.P)	1,300	"
Interior Wall Painting (")	1,200	"
Steel Painting (O.P)	1,250	"

GRAPH 1 : INDEX NUMBERS OF PRICE PAID BY FARMER, HOUSEHOLD CONSUMPTION SECTOR

CENTRAL JAVA (1976 = 100)

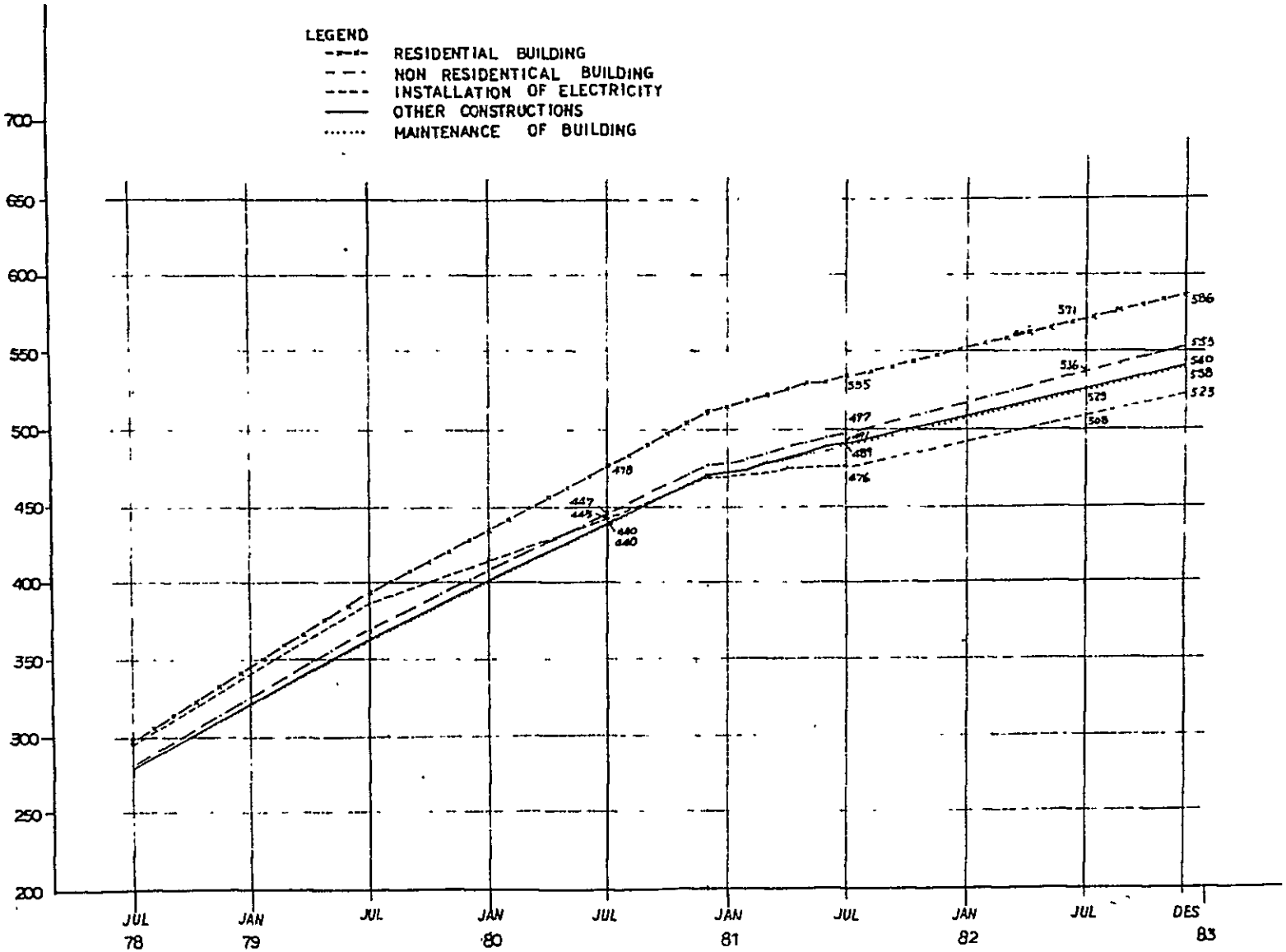


GRAPH 2 : WHOLESALE PRICE INDEX OF CONSTRUCTION MATERICALS



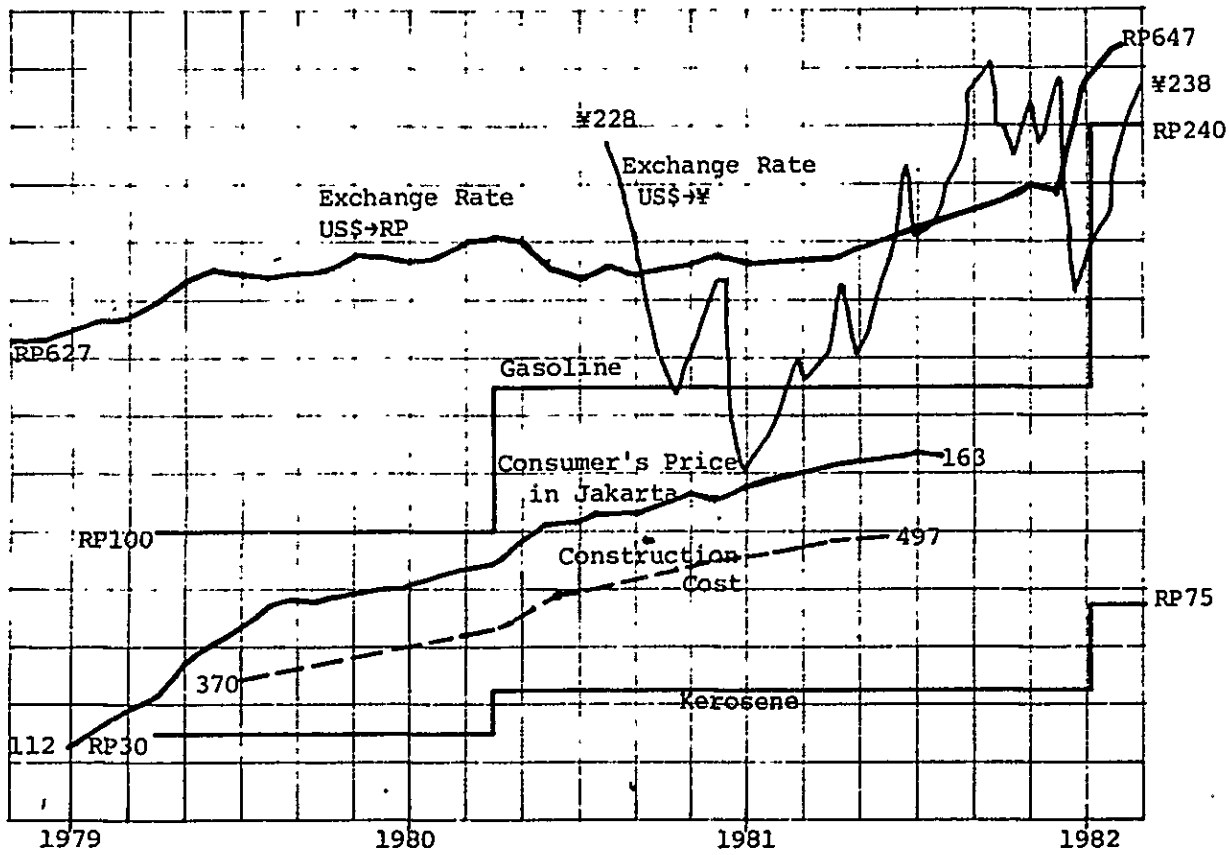
GRAPH 3 : WHOLESALE PRICE INDEX OF CONSTRUCTION MATERIALS BY TYPE OF CONSTRUCTION

INDONESIA (1971 = 100)



* Price Rise of Petroleum

As was reported in newspapers, etc., the price of petroleum was raised on January 4, 1982 after two (2) years' interval. This price rise is the biggest of those have ever occured, by an average of 60 percent rise of the prices of all the petroleum products. Since then, consumer's prices as well as construction costs have started increasing, however, it is extremely difficult to anticipate now how much the influence of this inflation will be.



PRICE INDEX GRAPH

* Reference Data

1) DAIYONKI(The Quaternary), Geoscience Course, Vo. XI, Kenzo Hatori and Tatsuo Shibazaki ed., Kyoritsu Suppan.

2) Geology Dictionary, Heibon-sha.

3) Indonesia Handbook, Jakarta Japan Club, Corporation Div., 1981.