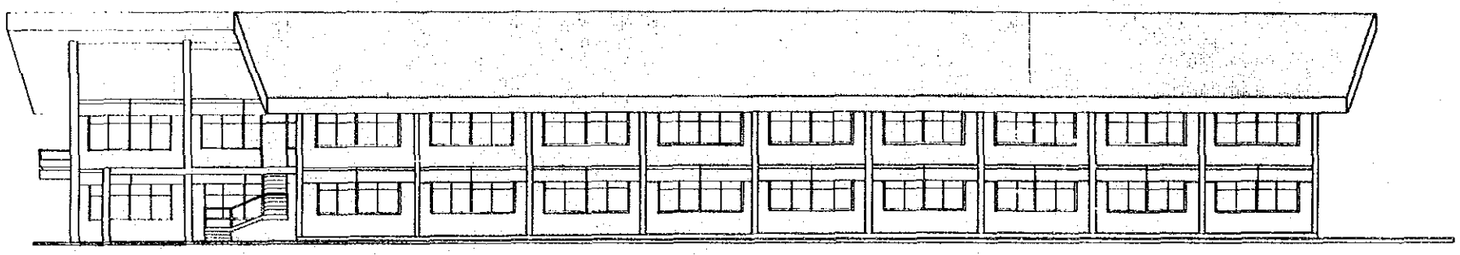
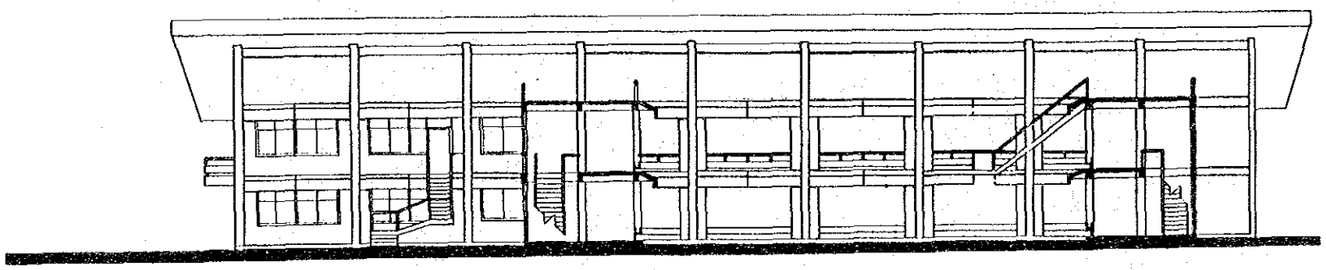
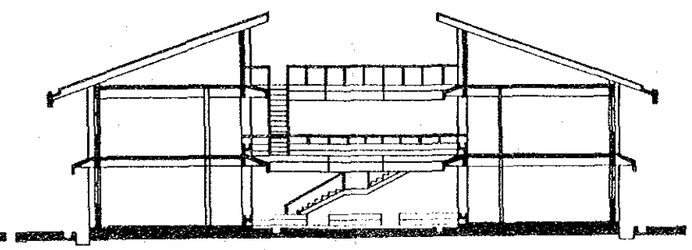


SOUTH ELEVATION



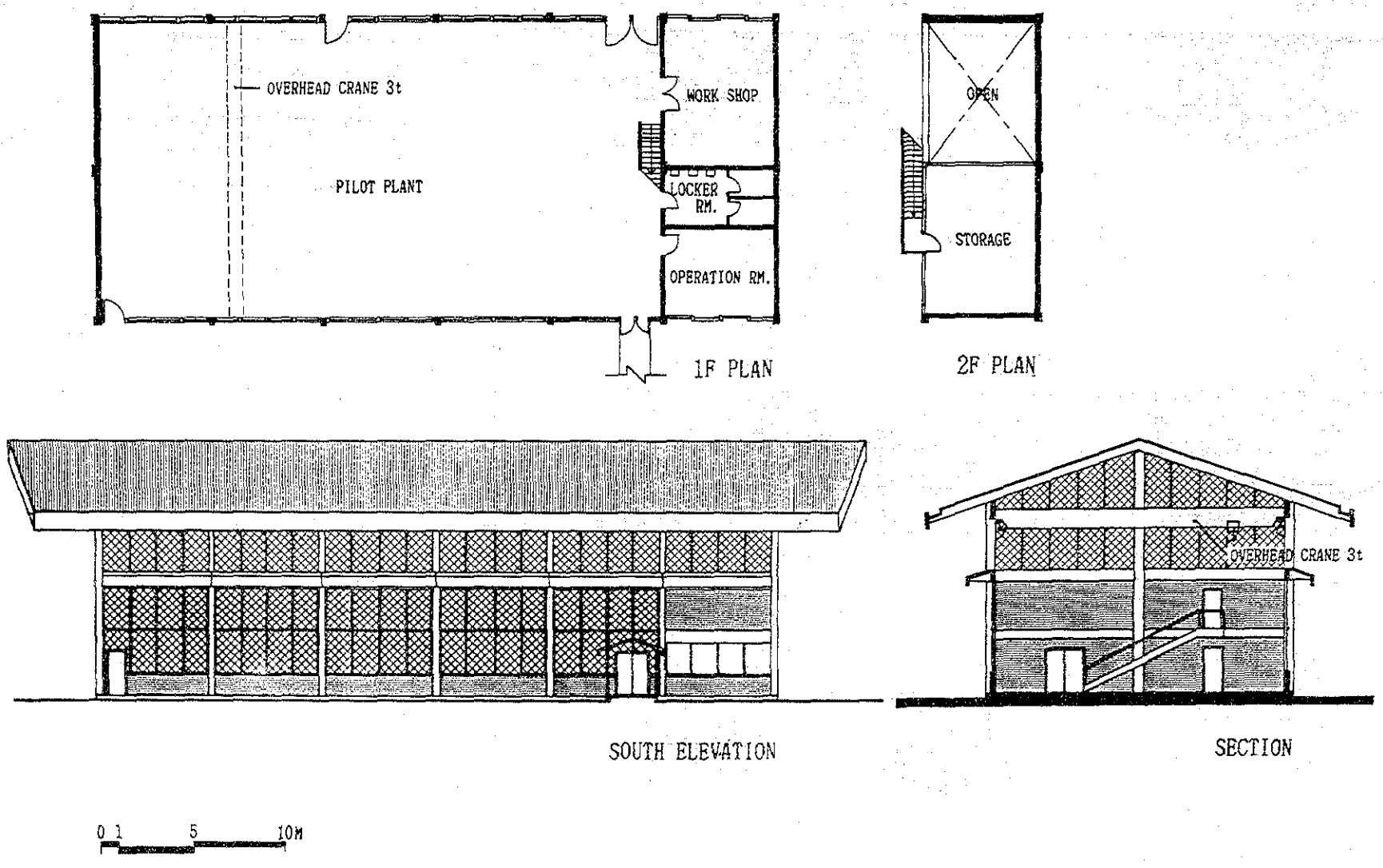
0 1 5 10M

SOUTH-NORTH SECTION



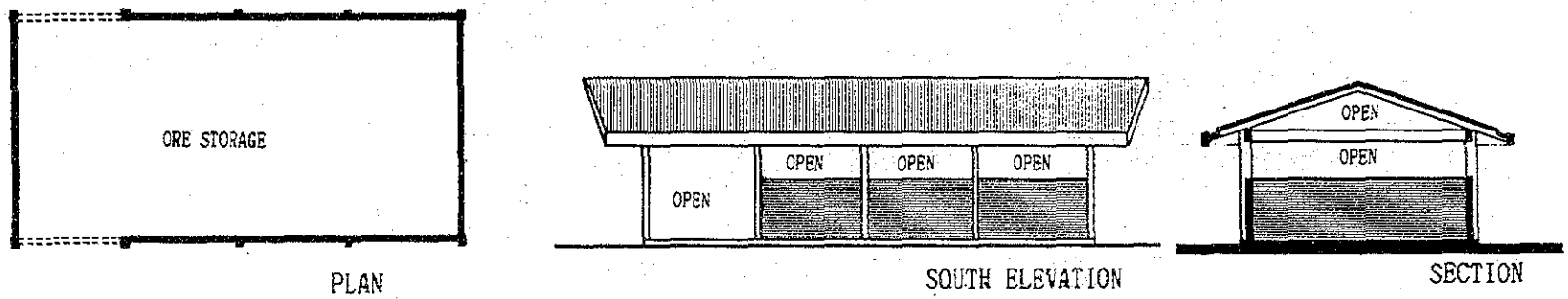
EAST-WEST SECTION

4 ELEVATIONS AND SECTION
OF LABORATORY BUILDING

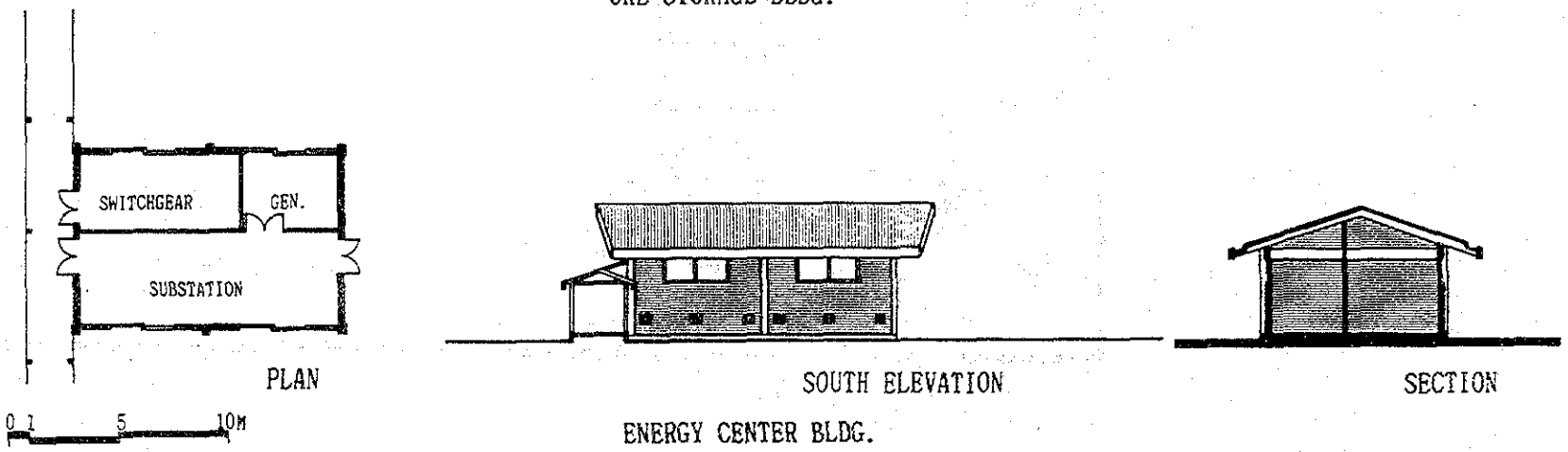


5 FLOOR PLAN, ELEVATION AND SECTION OF PILOT PLANT BUILDING

DANGEROUS MATERIAL STORAGE BLDG.

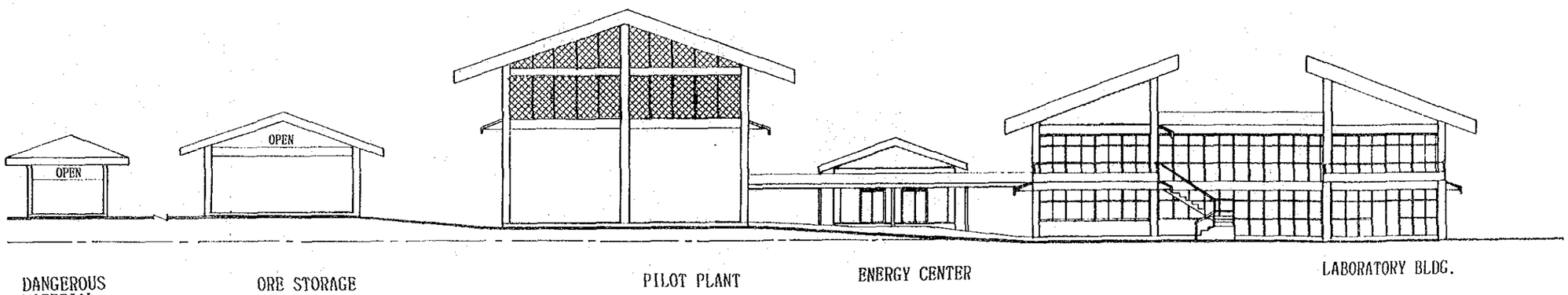


ORE STORAGE BLDG.

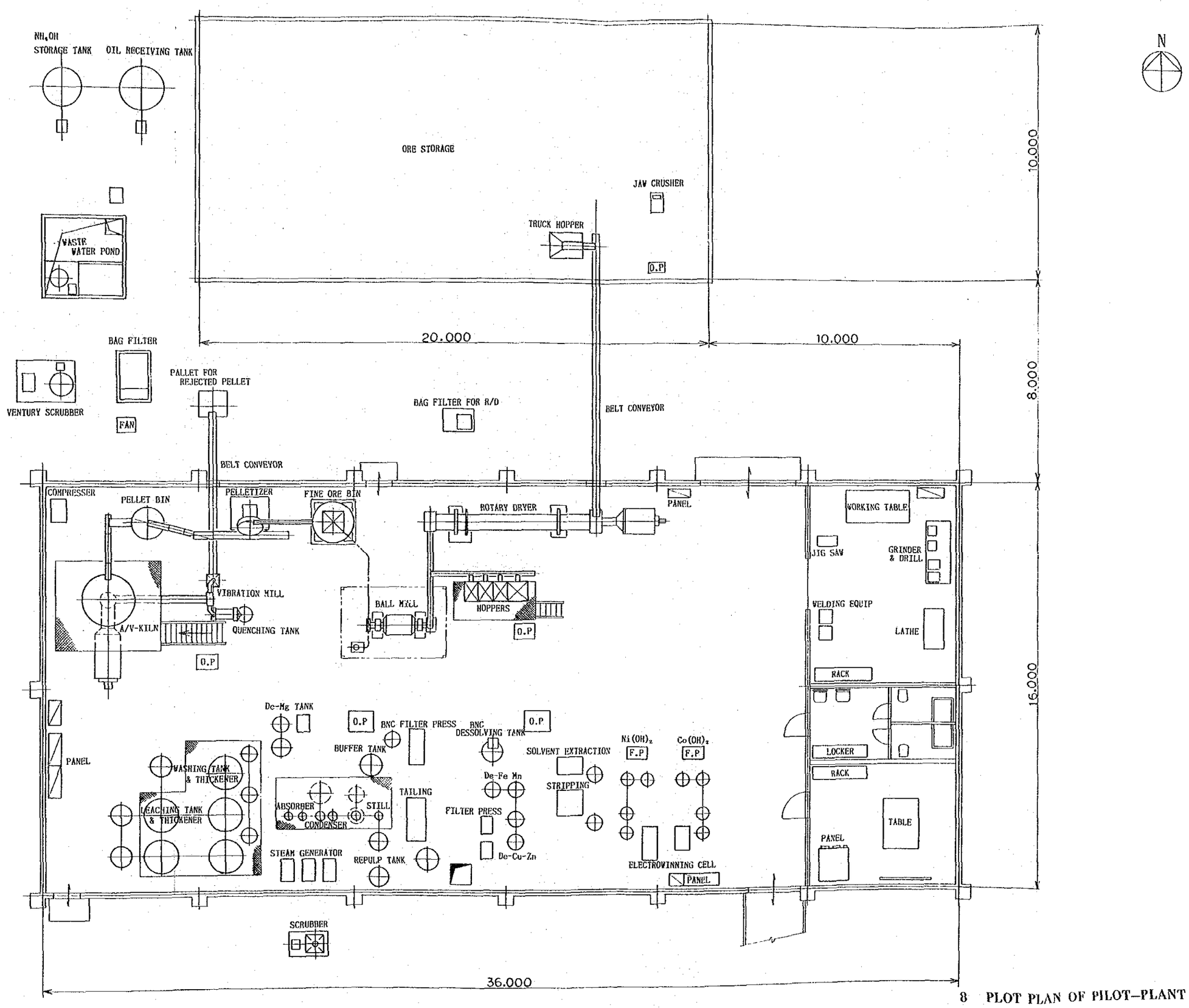


ENERGY CENTER BLDG.

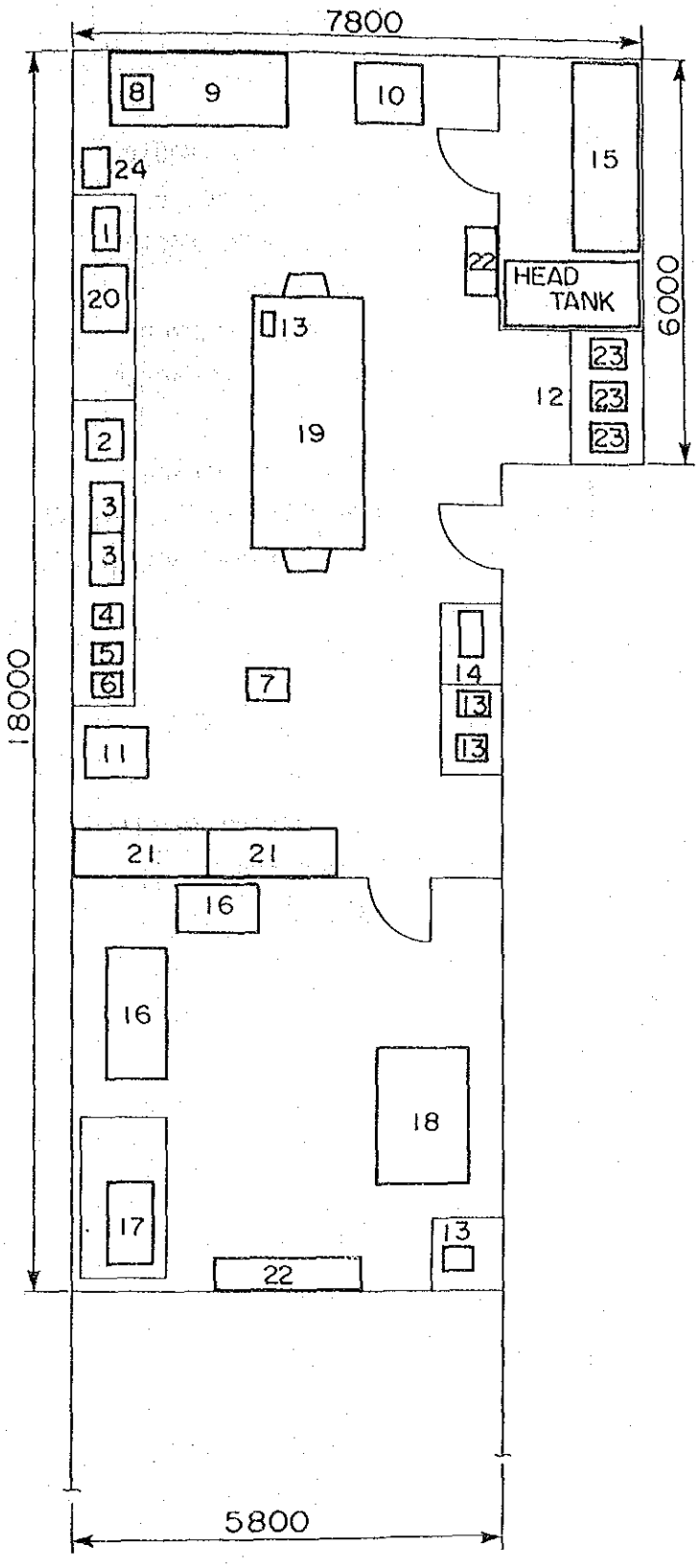
6 FLOOR PLANS, ELEVATIONS AND SECTIONS OF ENERGY CENTER, ORE STORAGE BUILDING AND DANGEROUS MATERIAL STORAGE BUILDING



7 OVERALL WEST SIDE ELEVATION

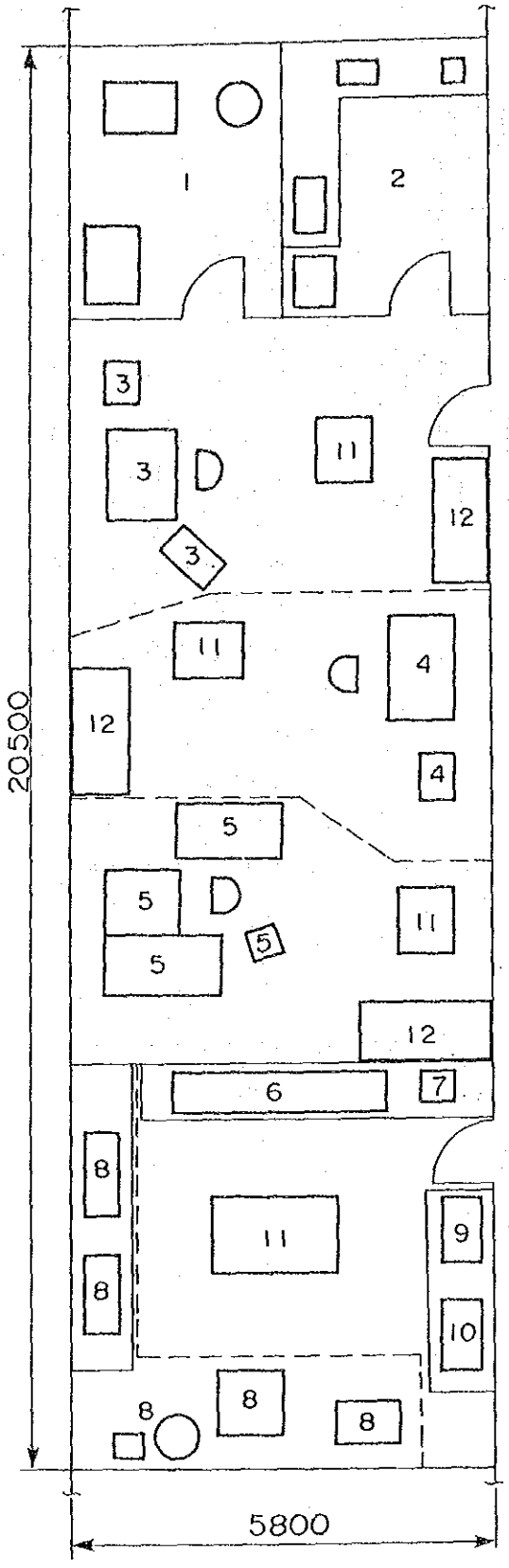


8 PLOT PLAN OF PILOT-PLANT FACILITIES



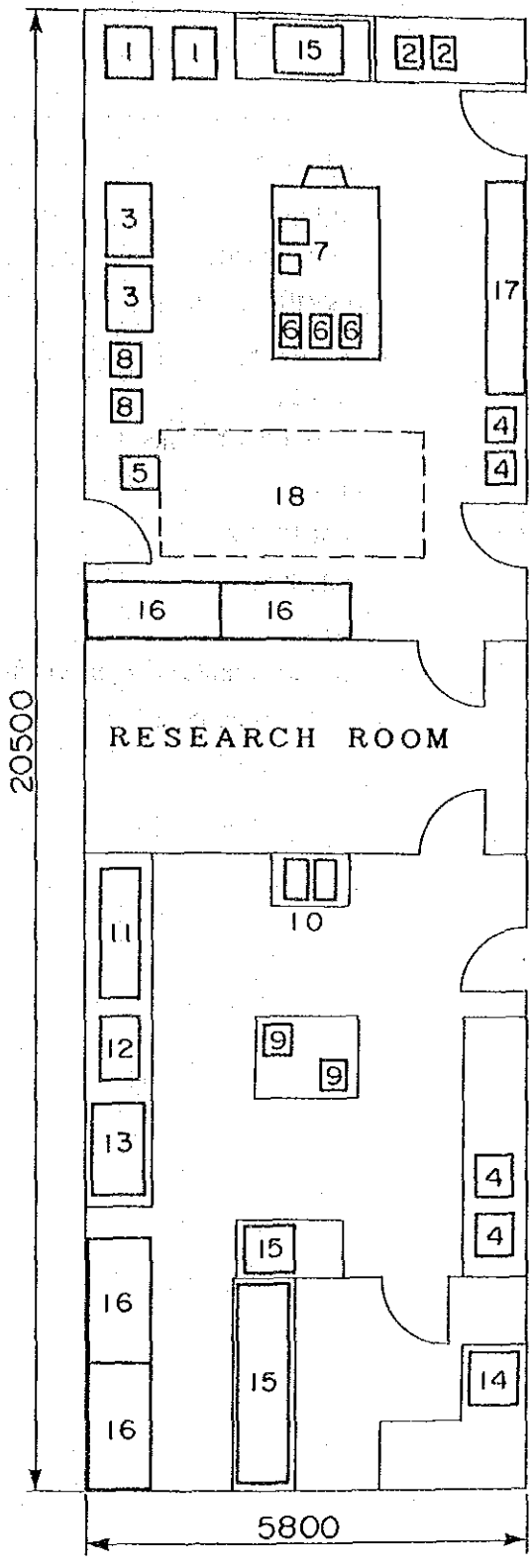
1 ULTRASONIC CLEANER
2 WATER BATH
3 MAGNETIC STIRRER
4 pH METER
5 ELECTRO COND. METER
6 ION METER
7 SHAKER
8 VAC. DRYING OVEN
9 FUSION TABLE
10 MUFFLE FURNACE
11 CENTRIFUGE
12 FUME HOOD
13 BALANCE
14 SPECTROPHOTOMETER
15 PURE WATER MAKER
16 ICP
17 AA
18 C.S ANALYZER
19 GENERAL ANALYSIS TABLE
20 SINK
21 CABINET
22 CUPBOARD
23 SAND BATH
24 VACUUM PUMP

9. Equipment Plot Plan of Chemical Analysis Room,
Instrumental Analysis Room (A)



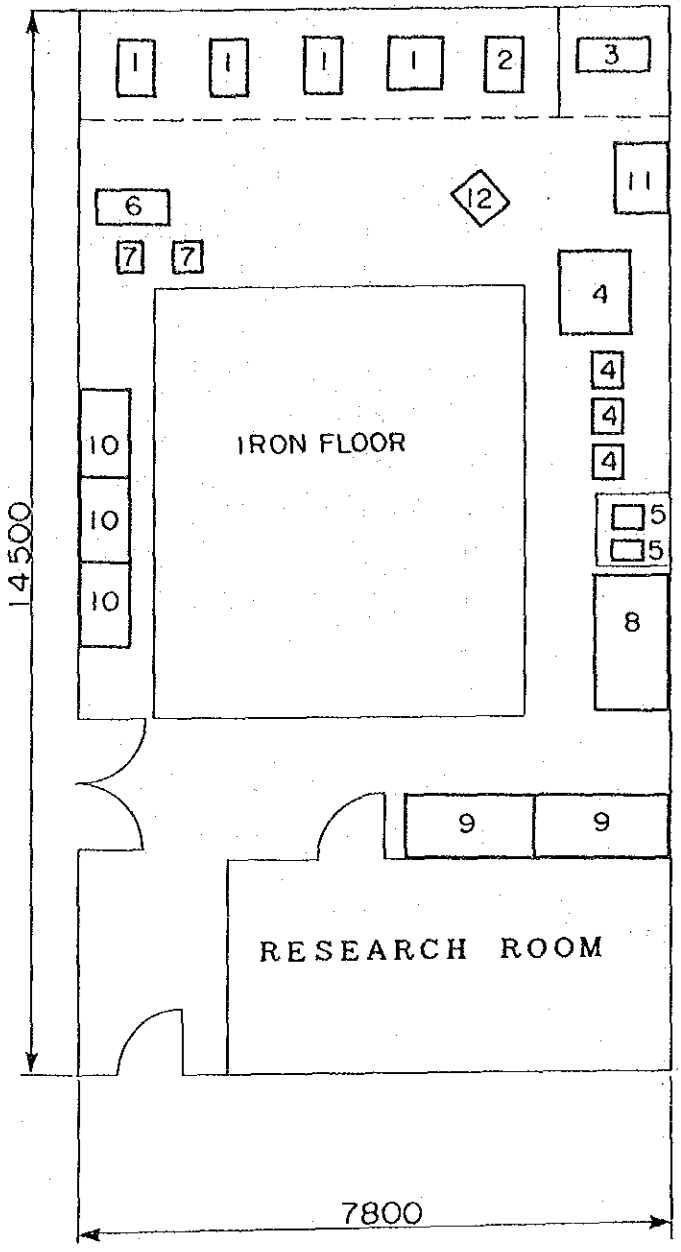
1 SAMPLE PREP. EQUIP.
for Xray EQUIP.
2 SAMPLE PREP. EQUIP.
for EPMA
3 Xray FLUORESCENCE
4 Xray DIFFRACTOMETER
5 EPMA
6 DTA.TG.DSC SYSTEM
7 AUTOMATIC MOIST. BALANCE
8 COAL ANALYSIS APPARATUS
MOISTURE
ASH
VM
SULPHER
CARBON
9 IR SPECTROPHOTOMETER
10 POLAROGRAPH
11 TABLE
12 CABINET

10. Equipment Plot Plan of Instrumental Analysis Room (B), (C)



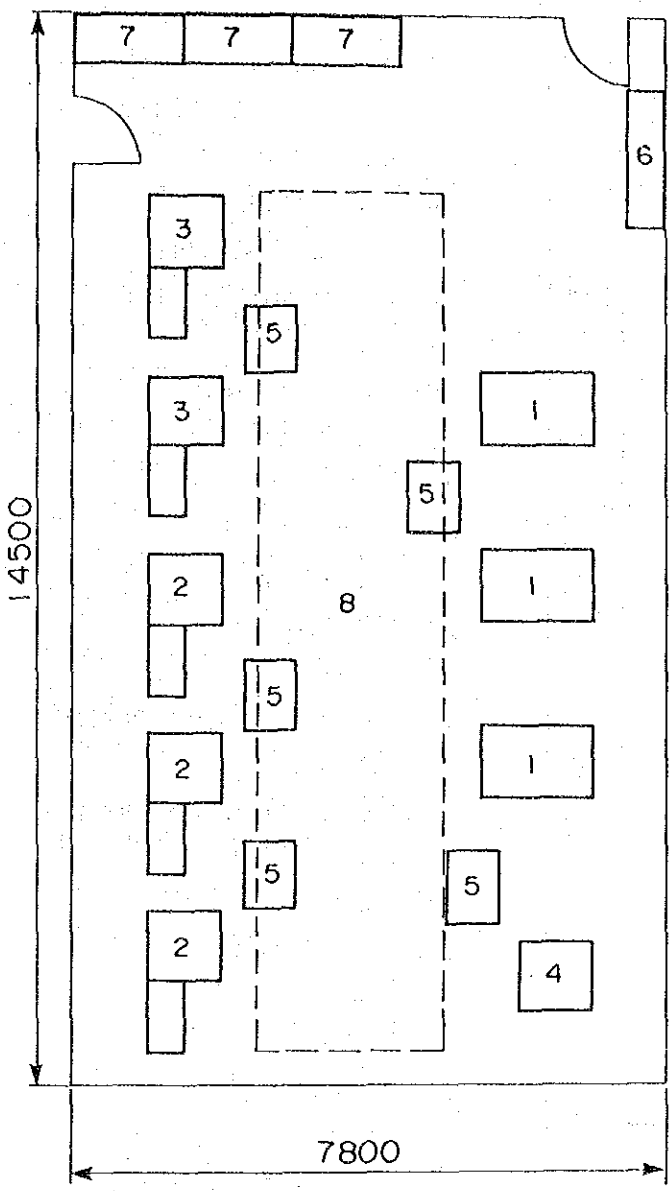
1 FLOTATION CELL
2 pH METER
3 JAR MILL DRIVER (BALL MILL)
4 DRYING OVEN
5 ELECTROSTATIC SEPARATOR
6 VACUUM FILTER
7 BALANCE
8 MAGNETIC SEPARATOR
9 MICROSCOPE
10 DESICCATOR
11 MOUNTING APPAR.
12 CUTTER
13 POLISHING APPAR.
14 FILM PROCESSOR
15 SINK
16 CABINET
17 CUPBOARD
18 SAMPLE HANDLING SPACE

11. Equipment Plot Plan of Mineral Dressing Room, Mineralogical Room and Dark Room



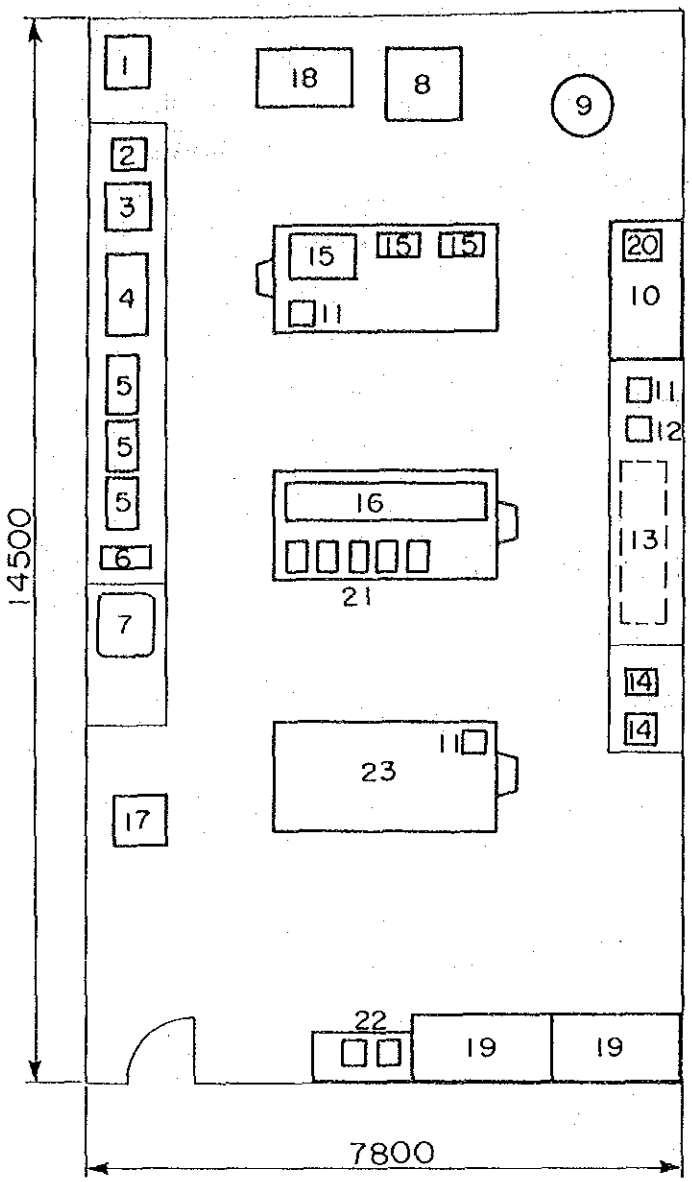
1 CRUSHER
2 SCREEN
3 COMPRESSOR
4 DRYING OVEN
5 BALANCE
6 MIXER
7 SAMPLE DIVIDER
8 TABLE
9 CABINET
10 CUPBOARD
11 SINK
12 DUST COLLECTION SUSTEM (movable)

12. Equipment Plot Plan of Sample Preparation Room



1 TUBE FURNACE
2 MUFFLE FURNACE
3 CRUSIBLE FURNACE
4 INDUCTION FURNACE
5 CART
6 CUPBOARD
7 CABINET
8 SAMPLE HANDLING SPACE

13. Equipment Plot Plan of Pryometallurgical Room



1 AUTO STILL
2 CENTRIFUGAL FILTER
3 CENTRIFUGE
4 JAR TESTER
5 MAGNETIC STIRRER
6 ULTRASONIC CLEANER
7 SINK
8 MUFFLE FURNACE
9 AUTOCLAVE
10 FUME HOOD
11 pH METER
12 ION METER
13 SMALL EQUIP.
14 BALANCE
15 TABLE FOR ELECTROLYTIC EQUIOP.
16 TABLE FOR MIXER SETTLER, etc.
17 SHAKER
18 DRYING OVEN
19 CABINET
20 HEATER
21 VACUUM FILTER
22 VACUUM DESICCATOR
23 TABLE FOR COMMON USE

14. Equipment Plot Plan of Hydrometallurgical Room

4-4 Construction Planning

(1) Existing conditions for construction and construction policy

There are many modern high-rise buildings located in the central part of Jakarta City demonstrating the essence of highly advanced architectural technology, but due to the economic recession since 1982, the building demand for offices has gradually decreased and the construction sites which could be seen everywhere are now also decreasing. The number of construction sites of small and medium size buildings which support the construction industry has decreased, except for a few banks and condominium apartments presently under construction. Under such conditions, the construction method using precast concrete exterior panels, which has been employed by Japanese construction companies, is now drawing attention.

Since the devaluation of the Indonesian currency, the rupiah, in September 1986, the general consumer price index has risen from 3% in August to 6.8% in September, compared to the same months of the previous year, and has gradually risen to 8.9% in October, 9.2% in November and 9.1% in December. There is no official data concerning the price rise of of construction materials, but it can be assumed to have followed general consumer prices.

For the construction site of the PUSPIPTEK complex, most of the building materials are carried from Jakarta City. Skilled laborers will also be supplied from there so the price will become rather higher than in Jakarta. Accordingly it is most important that irrational work schedules which waste manpower should not be planned. In Indonesia the subdivided separate contract is common, and waste and trouble happen to occur in the construction work because each contractor has no responsibility for work other than his scope of work within the contract. In order to lessen wastage of time and materials, the construction should be performed according to the general construction schedule. Throughout this work, Japanese technology for this integrative construction schedule control is intended to be transferred to the Indonesian subcontractors.

Rainfall in the area of Jakarta is usually concentrated within the period of November to April. Since it does not rain continuously all the day, different from Japan's rainfall during the rainy season, construction works can be continued there during the rainy season. However, it is desirable that the construction schedule be set to avoid earth work in January when average rainfall reaches 335 mm.

The determination of the construction period is dependent upon the two-storied concrete laboratory building, but at the same time the period for installation of plant equipment for the pilot plant building should be taken into account. Accordingly, it is desired that the construction work of these two buildings will commence at the same time.

As mentioned, it is necessary to reduce the weight of the buildings in consideration of the bearing capacity of the soil, therefore the first floor will be concrete slab on grade so that the load will be placed directly on the soil. This floor is designed to be on the cut soil instead of on the embankment, so as to avoid future settlement. In addition, the bearing capacity of the soil should also be confirmed by conducting a loading test before the commencement of construction.

(2) Scope of work

The scope of work for both the Japanese and Indonesian side is as follows.

No.	Item	Work for Japanese Side	Work for Indonesian Side	Remarks
1)	Cutting of portion above E.L. 96m & cut soil transportation to outside of project site		O	See Appendices 10-1, Site Survey Diagram
2)	North side boundary fencing		O	Protection against penetration from outside
3)	a) Construction of access road to project site		O	Temporary road should be completed before work-commencement
	b) Construction of roads within project site	O		
4)	Construction of planned buildings	O		Including building equipment
5)	Construction of pilot plant facilities	O		Including test operation & adjustment
6)	Analytical and laboratory equipment	O		Including installation & adjustment
7)	Construction of parking lot in project site	O		
8)	Landscaping & planting works		O	
9)	Power lead-in			
	a) Power lead-in to project site		O	
	b) Construction of switch gear room for PLN	O		
10)	Water supply to project site		O	Temporary lead-in should be completed before commencement of building work
11)	Telephone drop to administration office of laboratory building		O	- ditto -
12)	Extension of drainage system installed together with access road to project site		O	
13)	Furnishings			
	a) General furnishings (Desk, chair, table & curtain, etc.)		O	
	b) Furniture for research (Built-in table, chemical experiment table & draft chamber, etc.)	O		
14)	Custom clearance & landing of Japanese products at Jakarta port			
	a) Ocean freight between Japan and Indonesia (Including marine insurance)	O		
	b) Exemption of customs duties & customs clearance		O	
	c) Inland transportation in Indonesia between Jakarta port & project site	O		
15)	All expenses required for transfer from RDCM in Bandung to this Metallurgical Laboratory for Laterite		O	Including staff's housing allowance
16)	Application for approvals & permits such as application for building permit, required for construction works			
	a) Making up of necessary drawings & calculation sheets	O		
	b) Acquisition of approvals & permits		O	Including service charge & other fee needed for acquisition
17)	Value Added Tax on the project		O	

(3) Work supervision planning

After the cabinet decision on grant aid by the Japanese Government has been made following the completion of the basic design study, the Exchange of Notes between the Japanese government and the Indonesian government will be concluded, and the detailed design and work supervision services will be carried out in accordance with the consultant agreement which will be concluded between the Indonesian Institute of Sciences and the Consultant, a Japanese legal person.

1) Detail design

In order to determine the general conditions, special conditions and technical specifications that are required for the tender of the building construction and the equipment procurement, the Consultant will discuss matters with the Indonesian agencies concerned, and proceed with its detail design, based on the basic design that has been determined in the basic design study. In accordance with this detail design, the Consultant will prepare the documents necessary for the tender.

2) Construction management

a) Tender

The Consultant will carry out the public notice for bids, acceptance of request for tender, execution of pre-qualification, holding of meetings for bids, issuance of tender documents etc., to determine contractors. The Consultant will conduct the acceptance and examination of the tenders and assist the conclusion of the Contract between the Indonesian government and contractors.

b) Approval for working and shop drawings

The Consultant will study the work drawings for various equipment and the shop drawings for construction work submitted by the contractors,

and give the necessary instructions to the contractor to carry out work smoothly, upon approval.

c) Witness for shop test

The Consultant will witness and approve the shop testing of the building components and equipment manufactured by the contractors, whenever necessary.

d) Supervision of construction

The Consultant will, according to the content of the contract, send special supervisory engineers to the construction site, conduct necessary discussions, give instructions to the contractors, inspect quality, give approval, and then make the required reports to Indonesian side.

e) Supervision of construction schedule

The Consultant will give necessary instruction to the contractors by making an inspection of the construction schedule in order that the work will be completed within the period of time stipulated in the Exchange of Notes.

f) Inspection upon completion and trial running

After conducting an inspection upon the completion of the buildings and its supporting facilities, and test running, the Consultant will submit a report on the inspection, confirming that the quality stipulated in the specifications has been guaranteed.

The consultant will inspect installation conditions of the individual equipment, piping, and wiring of the pilot plant facilities, and conduct performance tests and operation tests, such as a combustion test and hydraulic test. The installation and adjustment of the main analytical and laboratory equipment will be done by professional specialists or engineers who will be sent from the manufacturer. The

precision inspection will also be carried out by the same specialists, with a standard sample of this equipment. The consultant will submit to the Indonesian side a report on the inspection upon completion, confirming that the performance described in the specifications satisfies its requirements.

g) Delivery and training:

Considerable skills and knowledge will not only be required for the operation and running of the buildings, pilot-plant facilities and analytical and laboratory equipment, but also for their maintenance after delivery. So the Consultant will draw up and put into practice a training schedule for technicians of the Indonesian side to become proficient and skilled in operation and running during the period of installation, adjustment, and trial running of the equipment.

(4) Equipment and machinery procurement planning

As for the material and machinery for the buildings and the building equipment, Indonesian products will be used in principle, if their quality is acceptable. The use of Japanese products will be considered only when the equipment and machinery required could not be procured in Indonesia. Only when some of the Indonesian products are presumed to cause trouble on account of performance, quality or time scheduling, will Japanese products be considered for use. Building equipment which is locally procurable is shown in the building material planning.

Most of the plant equipment will be exclusively designed and manufactured for use in the subject project. All of the plant equipment will have to be procured from Japan because the various units are to be connected in series through the whole process, and because of the necessity for integration of the standards and criteria for erection and connecting the portions.

As for the analytical and laboratory equipment, most of it will be procured in Japan. Selection of types of equipment for which maintenance and afterservice are easily available is of utmost importance. For the precision analytical instruments in particular, it is necessary to select those for which there are agents, afterservice or similar service systems available in Indonesia.

4-5 Execution Schedule

a) Consultant agreement

It is important to conclude the consultant agreement immediately after the conclusion of the Exchange of Notes, so that the construction schedule will be kept. This agreement will be sent to the Ministry of Foreign Affairs of the Japanese Government through the Japanese Embassy, and will come into effect upon the verification of the same Ministry.

b) Detailed design

The Consultant will start the detailed design work upon the conclusion of the consultant agreement. The Consultant will submit and explain all of the drawings and specifications including tender documents, to the Indonesian side, and the Indonesian side in turn will give approval of them.

c) Tender and contract

The Consultant, on behalf of the Indonesian side, will make the public notice for bids, review of the qualification documents, selection of a qualified tenderers, and issue the tender documents in Japan. The bidding will be carried out with the attendance of representatives of the Republic of Indonesia, and the Indonesian side will start contract negotiations with the lowest bidder with the assitance of the Consultant.

d) Construction contract

When the negotiation for the construction contract comes to an agreement, the Indonesian side will make and enter into the contract with the Contractor. This construction contract will be sent to the Ministry of Foreign Affairs of the Japanese Government through the Japanese Embassy, and will come into effect upon the verification of the same Ministry.

e) Building completion inspection and the inspection upon equipment completion

The Consultant will conduct the final inspections upon the completion of the building construction and upon the completion of the equipment installation, and will submit reports to the Indonesian side. Upon receipt of the reports, the Indonesian side will issue the certificates of completion, and the work will be terminated.

4-6 Maintenance Cost

Annual maintenance costs required for the planned facilities after delivery are classified by the following items and provisionally estimated with the current prices as of April 1987 as below:

Description of annual maintenance costs

(1) Additional personnel expenses
(2) Operation cost of facilites
(3) Cleaning cost and guardmen's wage
(4) Maintenance, inspection and repair costs
(5) Maintenance cost of analytical and laboratory equipment.

(1) Additional personnel expenses

According to the project plan of RDCM, the following additional personnel expenses have been appropriated for this project.

60,000,000 rupiah/year
(Budget for 1989)

(2) Operational cost of facilities

The annual operational cost of facilities is provisionally estimated on the assumption that the costs for electricity, telephone service, water supply, LPG, fuel gas and raw materials for the pilot plant will be calculated considering the operational loads. However, the electricity, telephone service and water supply are offered without charge in the National Centre for Research, Science and Technology (PUSPIPTEK). Therefore, the consumption quantity is indicated for these 3 items.

1) General building operational cost excluding pilot plant

a) LPG (Liquefied Petroleum Gas)

(1) For analysis and research	1,300,000	rupiah/year
(2) For kitchen	1,200,000	rupiah/year
Sub-total:	2,500,000	rupiah/year

b) Diesel gas oil for generator 100,000 rupiah/year

c) Materials and consumables for analysis and research

(1) Polaroid film	3,587,000	rupiah/year
(2) Iron cap	517,000	"
(3) Alminium ring	518,000	"
(4) Combustion crucible	916,000	"
(5) Combustion promoter (W.Sn)	2,200,000	"
(6) Sample cell (Pt,Al_2O_3)	2,288,000	"
(7) Sample cell (Al)	15,000	"
(8) PR gas	242,000	"
(9) Liquid nitrogen	1,030,000	"
(10) Argon gas	16,178,000	"
(11) Nitrogen gas	287,000	"
(12) Acetylene gas	484,000	"
(13) Others	238,000	"
Sub-total:	28,500,000	rupiah/year

Total of a) through c) = 31,100,000 rupiah/year

d) Electric power consumption

Electric lamp and receptacle outlets	151,140	kwh/year
Analytical and laboratory equipment	197,180	"
Equipment for air conditioning and ventilation	187,680	"
Sub-total:	536,000	kwh/year

e) Water consumption 1,960 m^3/year

f) Telephone service (6,000,000 rupiah/year)

2) Operational cost for pilot plant building

The pilot plant is a combination of various processes. Mainly pyrometallurgy down to reduction furnace will be intensively operated at the earlier stage, while hydrometallurgy after ammonia leaching will be partially performed by discontinuous operation. The Japanese expert dispatched under the Project Type Technical Cooperation and engineers of RDCM will decide the operation schedule through discussion.

Therefore, in this item, running costs are provisionally estimated supposing the peak situation, that is, on the assumption that all the processes connected with each other are operated at the same time. Criteria for calculation is as follows:

- Annual operational days: 180 days/year
- Nickel grade of ores: 1.8 %
- Ore to be treated: Pyrometallurgical process
  3 dry ore tons/day
  Hydrometallurgical process
  1 dry ore tons/day

a) Fuel oil (kerosene or A heavy oil)

Annual consumption		Unit price		
91,800 ℓ/year	x	100 rupiah/ℓ	=	9,180,000 rupiah/year

b) Raw materials and chemicals

Item name	Annual consumption	Unit price	Price
(1) Ore	540 t	(to be offered free of charge by P.T. Aneka Tambang)	
(2) Brown coal	81 t	42,000 RP/t	3,402,000 RP/year
(3) Aqueous ammonia	19,300 ℓ	420 RP/ℓ	8,106,000 "
(4) Solvent	100 ℓ	25,000 "	2,500,000 "
Diluent	100 ℓ	2,500 "	250,000 "
(5) Hydrochloric acid(35%)	4,360 kg	200 RP/kg	872,000 "
(6) Sodium carbonate	900 kg	950 "	855,000 "
(7) Phosphoric acid	120 kg	2,500 "	300,000 "
(8) Pyrite	10.3 t	30,000 RP/t	309,000 "
(9) Cathode (nickel)	270 kg	12,000 RP/kg	3,240,000 "
Cathode (cobalt)	7 kg	31,000 "	217,000 "
(10) Carbon dioxide gas	3,600 kg	1,500 "	5,400,000 "
(11) Other chemicals	-	-	531,000 "
		Sub-total:	25,982,000 RP/year

Total of a) and b) = 35,162,000 Rupiah/year

c) Electric power consumption 734,000 kwh/year

d) Water consumption 12,000 m^3/year

(3) Cleaning cost and guardmen's wage

a)	Cleaning cost	3 persons	1,800,000 rupiah/year
b)	Guardmen's wage	4 persons	2,880,000 " "
		Total of 3) =	4,680,000 rupiah/year

(4) Maintenance, inspection and repair costs

a) Buildings

The building's repair costs will vary greatly year by year and usually gradually increase, but assuming that the life of the building is 30 years, the average repair costs can be estimated to be 3,700 rupiah/m^2 per year. Therefore, annual repair costs will be as follows;

3,700 rupiah x 3,000 m^2 = 11,100,000 rupiah/year

However, the repair costs will be from 1/20 to 1/10 of this amount for the first five years after completion.

b) Building equipment

The repair costs for the building equipment will be the same as those for the buildings during the first three to five years, since there will be little replacement of parts, but after that, parts replacement, overhaul and replacement of the machinery itself will become necessary in due course.

The average amount will be estimated annually as 9,000 rupiah/m^2. Therefore, the annual repair costs will be as follows;

9,000 rupiah x 3,000 m^2 = 27,000,000 rupiah/year

However, for the period within five years after completion, the cost will be considered to be from 1/10 to 1/5 of the above.

c) Pilot plant facilities

The spare parts necessary during operating hours for the pilot plant facilities will be provided together with the equipment itself. Additionally, unlike the commercial plant, its operating hours are few. Therefore the cost of maintenance for the facilities is to be estimated for outside orders for repair.

Repair costs for breakdown:

450,000 rupiah/time x 5 times/year = 2,250,000 rupiah/year

d) Analysis and research instruments:

For the precision analytical instruments included in this project, maintenance and inspection should be regularly carried out by the specialists dispatched from the manufacturers.

When selecting these instruments, it is important to choose the products of manufacturers which have agencies with specialists located in Indonesia or adjacent countries such as Singapore. However, since this is uncertain, the costs were calculated supposing the case where specialists will be dispatched from Japan and estimated as follows;

21,000,000 rupiah/year

(5) As a result, the annual maintenance cost except for water supply, electricity and telephone service is as follows:

(1) Before starting pilot plant operation	157,130,000 rupiah/year
(2) After starting pilot plant operation	192,292,000 rupiah/year

Since the repair cost of the building can be regarded as 1/10 and the repair cost of the building equipment as 1/5 during 3 or 5 years after the completion of the work as aforementioned, the annual

maintenance cost excluding water supply, electricity and telephone is as follows:

(3) Before starting pilot plant operation 125,540,000 rupiah/year
(4) After starting pilot plant operation 160,702,000 rupiah/year

4-7 Approximate Project Cost

The approximate project cost required for the implementation of this Project is estimated as follows:

Project cost to be borne by the Indonesian Government

The amount of the project cost to be borne by the Indonesian Government is estimated to be approximately 360 million rupiah.

The detail is as follows:

(1) Preparation of infrastractures; incoming electricity, telephone and water supply, construction of access road and main drainage ditch.
91 million rupiah

(2) Value Added Tax for the local portion of the Project cost:
269 million rupiah

Total:360 million rupiah

CHAPTER 5 EVALUATION OF THE PROJECT

This project is a technical development project to effectively utilize the abundant nickel resources which occur in Indonesia.
In evaluating the appropriateness of the project, the technical and economical effect which implementation of the project will create, is comprehensively taken into consideration.

Of the neighboring ASEAN countries, Indonesia has the most abundant mineral resources and has lately oriented herself in the conduct of state affairs toward the exploitation of non-oil mineral resources. Therefore, the development of nickel resources, a key mineral, is indispensable in supporting the economic base of Indonesia. However, effective processing technologies have not yet been established in Indonesia relative to low-grade nickel laterite, that is the major part of nickel resources in the country. Moreover, research and development facilities are considered to be inadequate.

In these circumstances, construction of a new metallurgical laboratory, centered on the development of nickel laterite, will not only equip the country with necessary tools, but will also contribute to the establishment of the processing technology of nickel laterite when the research advances, in combination with the project type technical co-operation programme plan, concurrently underway, and will substantially grade up and enhance the capability of metallurgical potentials in this country, thus expanding Indonesia's possibility in the future.

The following results may be achieved with the implementation of this project.

1) By further developing the basic nickel research which has been conducted by the Research and Development Centre for Metallurgy (RDCM) over the past 5 years, and by conducting tests with the pilot plant after its construction, research and development of this technology will be considerably advanced.

2) An early establishment of an economical method for the efficient recovery of nickel and cobalt from low-grade nickel laterite ore will be a pioneering achievement in laterite research.

3) Completion of the facilities of RDCM, which is the main organization for metallurgical research in Indonesia, will lead to an overall improvement and expansion of the level of metallurgical research.

4) It is anticipated that capable researchers will be fostered through tests and research with the pilot plant, and that this will lead extensively to the development of metallurgical research activities.

Furthermore, the following effects in Indonesia's resource development and national economy are expected, if the results of the research and development of this technology leads to future industrialization.

1) Indonesia's resources will be expanded by extracting metal economically from low-grade nickel laterite ore (nickel grade less than 2.0%), which at present has little economic value.

2) It is anticipated that this will enable Indonesia to get rid of exporting ore and importing metallic nickel, and will contribute to economic independence by means of acquisition of foreign currencies.

3) It is anticipated that it will contribute to the prosperity of the local district, through the construction and operation of plants in mining areas.

The Extraction Metallurgy Division of RDCM will be devoting all its efforts to the implementation and operation of this research project. Governmental organizations have expressed strong support in securing the necessary personnel, solving any operating problems, and budgeting for the construction of the research facilities.

As described, it is strongly anticipated that the successful implementation of this project will undoubtedly contribute to the effective utilization of mineral resources, and also to the enhancement of metallurgical technology in Indonesia. And this is of great significance to the country.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6-1 Conclusion

Evaluation of the project shown in the preceeding chapter could only have been done through investigation and analysis of the content of the request by the Indonesian government regarding the establishment of the Metallurgical Laboratory for Laterite, and of various matters related to the implementation of the project. In line with the request from the Government of the Republic of Indonesia, the basic design shown in Chapter 4 is adequate for experimental research of the pilot plant after the completion of the study in laboratory scale. The development of the unique leaching method for low grade nickel laterite, and the accomplishment of industrialization by implementing this project, will not only contribute to the development of the Indonesian economy, but will also serve the promotion of employment. As this type of industrialized plant will have to be constructed in local areas close to the mines, it will help solving the problem of the difference in living standards between cities and provinces which is one of the major issues in Indonesian society. It will also contribute to the local development policy advocated by the Indonesian government. From this point of view, the implementation of this project by means of grant aid from the Japanese Government is judged to be appropriate.

6-2 Recommendations

We hereby recommend taking the necessary measures regarding the undermentioned matters for smoothly promoting this project and bringing about effective results.

(1) This project is based on the fruitful result of the technical cooperation by individually assigned experts, whom the Japan International Cooperation Agency had dispatched to Indonesia, beginning in 1982. The government of the Republic of Indonesia has requested the grant aid together with the project type technical cooperation. Besides the construction of the facilites and the installation of the equipment by the grant aid, the implementation of the project type technical cooperation is considered to be most essential for the greater achievement of success on this project.

(2) The Research and Development Centre for Metallurgy (RDCM) which is the nucleus of the execution of this project, is now located in Bandung. The planned Metallurgical Laboratory for Laterite is proposed to be constructed within the site of the National Centre for Research, Science and Technology (PUSPIPTEK), which is on the outskirts of Jakarta City. Therefore, all the necessary budgetary measures including preparations for ensuring staff housing, should be taken by the Indonesian government, so that the Extraction Metallurgy Division of RDCM which is responsible for this project, can smoothly transfer at the completion of construction of these facilities.

(3) Different from common laboratories, this project will include the plant. Therefore, it requires not only laterite ore and other materials for its operation, but also a great amount of energy consumption can be anticipated. Accordingly the necessary budgetary measures for the smooth operation of the facilities should be taken by the government of the Republic of Indonesia.

(4) This project includes not only building equipment and pilot plant facilities, but also various types of highly-advanced and sophisticated analytical and laboratory equipment. It is advisable that engineers and technicians would be promptly arranged to operate these facilities and equipment normally.

(5) The pilot plant that will be included in this project is not a so-called "pollution generating type", except for dust originating from the ore and a small amount of chemical waste liquid. Therefore, the elimination and treatment of these pollution factors will have to be considered in the planning of the facilities. Also the treatment facilities for this environmental pollution control will have to be monitored for normal functioning and be maintained for the normal operation after the completion of the work.

APPENDICES

1. Minutes of Discussions (Basic Design Study)
2. Minutes of Discussions (Draft Final Report of the Basic Design Study)
3. Member List of Study Team (Basic Design Study)
4. Member List of Study Team (Draft Final Report of the Basic Design Study)
5. Itinerary
6. Minutes of Meeting (Long Term Survey of Project Type Technical Cooperation)
7. List of Persons Interviewed
8. Conditions of Project Site
9. Collected Data
10. Others

1. Minutes of Discussions (Basic Design Study)

MINUTES OF DISCUSSIONS
ON
THE PROJECT FOR ESTABLISHING
THE METALLURGICAL LABORATORY FOR LATERITE
IN
THE REPUBLIC OF INDONESIA

In response to the request of the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on the Project for establishing the Metallurgical Laboratory for Laterite (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to the Republic of Indonesia the study team headed by Dr. Kenji Tomita, Special Technical Advisor, JICA, from February 16 to March 7, 1987.

The team had a series of discussions on the Project with the officials concerned of the Government of the Republic of Indonesia and conducted a field survey.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Jakarta, February 25, 1987

富田堅二

Dr. KENJI TOMITA
Leader, Basic Design Study Team,
Japan International Cooperation Agency

Prof.Dr. D.A. TISNA AMIDJAJA
Chairman,
Indonesian Institute of Sciences

ATTACHMENT

1. The objective of the Project is to provide necessary buildings, facilities and equipment for the establishment of the Metallurgical Laboratory for Laterite (hereinafter referred to as "MLL") in order to promote the research and development for the utilization of Indonesian low grade nickel laterite.

2. Main activities of MLL are as follows :
   (1) Mineralogical Study
   (2) Chemical and Instrumental Analysis
   (3) Mineral Dressing
   (4) Pyro Metallurgy
   (5) Hydro Metallurgy
   (6) Process Development

3. Staffing plan for MLL is shown in ANNEX I.

4. The executing agency for the implementation of the Project in Indonesia is the Research and Development Centre for Metallurgy (RDCM), Indonesian Institute of Sciences (LIPI).

5. The proposed site of the Project is located in the allocated RDCM area at the PUSPIPTEK in Serpong and is shown in ANNEX II.

6. The team will convey to the Government of Japan the desire of the Government of the Republic of Indonesia that the Government of Japan takes necessary measures to cooperate in providing the items listed in ANNEX III within the scope of Japan's Grant Aid Program.

7. The Government of Indonesia has understood the Japan's Grant Aid system explained by the team, including a principle that a Japanese consultant firm and a Japanese general contractor should be used for the implementation of the Project.

8. The Government of Indonesia will take necessary measures as listed in ANNEX IV on condition that Grant Aid by the Government of Japan is extended to the Project.

9. The Government of Indonesia confirmed that PUSPIPTEK would clear and level the proposed project site and provide facilities for distribution of electricity, telephone, water supply, drainage and other incidental facilities.

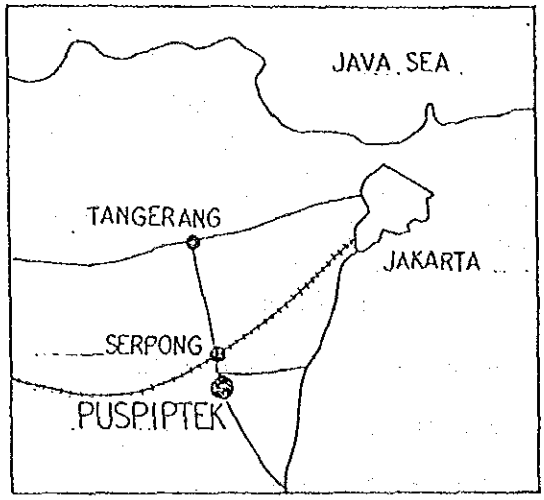
10. The Government of Indonesia confirmed that the expenses for removal of the necessary personnel and equipment to MLL as well as the necessary operational cost of MLL shall be prepared properly.

11. The Government of Indonesia will inform the JICA Indonesian Office of the budget allocation for the Project timely, which is scheduled by mid of May 1987.

ANNEX I

Staffing plan for MLL is as follows :

Position	Number
Head of MLL	1 (university graduate)
Head of Mineral Dressing Laboratory	1 (do)
Head of Pyro Metallurgy Laboratory	1 (do)
Head of Hydro Metallurgy Laboratory	1 (do)
Head of Electro Metallurgy Laboratory	1 (do)
Head of Process Development	1 (do)
Researchers	11 (university graduates)
	6 (college graduates)
Technicians	17 (high school graduates)
Administration and supporting staff	8 persons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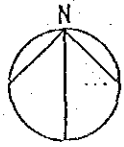
TANGERANG
JAKARTA
SERPONG
PUSPIPTEK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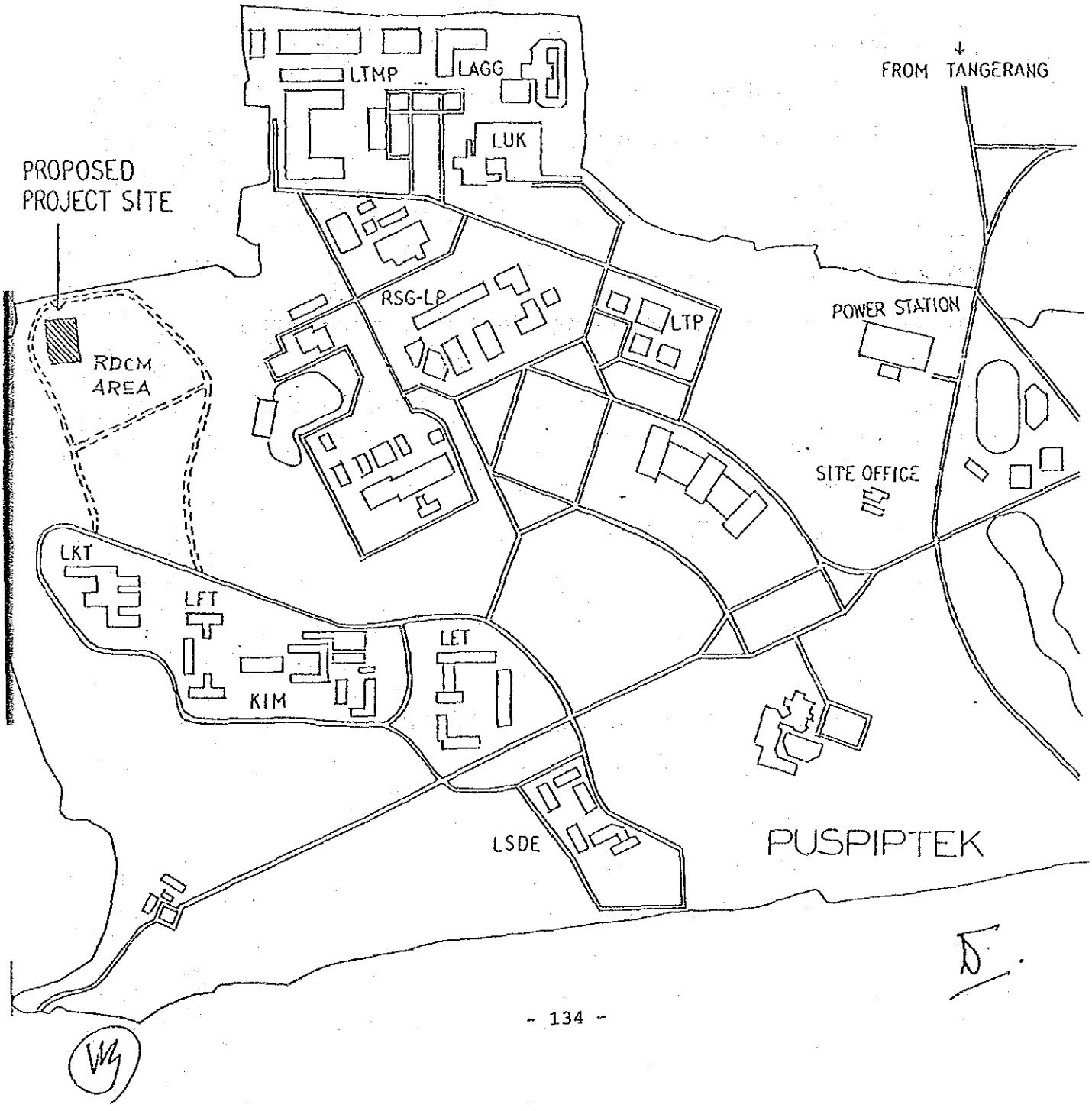

LTMP
LAGG
LUK
FROM TANGERANG
PROPOSED
PROJECT SITE
RSG-LP
LTP
POWER STATION
RDCM
AREA
SITE OFFICE
LKT
LFT
LET
KIM
LSDE
PUSPIPTEK

1. Building

   (1) Laboratory Building

      a. Mineralogical Study room

      b. Sample Preparation room

      c. Mineral Dressing room

      d. Pyro Metallurgy room

      e. Hydro Metallurgy room

      f. Chemical Analysis room

      g. Instrumental Analysis room

      h. Others

   (2) Pilot Plant Building

   (3) Ore Storage Building

   (4) Others (Work Shop, Dangerous Material Storage House, etc.)

2. Equipment

   (1) Equipment for the Pilot Plant

      a. Equipment for the Ore Preparation

      b. Equipment for the Reduction Furnace

      c. Equipment for Ammonia Leaching

      d. Equipment for Basic Nickel Carbonate Recovery

      e. Equipment for the Solvent Extraction

      f. Equipment for Electrowinning for Ni and Co

      g. Environmental Control Equipment

      h. Electrical and Instrumental Equipment

      i. Miscellaneous Equipment

      j. Workshop Equipment

(2) Analytical Equipment

(3) Laboratory Equipment

(4) Others (vehicle, etc.)

ANNEX IV

Following arrangements are required to be taken by the Government of the Republic of Indonesia.

1. To secure a lot of land necessary for the construction of facilities and to clear, fill and level the site as needed before the start of the construction.

2. To provide necessary data and information for the Project.

3. To construct an access road to the proposed project site; to provide facilities for distribution of electricity, telephone, water supply, drainage and other incidental facilities to the site; and to provide temporarily the above road and facilities before the start of the construction.

4. To undertake incidental civil works such as gardening and fencing, if needed.

5. To provide general furniture and materials for daily activities.

6. To bear the following commissions to a Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

   Advising commission of Authorization to Pay

   Payment commission

7. To ensure prompt unloading, tax exemption, customs clearance of the products and related equipment under the Grant Aid at the port of disembarkation in Indonesia.

8. To exempt Japanese nationals engaged in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Indonesia with respect to the supply of the products and the services under the verified contracts.

9. To bear all expenses, including V.A.T. (Value Added Tax), other than those to be borne by the Grant Aid Program, necessary for construction of the facilities as well as for transportation and installation of the equipment.

10. To prepare necessary space out of the Project site for the wastes from the Pilot Plant.

11. To maintain and use properly and effectively the facilities constructed and the equipment provided under the Japan's Grant Aid Program.

2. Minutes of Discussions (Draft Final Report)

MINUTES OF DISCUSSIONS ON THE PROJECT FOR ESTABLISHING THE METALLURGICAL LABORATORY FOR LATERITE IN THE REPUBLIC OF INDONESIA

In response to the request of the Government of the Republic of Indonesia for Grant Assistance for the Project for Establishing the Metallurgical Laboratory for Laterite (hereinafter referred to as "the Project"), the Government of Japan decided to conduct a basic design study on the Project and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Republic of Indonesia the team headed by DR. Kenji Tomita, Special Technical Advisor, JICA, from February 16 to March 7, 1987.

As a result of the study, JICA prepared a draft report and dispatched a mission to explain and discuss it from June 11 to June 18, 1987.

Both parties had a series of discussions on the Report and agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Jakarta, June 16, 1987

富田堅二

DR. KENJI TOMITA

Leader, Draft Report Mission
of Basic Design Study
Japan International Cooperation
Agency.

IR. SUKARNA DJAJA

Head, Research and Development Centre for Metallurgy
On behalf of
Prof.DR. D.A. TISNA AMIDJAJA
Chairman, Indonesian Institute of Sciences.

ATTACHMENT

Major Points of Understanding :

1. The Indonesian side principally agreed to the basic design proposed in the Draft Report.
2. The Final Reports (10 copies in English) on the Project will be submitted to the Indonesian side by the beginning of September, 1987.
3. The Indonesian side understood the system of Japan's Grant Aid Program and confirmed the measures to be taken by the Indonesian side towards the realization of the Project as agreed on in the Minutes of Discussions dated February 25, 1987.
4. The Indonesian side confirmed that necessary staff would be allocated according to the ATTACHMENT 3 in the above Minutes of Discussions and necessary maintenance and operation cost would be prepared when the new Laboratory is established in Serpong.

3. Member List of Basic Design Study Team (Basic Design Study)

Kenji Tomita	(Leader, General)	Special Technical Advisor, Japan International Cooperation Agency
Takanori Kamei	(Extractive Metallurgy Planning)	Head of Development Team, Mining Division, Director-General's Secretariat, Agency of Natural Resources & Energy, M.I.T.I.
Ryota Ono	(Coordinator)	2nd Basic Design Study Division, Grant Aid Planning & Survey Dept., JICA
Shoji Yamamoto	(Architectural Planning)	Nihon Architects, Engineers and Consultants, Inc.
Gaku Yanagi	(Architectural Design)	Nihon Architects, Engineers and Consultants, Inc.
Motohiro Okada	(Architectural Equipment)	Nihon Architects, Engineers and Consultants, Inc.
Ichiro Doi	(Plant Planning)	Sumitomo Metal Mining Co., Ltd.
Katsutoshi Ina	(Plant Design)	Sumitomo Metal Mining Co., Ltd.
Iwao Nagai	(Laboratory Equipment)	Sumitomo Metal Mining Co., Ltd.

4. Member List of Basic Design Study Team (Draft Final Report)

Kenji Tomita	(Leader, General)	Special Technical Advisor, Japan International Cooperation Agency
Ryota Ono	(Coordinator)	2nd Basic Design Study Division, Grant Aid Planning & Survey Dept. JICA
Shoji Yamamoto	(Architectural Planning)	Nihon Architects, Engineers and Consultants, Inc.
Gaku Yanagi	(Architectural Design)	Nihon Architects, Engineers and Consultants, Inc.
Ichiro Doi	(Plant Planning)	Sumitomo Metal Mining Co., Ltd.
Iwao Nagai	(Laboratory Equipment)	Sumitomo Metal Mining Co., Ltd.

5. ITINERARY

(1) Basic Design Study Team

Feb. 16 (Mon.)	Lv. Narita Ar. Jakarta
Feb. 17 (Tue.)	Meeting at JICA Indonesian Office Meeting at Embassy of Japan Courtesy Call on BAPPENAS Courtesy Call on PUSPIPTEK Jakarta Office Courtesy Call on Ambassador Muto, Embassy of Japan Investigation of construction and transportation conditions in Jakarta City
Feb. 18 (Wed.)	1st meeting with LIPI Site investigation at PUSPIPTEK, Serpong
Feb. 19 (Thu.)	Moving from Jakarta to Bandung
Feb. 20 (Fri.)	1st meeting with RDCM Investigation of actual conditions of RDCM
Feb. 21 (Sat.)	2nd meeting with RDCM Visit to ITB (Bandung Institute of Technology)
Feb. 22 (Sun.)	Internal group meeting
Feb. 23 (Mon.)	3rd meeting with RDCM Moving from Bandung to Jakarta (Tomita, Kamei, Ono, Nitta, Yamamoto, Ina and Arakawa)
Feb. 24 (Tue.)	Interim report to JICA Indonesian Office (Secretary Fukushima, Embassy of Japan assisted) Visit to P.T. ANEKA TAMBANG(National Metal Mining Corp.) 2nd meeting with LIPI 4th meeting with RDCM, the team stayed in Bandung (Okada, Yanagi, Doi, Nagai),
Feb.25 (Wed.)	Visit to SEKKAB 3rd meeting with LIPI Signed on Minutes of Discussion Visit to BPPT Report to JICA Indonesian Office 5th meeting with RDCM, team stayed in Bandung, Technical Cooperation Team (Nitta and Arakawa), Lv. Jakarta
Feb. 26 (Thu.)	Report to JICA Indonesian Office 6th meeting with RDCM, team stayed in Bandung. Yamamoto and Ina, moving from Jakarta to Bandung

Feb. 27 (Fri.)	Tomita, Kamei and Ono, Lv. Jakarta All the members of Consultant, 7th meeting with RDCM at Bandung
Feb. 28 (Sat.)	8th meeting with RDCM Visit to the Quarternary Geology Laboratory
Mar. 1 (Sun.)	Filing Draft of Memorandum of Discussions
Mar. 2 (Mon.)	9th meeting with RDCM, determination of Memorandum of Discussions after discussion
Mar. 3 (Tue.)	Memorandum of Discussions signed at RDCM All members, moving from Bandung to Jakarta
Mar. 4 (Wed.)	Reinvestigation of the project site in PUSPIPTEK complex Meeting with PUSPIPTEK at Site Office (persons concerned of RDCM assisted) General investigation of the existing facility in the PUSPIPTEK complex
Mar. 5 (Thu.)	Investigation on construction conditions at PUSPIPTEK Jakarta Office Ordering of soil investigation by boring Data investigation such as statistical data Investigation on mining conditions at P.T. ANEKA TAMBANG Investigation on mining conditions at P.T. INCO
Mar. 6 (Fri.)	Final report to the JICA Indonesian Office Collection of data concerned at the branches of the Bank of Tokyo and the Tokai Bank Filing
Mar. 7 (Sat.)	Lv. Jakarta (Yamamoto, Okada, Bando, Doi, Ina and Nagai)

(2) Study Team for the Draft Final Report

Jun. 11 (Thu.)	Lv. Narita Arr. Jakarta (Yamamoto, Yanagi, Doi and Nagai)
Jun. 12 (Fri.)	Meeting at JICA Indonesian Office 1st meeting with LIPI
Jun. 13 (Sat.)	2nd meeting with LIPI
Jun. 14 (Sun.)	Lv. Narita Arr. Jakarta (Tomita and Ono) Internal group meeting
Jun. 15 (Mon.)	Meeting at JICA Indonesian Office 3rd meeting with LIPI
Jun. 16 (Tue.)	4th meeting with LIPI
Jun. 17 (Wed.)	5th meeting with LIPI Signed the Minutes of Discussions Report to JICA Indonesian Office Report to Embassy of Japan
Jun. 18 (Thu.)	Lv. Jakarta Arr. Narita

6. Minutes of Meeting (Long Term Survey of Project Type Technical Cooperation)

MINUTES OF MEETING

ON

TECHNICAL COOPERATION FOR THE PROJECT

ON RESEARCH AND DEVELOPMENT OF LOW GRADE NICKEL LATERITE

IN THE REPUBLIC OF INDONESIA

The Japanese Survey Team for the Project-Type Technical Cooperation (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") visited Indonesia from February 16 to February 25, 1987, together with the Basic Design Study Team for the Grant Aid Project headed by Dr. Kenji Tomita, Special Technical Advisor of JICA, for the purpose of discussing on the implementation planning of the Project on Research and Development of Indonesian Low Grade Nickel Laterite (hereinafter referred to as "the Project") with Indonesian side.

During its stay in Indonesia, the Team had a series of discussions with the officials of the Research and Development Centre for Metallurgy (hereinafter referred to as "RDCM") and also made a field survey to the relevant sites and facilities.

With the support of the Basic Design Study Team, both sides, the Team and RDCM, came to the understanding concerning the matters referred to in the document attached herewith.

Bandung, February 23, 1987

富田堅二

Dr. KENJI TOMITA
Special Technical Advisor,
Japan International
Cooperation Agency

Sukarna Djaja

Ir. SUKARNA DJAJA
Head,
Research and Development Centre
for Metallurgy
Indonesian Institute of Sciences

ATTACHED DOCUMENT

A. PROJECT IMPLEMENTATION AGENCY

Research and Development Centre for Metallurgy, Indonesian Institute of Sciences.

B. TENTATIVE SCHEDULE OF IMPLEMENTATION OF THE PROJECT

1. The Team suggested and explained the Tentative Schedule of Implementation of the Project.
(hereinafter referred to as "TSI") as shown in Annex 1.

2. On the TSI, RDCM requested that the Japanese experts shall be dispatched to Bandung, as soon as possible after the signing of the Record of Discussions (hereinafter referred to as "RD"), because many preparation studies should be done in Bandung laboratory mainly in the fields of hydro-metallurgy and analysis.

3. As to the acceptance of Indonesian counterpart personnel in Japan,
   1) RDCM requested the acceptance ofIndonesian trainees in Japan and the Team explained that JICA would accept about three trainees every year during the term of the Project and this acceptance of trainees would be commenced after signing of RD.

   2) RDCM proposed that training in Japan should be implemented as

much as possible prior to completion of the new laboratory for Laterite in Serpong.

3) RDCM's proposal on the training of counterpart personnel in Japan is as shown in Annex 2.

4. Duration of the Project.

The Team explained that the duration of technical cooperation is four (4) years as shown in Annex 1.

RDCM proposed the duration of four and half (4.5) years instead of 4 years.

The reasons of this extension of the duration are as follows :

1) RDCM requested that the start of dispatch of Japanese experts shall be commenced immediately after the signing of RD. This will result in 3 months earlier start than TSI.

2) RDCM proposed that it will take 9 months for the working of "Basic study prior to pilot plant test" instead of 6 months as shown in Annex 1 due to interruption of the study by removing of Indonesian staff from Bandung to Serpong.

This will effect on start of working of B.1.2 and B.2 as shown in Annex 1 resulting in 3 months extension of the duration of TSI.

5. The Team explained that the TSI would depend on the time schedule of Japan's Grant Aid Project and RDCM understood it.

C. ALLOCATION OF MAN-POWER AND OPERATIONAL COST BY THE INDONESIAN SIDE

1. RDCM explained that they would make efforts to allocate necessary man-power and showed the management system of the implementation of the Project as in Annex 3.

   In addition, they also explained that the absence of "Project Coordinator" in new laboratory would never affect the on-scheduled implementation of the Project after completion of the new laboratory.

2. RDCM showed the estimated operational cost requirement as in Annex 4.

   And they explained that raw ore would be provided by PT. Aneka Tambang.

Annex 1

TENTATIVE SCHEDULE OF IMPLEMENTATION OF THE PROJECT

1. General

The implementation programme of the technical cooperation is planned according to the below listed items.

A. The technical cooperation prior to completion of the new Laboratory in Serpong.

B. The technical cooperation after completion of the new Laboratory in Serpong.

B.1. The technical cooperation at the laboratory building.

b.2. The technical cooperation at the pilot plant.

The working of above A will be done in Bandung and/or Serpong. The working B will be done in Serpong.

2. Research and development working programme

A. The technical cooperation prior to completion of the new Laboratory in Serpong.

A.1. Review of past 5 year basic study

Working place : Bandung
Term : three months (from 7th month after E/N)

A.2. Preparative test using facilities of Bandung laboratory

1) Detail study of material ore
2) Basic study of reduction
3) Basic study of ammonia leaching
4) Basic study of solvent extraction and electrowinning

Working place : Bandung
Term : six months (from 10 th month after E/N)

A.3. Planning of working programme for study at the new Laboratory in Serpong.

1) Preparation of standards of operation for analysis, laboratory facilities and pilot plant.

2) Preparation of standards of operation control.

3) Preparation of tests and study planning of pilot plant.

Working place : Bandung or Serpong
Term : three months (from 16th month after E/N)

For the above technical cooperation, Japanese long-term experts will be dispatched as follows :

Chief advisor	one (1)
Pyro-Metallurgist	one (1)
Hydro-Metallurgist	one (1)
Analyst	one (1)

B. The technical cooperation after completion of new Laboratory in Serpong.

B.1. Laboratory building

B.1.1. Basic study prior to pilot plant test.

These study shall cover those test items which are not available with test facilities of Bandung laboratory. Test items are the same to those of A.2 1) -4).

Working place : Serpong
Term : six months (from 19th month after E/N)

B.1.2. Analysis working and back-up basic study during pilot plant test.

Working place : Serpong
Term : twenty four months (from 25th month after E/N)

For the above technical cooperation Japanese long-term experts will be dispatched as follows :

Chief advisor	one (1)
Pyro-Metallurgist	one (1)
Hydro-Metallurgist	one (1)
Analyst	one (1)

B.2. Pilot plant operation

B.2.1. No load test for pilot plant facilities

B.2.2. Training of operation manual of pilot plant

B.2.3. Preparation working of raw material, reagent and others for pilot plant tests.

B.2.4. Pilot plant test

B.2.5. Arrangement and analysis of pilot plant test data

B.2.6. Arrangement of engineering data

B.2.7. Reporting

1) Report drafting
2) Preparation of final report

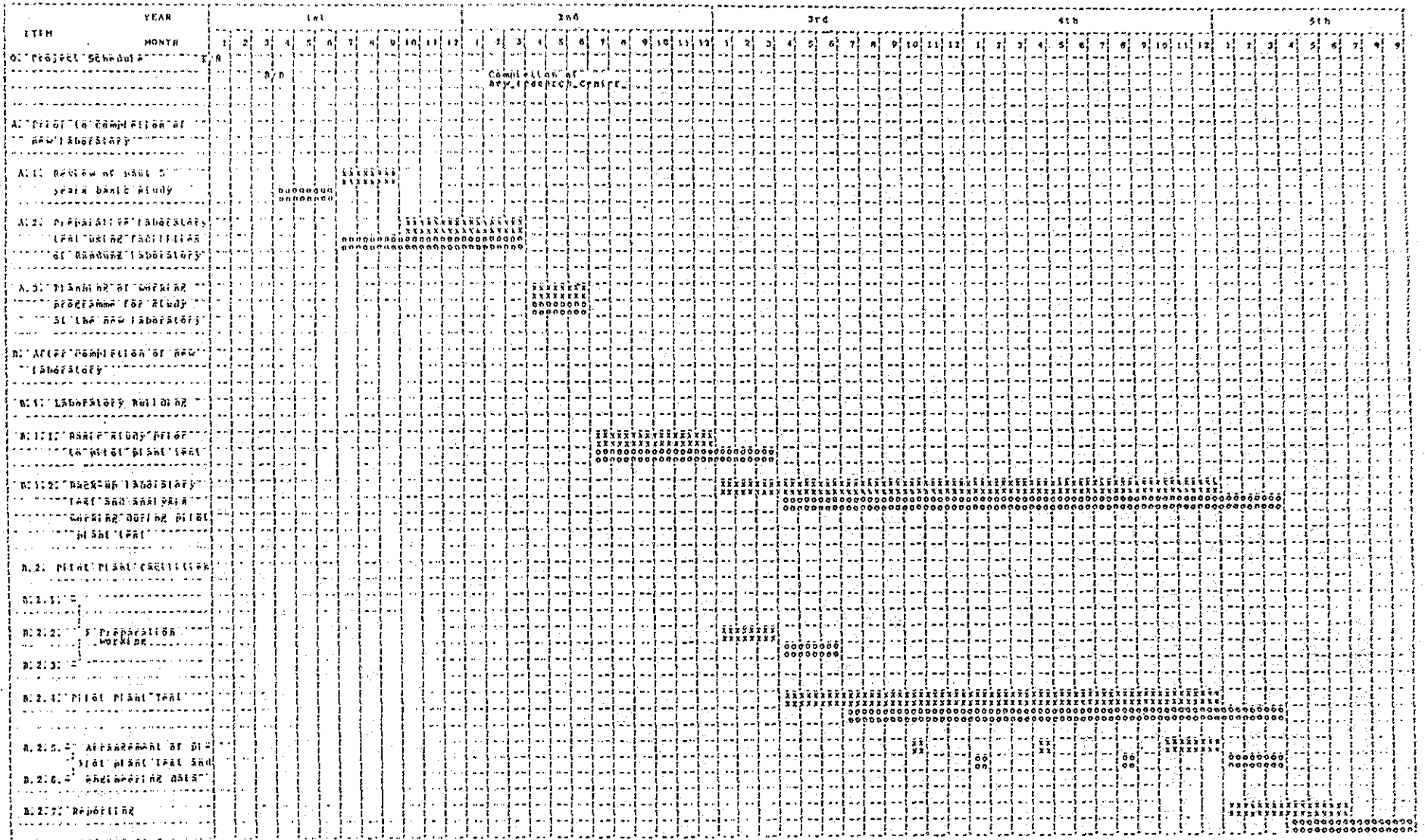
Working place : Serpong
Term : thirty months from 25th month after E/N

For the above technical cooperation, Japanese long-term experts will be dispatched as follows :

Chief Advisor	one (1)
Pyro-Metallurgist	one (1)
Hydro-Metallurgist	one (1)
Plant Engineer	one (1)
Analyst	one (1)

Except the Plant Engineer the four experts will be the same experts as B.1.

Note : In addition to the above Japanese long-term experts, two or three short term experts will be also dispatched each year for the purpose of assistance of technical cooperation, if necessary.


YEAR
ITEM
MONTH
1st
2nd
3rd
4th
5th
0. Project Schedule
A
B/D
Completion of new research centre
A.1. Review of past 5 years basic study
A.2. Preparative laboratory trial using facilities of Kaduna laboratory
A.3. Planning of working programme for study at the new laboratory
B. After completion of new laboratory
B.1. Laboratory Building
B.1.1. Basic study prior to pilot plant test
B.1.2. Back-up laboratory test and analysis during pilot plant trial
B.2. Pilot Plant Facilities
B.2.1.
B.2.2. Preparation works
B.2.3.
B.2.4. Pilot plant test
B.2.5. Arrangement of pilot plant test and
B.2.6. engineering data
B.2.7. Reporting
REMARKS : xxxxxxxxxx Proposal of the Team
oooooooooo Proposal of RDCM

Annex 2

TRAINING OF INDONESIAN COUNTERPART PERSONNEL IN JAPAN

FIELD	NUMBER	TERM	TIME
1. Ist Group			
1.1. Head of EMD*	1	2 months	from 2nd month
1.2. Instrumental Analysis	2	6 months	after R/D
2. IInd Group			
2.1. Instrumental Analysis	2	6 months	from 9th month after R/D
2.2. Metallurgy	1	6 months	
3. IIIrd Group			
3.1. Metallurgy	3	6 months	from 16th month after R/D
4. IVth Group			
4.1. Metallurgy	3	6 months	from 37th month after R/D

* EMD : Extraction Metallurgy Division of RDCM

Annex 3

THE MANAGEMENT SYSTEM OF THE IMPLEMENTATION OF THE PROJECT

(ALLOCATION OF INDONESIAN COUNTERPART PERSONNEL)

Project Coordinator	: Head of RDCM
Project Leader	: Head of Extraction Metallurgy Division
Coordinator for Laboratories Test	: 1 person
Coordinator for Pilot Plant Test	: 1 person
Researchers	: 13 - 20 persons
Technicians	: 15 - 25 persons
Administration and Supporting Staffs	: 5 - 8 persons

* After completion of the new Laboratory , all of the above personnel will move to Serpong except the Project Coordinator who will stay in the head office of RDCM in Bandung.

Annex 4

ESTIMATED OPERATIONAL COST REQUIREMENT

(in thousands Rp)

	Preparation		Operation			Evaluation
Fiscal year / Items	87/88	88/89	89/90	90/91	91/92	92/93
Additional Salary	19,500	30,000	60,000	60,000	40,000	20,000
Material	14,000	40,000	75,000	75,000	40,000	30,000
Travel	1,500	20,000	30,000	30,000	30,000	20,000
Utilities	-	20,000	75,000	75,000	45,000	25,000
Others	500	10,000	30,000	30,000	15,000	5,000
T O T A L	35,500	120,000	270,000	270,000	170,000	100,000

1) Additional Salary includes expenditure for removing work from Bandung.

2) "Others" includes the Maintenance Cost of Facilities.

7. List of Persons Interviewed

(1) Indonesian Institute of Science (LIPI)

Prof. Dr. D.A. Tisna Amidjaja, Chairman

Prof. Dr. Didin S. Sastrapradja, Vice Chairman

Ir. S. Kayatmo, Deputy Chairman for Technical Sciences

Miss Moertini Atmowidjojo, Head of International Relations Bureau

Mr. Hassan Bisri

Mr. Muljono

Mr. Soehartono Soedargo

(2) Research and Development Center for Metallurgy (RDCM)

Ir. Sukarna Djaja, Head

Ir. Redjadi Kodijat, Secretary

Ir. Yusuf, Head of Extractive Metallurgy Division

Ir. Kamarijanto, Head of Ore Concentration Laboratory

Ir. Djusman Sajuti, Head of Pyro Metallurgy Laboratory

Ir. Arifin Arif, Head of Hydro Metallurgy Laboratory

Ir. Ronald Nasoetion, Head of Process Development

Ir. Wahyudin, Head of Metals Technology Division

Ir. Indarto Katim, Head of Science and Technology Service Division

Ir. Eddy Dwi Tjahjono, Extractive Metallurgy Laboratory

Ir. A. Sulaiman, Head of Corrosion Division

Ir. Prabowo Adji, Architect

(3) National Center for Research, Science and Technology (PUSPIPTEK)

Dr. Djoewito Atmowidjojo, Head
Ir. Benito Kodijat, Chief Director, Head of PUSPIPTEK Project
Drs. Boy Suhartono, Director of General Affairs
Ir. Ngurah
Ir. Mohammad Joenoes
Ir. Dany Kadir

(4) National Development Planning Agency (BAPPENAS)

Dr. Astrid S. Susanto, Assistant to the Minister for National Development Planning for Science and Research

(5) BPPT

Dr. Wardiman Djojonegoro, Deputy Chairman for Administration

(6) SEKKAB

Mr. N. Widodo Gondowardayo, S, it., Head, International Cooperation Division

(7) P.T. Aneka Tambang

Mr. Santonius Siregar, Director
Mr. Anton J. Bruinier, Director
Mr. Darmoko Slamet, Assistant to Vice President for Nickel Development

(8) Embassy of Japan in the Republic of Indonesia

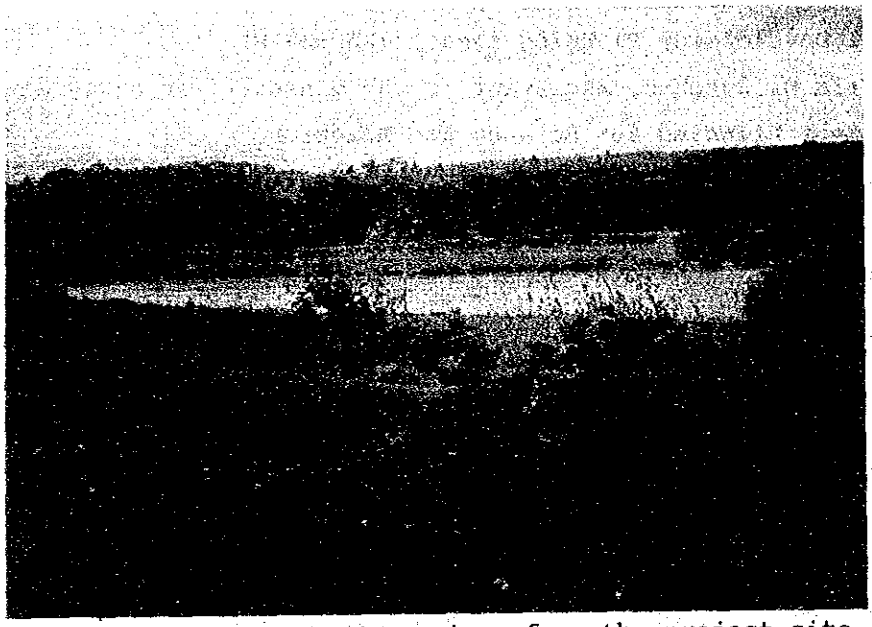
His Excellency Toshiaki Muto, Ambassador Extraordinary and Plenipotentiary
Mr. Akira Fukushima, Second Secretary

(9) Indonesian Office of JICA

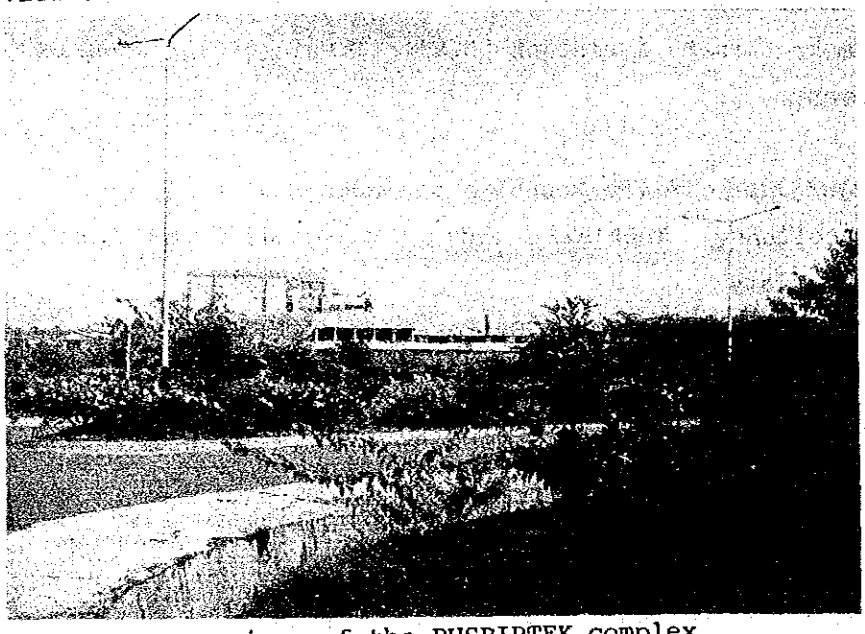
Mr. Hideo Endo, Resident Representative
Mr. Kanji Sato, Resident Assistant Representative
Mr. Sumio Aoki, Staff

8. Conditions of Project Site

Project Site



View of west side Cisadane river from the project site



Premises of the PUSPIPTEK complex

9. Collected Data

Data related to the Outline of the Republic of Indonesia

(1) 4th 5-year National Development Plan, INDUSTRI (Industry)

(2) ditto PERTAMBANGAN DAN ENERGI (Mining and Energy)

(3) ditto ILMU PENGETAHUAN, TEKNOLOGI, DAN PENELITIAN (Science, Technology and Research)

(4) STASIUM PENEGAMATAN: BANDUNG (Meteorological Data)

(5) STATISTIC INDONESIA 1985 (Statistic of Indonesia)

(6) Handbook of Indonesia, 1985

(7) Handbook of Indonesian Language, 1985

(8) BOT News (Price Trend)

(9) ITB (Bandung Institute of Technology), Pamphlet for Introduction

(10) East Java, Environment Standard

(11) West Java, Environment Standard

(12) West Java, Environment Control System

(13) PUSPIPTEK, Water Quality Analysis Data for Feedwater and Drain Water

Data related to the metallurgy Research

(1) ANEKA TAMBANG BROCHURE (Introduction of ANEKA TAMBANG, National Corporation)

(2) PEMBANGUNAN PUSAT PENELITIAN ILMU PENGETAHUAN DAN TEKNOLOGI DI SERPONG (Introduction of PUSPIPTEK)

(3) LAPORAN TAHUNAN LEMBAGA METALLURGI NASIONAL 1985/1986 (Annual report of RDCM)

(4) Research and Development of Indonesia Low Grade Nickel Laterites

(5) STATISTIK PERTAMBANGAN INDONESIA 1982/1983 (Statistic of Mine)

(6) Project: MLL

(7) PUSPIPTEK

(8) Science and Technology Policy Study, LIPI (1985)

(9) Republic of Indonesia, Minister of State for Research and Technology, Puspiptek

(10) Nickel Mining

(11) Metallic Minerals

(12) Transfer Master Plan (Equipment)

(13) Master Plan (Personnel/Floor Area) "RDCM"

(14) Laterite Spec.

(15) Spec. for BAYAH Coal

(16) Spec. for Required Equipment

(17) Existing Equipment list

(18) Bandung RDCM Layout

(19) Activity of RDCM

(20) 5 Year's Nickel Research

(21) Future Research Schedule

(22) Present Personnel List of RDCM

(23) Personal History for Extraction Metallurgy

(24) LIPI Organization

(25) Annual Report (LIPI)

(26) Layout Plan for RDCM at Serpong

Data related to the Architecture

(1) PERATURAN PERENCANAAN TAHAN GEMPA INDONESIA UNTUK GEDUNG 1981 (Building Code)

(2) PERSYARATAN UMUM BAHAN BANGUNAN DI INDONESIA PUBI-1982 (Material Standard)

(3) DASAR-DASAR PERENCANAAN BANGUNAN TAHAN GEMPA (Anti-Seismic Plan for Structures)

(4) AV41 ALGEMENE VOORWAARDEN VOOR DE UITVOERING BIJ AANNEMING VAN

OPENBARE WERKEN

SYART SYARAT UMUM UNTUK RELAKSAAN

BANGUNAN UMUM YANG DILELANGKAN SU41 (Stipulation for Public Building Contract)

(5) PERATURAN

PEMBEBANAN INDONESIA

UNTUK GEDUNG 1983 (Structural Standard)

(6) PEDOMAN

PLAMBING INDONESIA 1979 (Plumbing)

(7) PRATAMA JASA KONSINDO P.T.

HASIL PENYELIDIKAN TANAH

DI LAPANGAN & LABORATORIUM

PROYEK "L.M.T."

PUSPIPTEK SERPONG (Boring Data)

(8) Price List for Building Work 1985/1986

(9) Price List for Civil Work

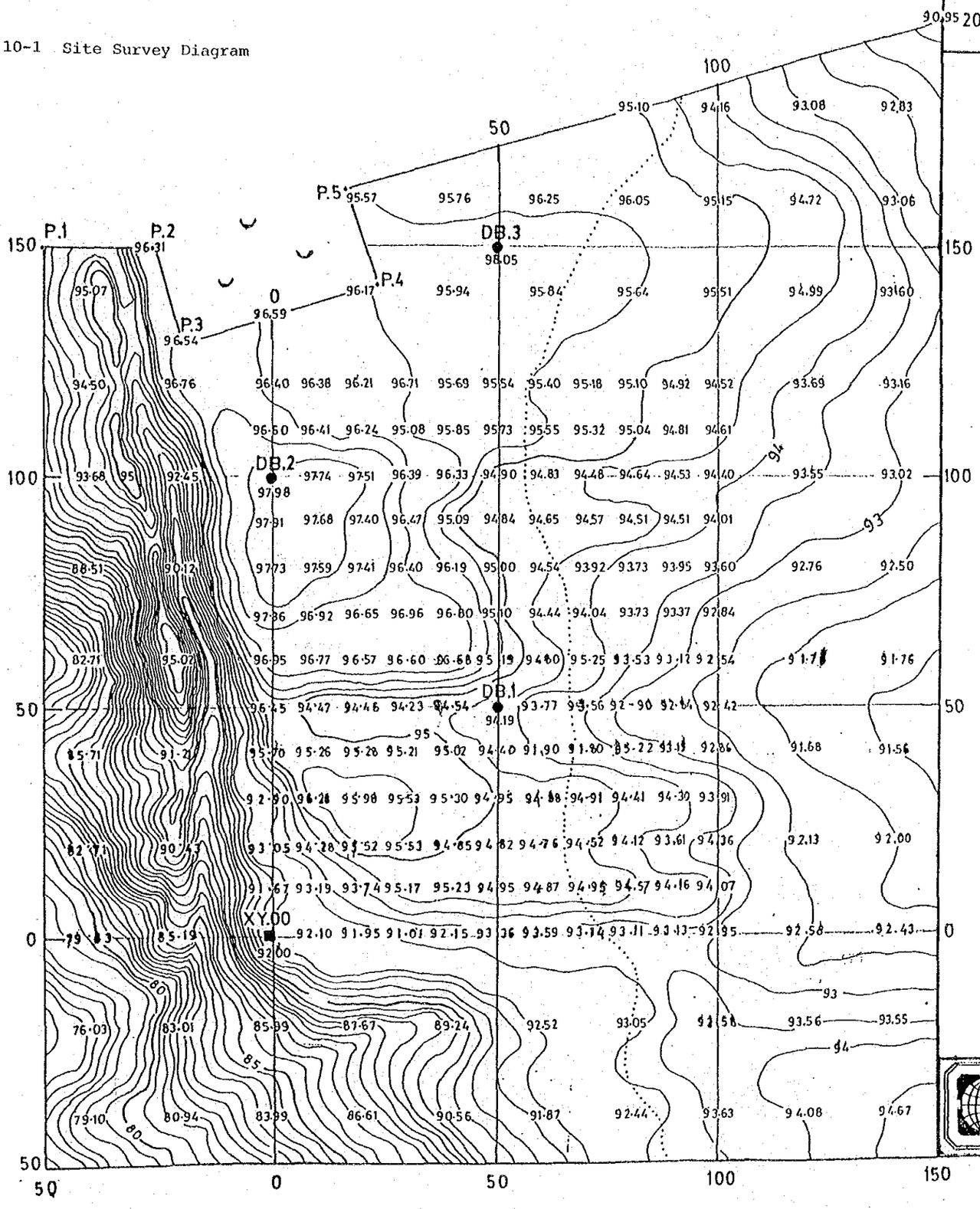
(10) Steel Project & Available Material in Indonesia

(11) Main Electric Line (Drawing)

(12) Main Water Line (Drawing)

10. Other Data

10-1 Site Survey Diagram



LOCATION MAP M.L.L PUSPIPTEK SERPONG

LEGEND

- ● : DEEP BORING
- ■ : XY.00
- ⌣ : CEMETERY
- ..... : FOOD PATH
- ≋ : CONTOUR

N

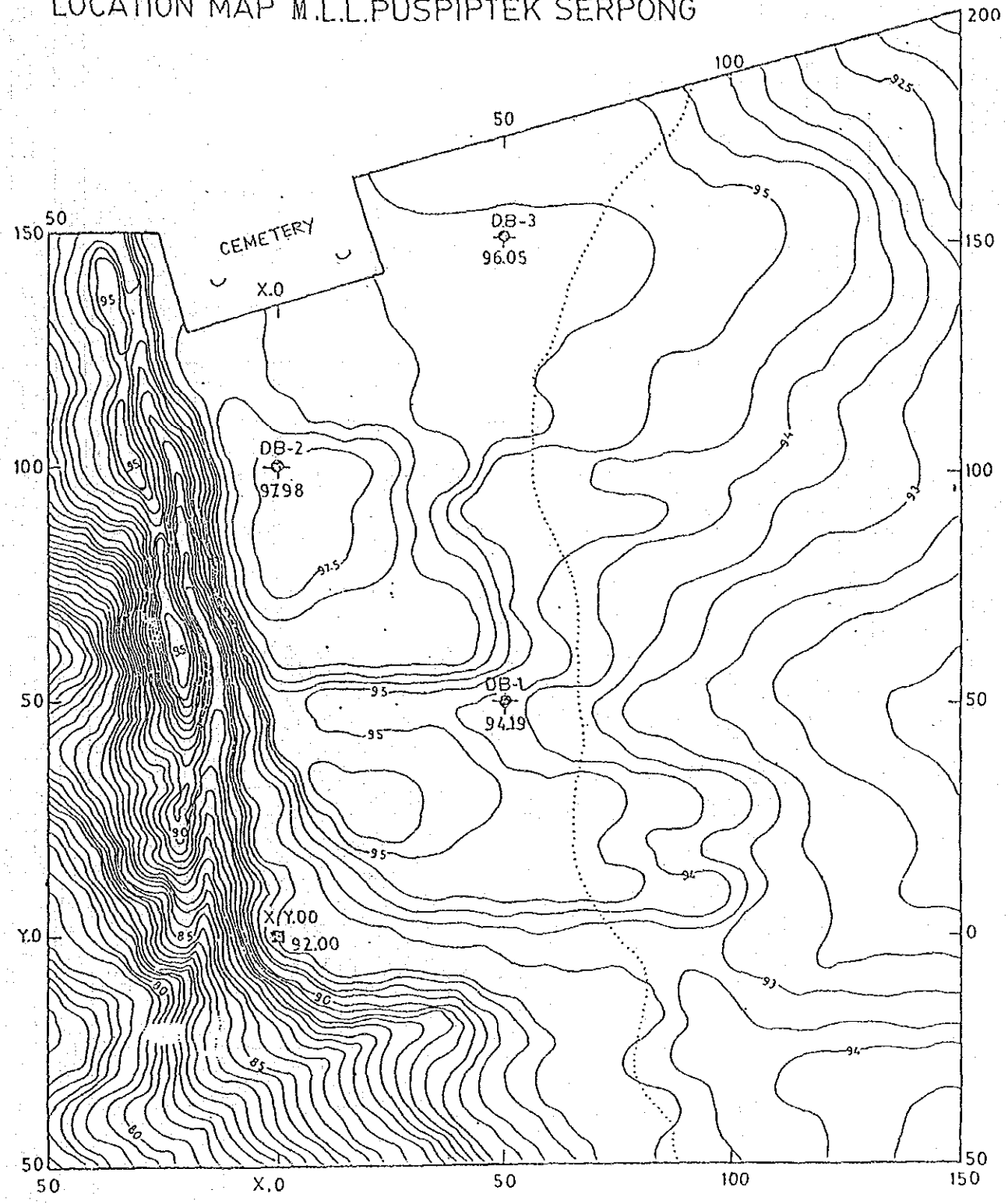
SCALE 1:1000

0 20 90 100 M

p.t. Bina Pudia Inti

Soil Investigation and Engineering Consultants

LOCATION MAP M.L.L.PUSPIPTEK SERPONG



LEGEND

- : DEEP BORING LOCATION
- : XY.00
- : CEMETERY
- : FOOT PATH
- CONTOUR LINES

SCALE 1:1000

0 20 50 100 M

U

BORING LOG AND LABORATORY TEST RESULT

JOB NO. : 87-002

Date of Boring : 12-13 March 1987
Ground level. (G.L) : -
Ground Water Level : -

STANDARD PENETRATION TEST
"N" Value (BLOWS/30 Cm)
UNCONFINED COMPRESSION STRENGTH. (Kg/cm²)

SOIL DESCRIPTION	Depth, in M.	Natural Water Cont. w_N %	Wet Density γ_1 t/m³	Dry Density γ_d t/m³	Specific Gravity G_s —	Void Ratio e —	Degree of Saturation S_r %	ATTERBERG LIMITS w_L %	w_P %	I_P %	w_S %	TRIAXIAL Cohesion c kg/cm²	TRIAXIAL Internl. Frict. Angle ∅ Degree	CONSL Compr Index C_c —
CLAY. silty. med. stiff. brown.	1.0 – 3.0													
SILT. clayey. stiff. yellowish-reddish brown & light grey. (MH)	3.0 – 5.0	40.984	1.7140	1.2157	2.6592	1.1874	91.78	87.50	49.0	38.50	-	0.37 (UU)	23.0 (UU)	0.36
SILT. clayey. stiff. yellowish & reddish brown. (MH)	5.0 – 8.0	53.945	1.6501	1.0719	2.6474	1.4698	97.16	121.0	53.57	67.43	-	0.60 (UU)	20.0 (UU)	0.40
SILT. clayey. soft to med. stiff. reddish brown. (MH)	8.0 – 10.0	86.497	1.4729	0.7898	2.6483	2.3531	97.35	140.75	68.13	72.62	-	-	-	0.94
END OF BORING : -10.45 m. GL	10.0 – 10.45													

LEGEND :
- THIN WALL SAMPLE
- DISTURBED SAMPLE
- SPLIT SPOON (SPT)
- CORE BARREL

BORING METHOD
WASH BORING

pt. Bina Pudia Inti
GEOTECHNICAL ENGINEERING CONSULTANTS AND SURVEYOR

HOEK NLL PUSPIPTEK
SERPONG

BORING NO : DB - II
FIG. : 3

BORING LOG AND LABORATORY TEST RESULT

JOB NO. : 87-002

Date of Boring : 11–12 March 1987
Ground level. (G.L) : –
Ground Water Level : –

SOIL DESCRIPTION	Sampling Method	Bor Profile	Depth, in M.	Standard Penetration Test "N" Value (Blows/30 Cm)	Unconfined Compression Strength (Kg/cm²)	Natural Water Cont. w_N %	Wet Density γt t/m³	Dry Density γd t/m³	Specific Gravity G_s –	Void Ratio e –	Degree of Saturation S_r %	Atterberg Limits w_L %	w_P %	I_P %	w_S %	Triaxial Cohesion c kg/cm²	Triaxial Interni. Frict. Angle ϕ Degree	Consl. Compr. Index C_c –
SILT. Clayey. med. stiff, reddish-brown. (MH)	1 2 1 3		1.0 – 1.45 – 2.0 – 2.45 – 3.0 – 3.50 – 3.95	6 6 6		54.613	1.6580	1.0723	2.6556	1.4765	98.22	113.25	50.88	62.37	–	UU 0.65	UU 22.30	0.405
SILT, clayey. stiff. reddish brown & light grey. (MH)	4 5 2 6		4.0 – 4.35 – 5.0 – 5.45 – 6.0 – 6.50 – 6.95	8 8		58.989	1.6153	1.0160	2.6633	1.6213	96.90	141.25	58.01	83.24	–	UU 1.08	UU 22.0	0.49
SILT, clayey. med. stiff, yellowish-and reddish brown. (MH)	7 8 3 9 10		7.0 – 7.45 – 8.0 – 8.45 – 9.0 – 9.45 – 10.0 – 10.45	4 5 5		58.528	1.5801	0.9967	2.6794	1.6883	92.83	71.15	49.50	21.65	–	UU 0.95	UU 12.0	0.755
END OF BORING : –10.45 m. GL																		

LEGEND :
- THIN WALL SAMPLE
- DISTURBED SAMPLE
- SPLIT SPOON (SPT)
- CORE BARREL

BORING METHOD : WASH BORING

pt. Bina Pudia Inti
GEOTECHNICAL ENGINEERING CONSULTANTS AND SURVEYOR

PROYEK NLL PUSPIPTEK
SERPONG

BORING NO : DB.III
FIG. : 4

BORING LOG AND LABORATORY TEST RESULT

JOB NO. : 87-002

Date of Boring : 14–15 March 1987
Ground level, (G.L) : –
Ground Water Level : –

STANDARD PENETRATION TEST "N" Value (BLOWS / 30 Cm) 10 20 30 40 50 | 1.0 2.0 30
⊙ UNCONFINED COMPRESSION STRENGTH. (Kg / cm²)

SOIL DESCRIPTION	SAMPLING METHOD	BOR PROFILE	DEPTH, in M.	Natural Water Cont. w_N %	Wet Density γ_1 t/m³	Dry Density γ_d t/m³	Specific Gravity G_s –	Void Ratio e –	Degree of Saturation. S_r %	ATTERBERG LIMITS w_L %	w_P %	I_P %	w_S %	TRIAXIAL Cohesion. c kg/cm²	TRIAXIAL Internl. Frict. Angle. ø Degree	CONSL Compr Index. C_c –
CLAY, Silty, med. stiff, brown.			0.0 – 3.0													
SILT, Clayey, soft to med. stiff, reddish brown. (MH)			3.0 – 10.0	53.743	1.6612	1.0805	2.6064	1.4122	99.19	108.50	50.07	58.43	–	0.86	9.0	0.485
				87.579	1.4730	0.7853	2.6298	2.3488	98.06	123.0	68.0	55.0	–	0.42	14.30	1.05
SILT, Clayey, soft to med. stiff, yellowish – reddish brown. (MH)			10.0 – 12.50	83.603	1.4798	0.8060	2.6819	2.3274	96.34	79.0	47.89	31.11	–	0.32	13.0	1.19
SILT, Clayey, stiff to very stiff, yellowish brown.			12.50 – 15.0	71.560	1.4741	0.8592	2.6729	2.1109	90.61	95.80	58.16	37.64	–	0.40	14.30	0.86
CLAY, Silty, stiff, yellowish grey.			15.0 – 20.0													
Cemenkd Silt, very hard, greyish yellow.																
SILT, Clayey, very stiff, greyish yellow with some white mottled.																
Cemented Silt, very hard, greyish yellow.																
END OF BORING : – 20.04 m.GL			20.0													

LEGEND :
- Thin Wall Tube.
- Split Spoon. (SPT)
- Core Barel.

BORING METHOD: WASH BORING

pt. Bina Pudia Inti
GEOTECHNICAL ENGINEERING CONSULTANTS AND SURVEYOR

HOTEL N L L PUSPIPTEK
SERPONG

BORING NO : DB-I
FIG. : 2

JICA