

No. 1

**DIRECTORATE GENERAL OF HIGHER EDUCATION,  
MINISTRY OF EDUCATION AND CULTURE,  
GOVERNMENT OF THE REPUBLIC OF INDONESIA.**

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT FOR DEVELOPMENT OF  
SCIENCE AND MATHEMATICS TEACHING FOR  
PRIMARY AND SECONDARY EDUCATION  
IN  
THE REPUBLIC OF INDONESIA**

MARCH 1999

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## PREFACE

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on the Project for Development of Science and Mathematics Teaching for Primary and Secondary Education, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team from 3 August to 6 September, 1998. The team held discussions with the officials concerned of the Government of Indonesia, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Indonesia in order to discuss a draft basic design, and as this result, the present report was finalized.

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

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

March 1999



Kimio Fujita  
President  
Japan International Cooperation Agency





March 1999

## LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Development of Science and Mathematics Teaching for Primary and Secondary Education in the Republic of Indonesia.

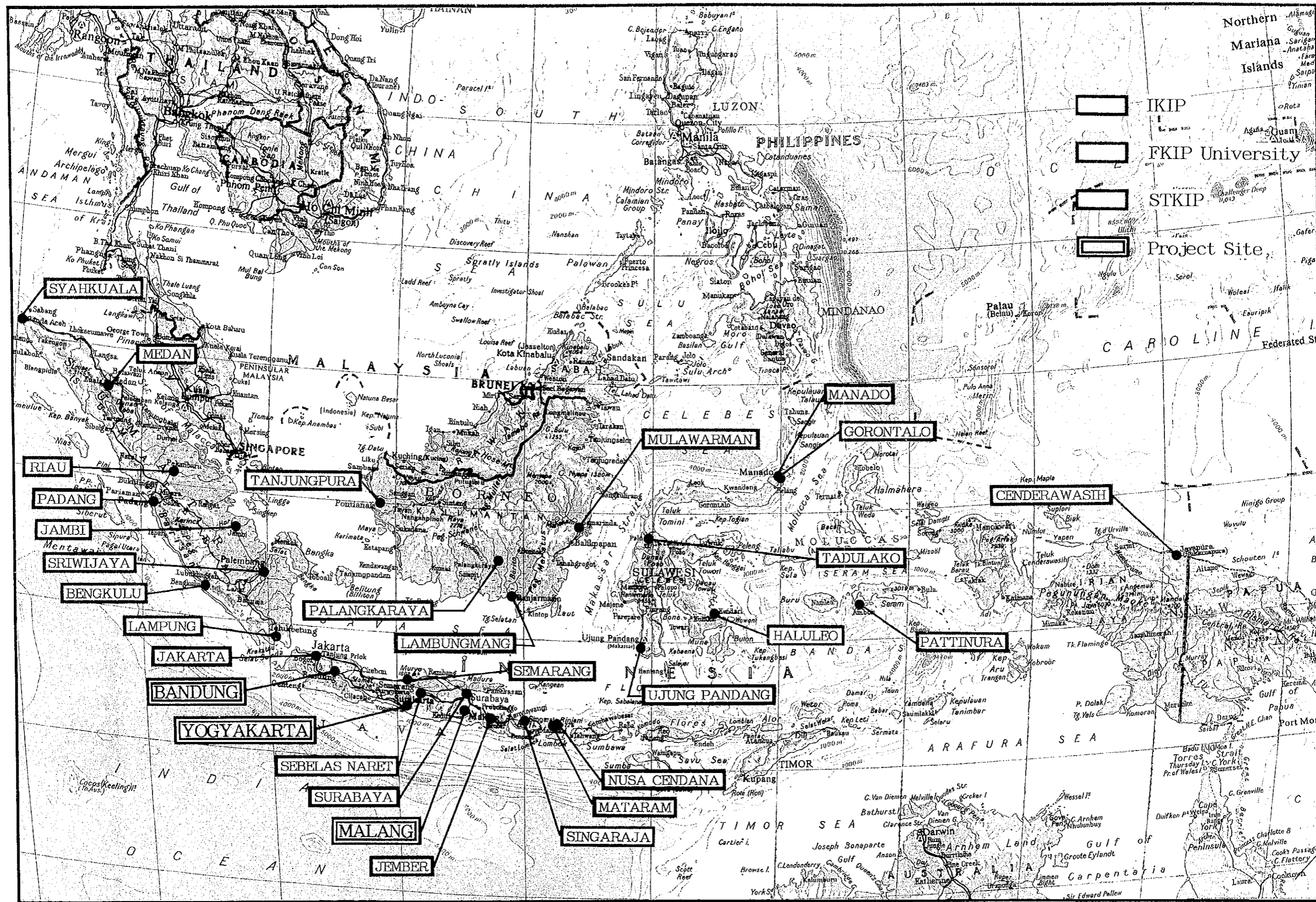
This study was conducted by Consortium of Pacific Consultants International and INTEM Consulting, Inc. under a contract to JICA, during the period from 31 July, 1998 to 31 March, 1999. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Indonesia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

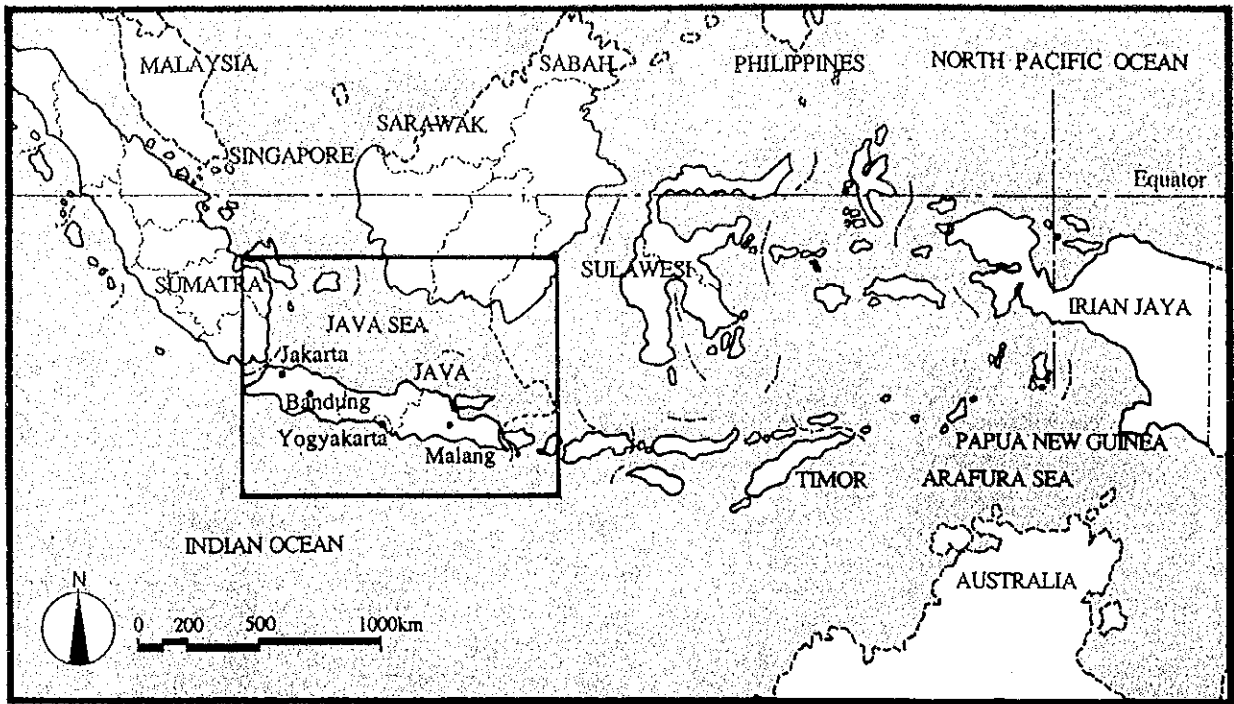
Very truly yours,



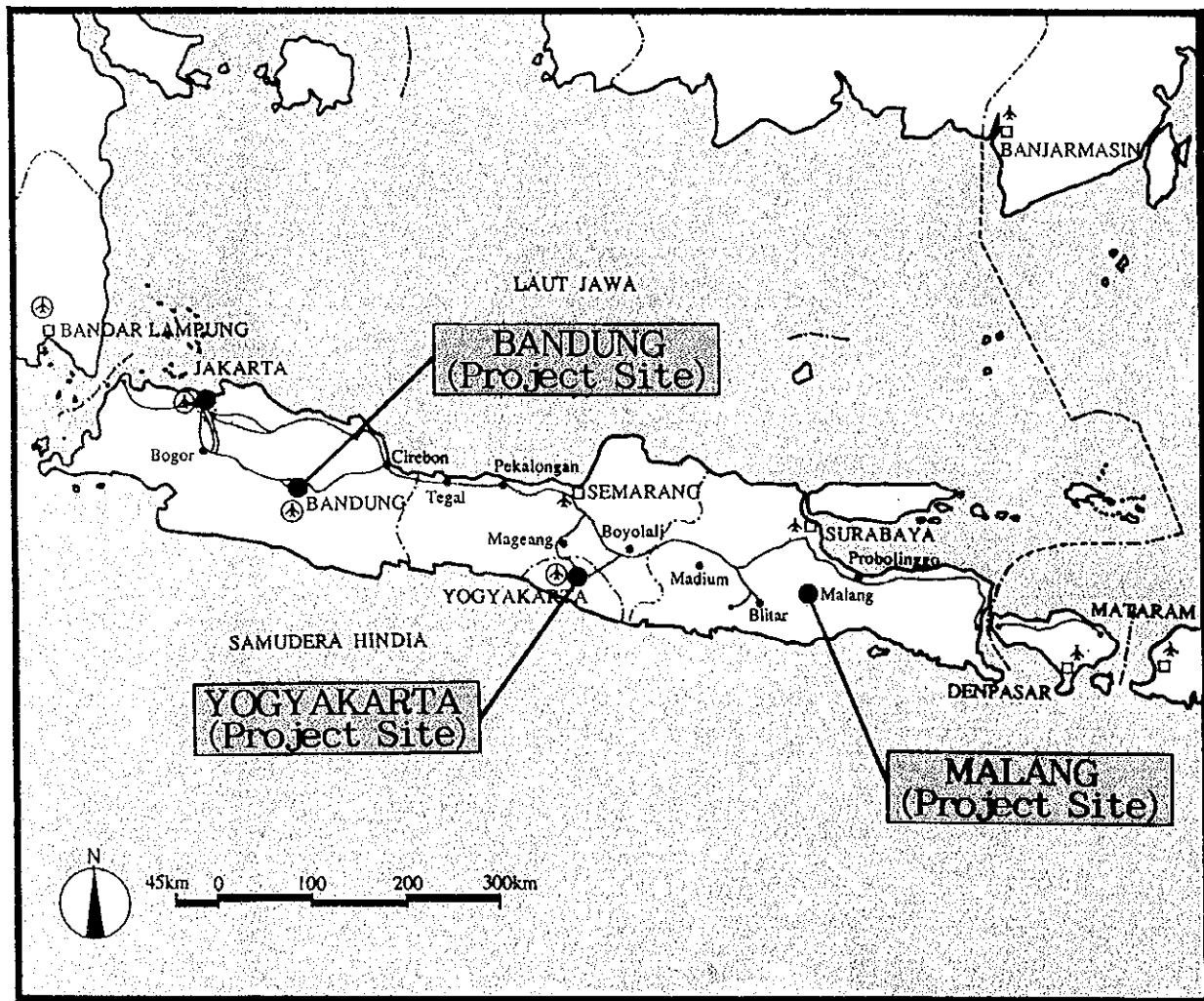
Tetsuji Hatano  
Project Manager,  
Basic design study team on  
The Project for Development of Science and  
Mathematics Teaching for Primary and  
Secondary Education in  
The Republic of Indonesia  
Pacific Consultants International  
INTEM Consulting, Inc.



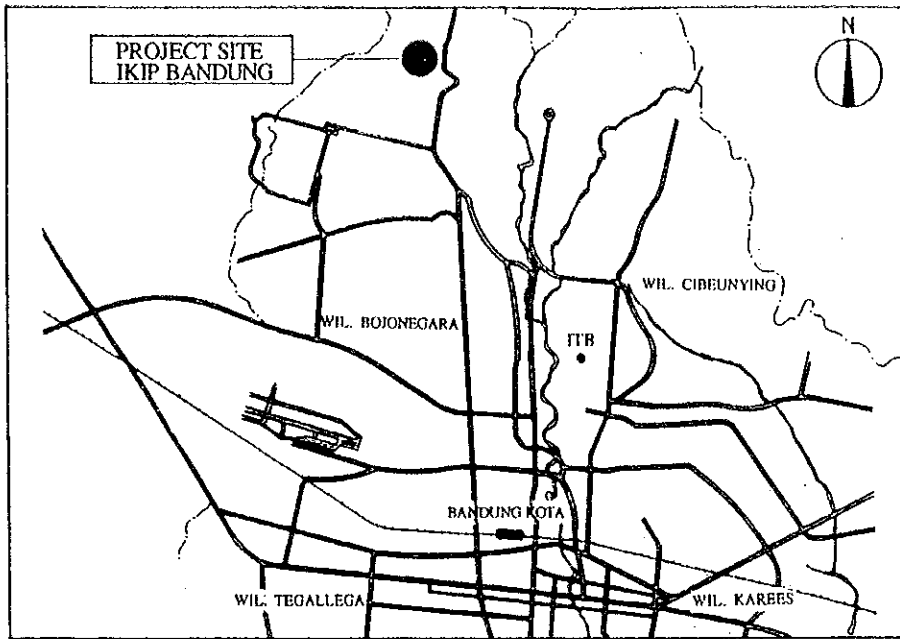
Allocation Map of Present State LPTK in Indonesia



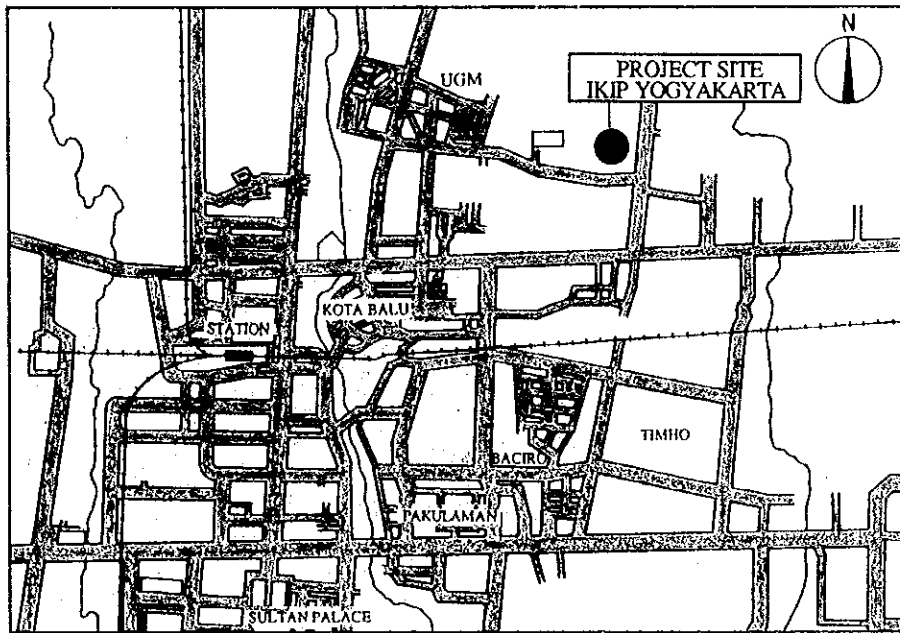
INDONESIA



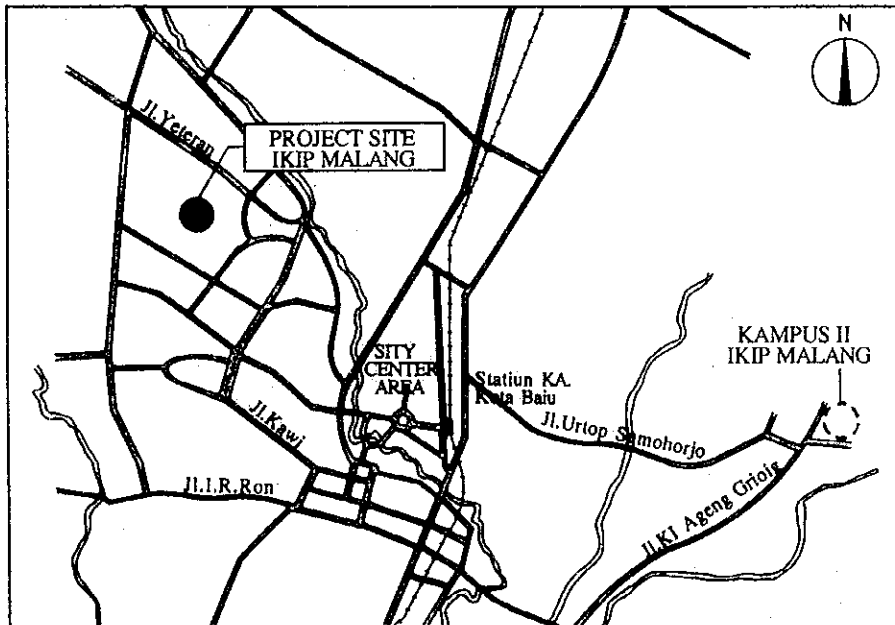
Location Map of Project Site-1



IKIP BANDUNG

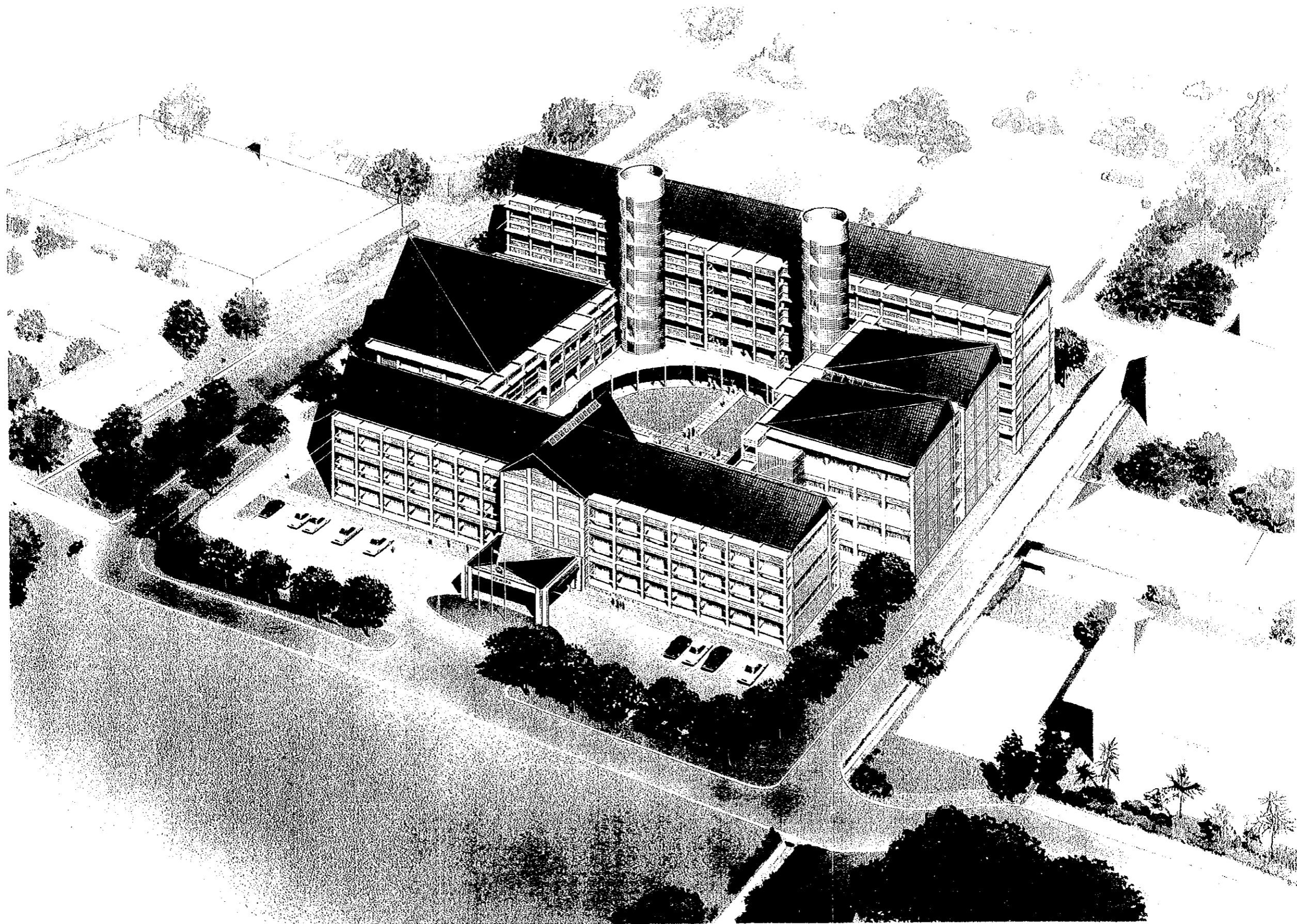


IKIP YOGYAKARTA



IKIP MALANG

Location Map of Project Site - 2

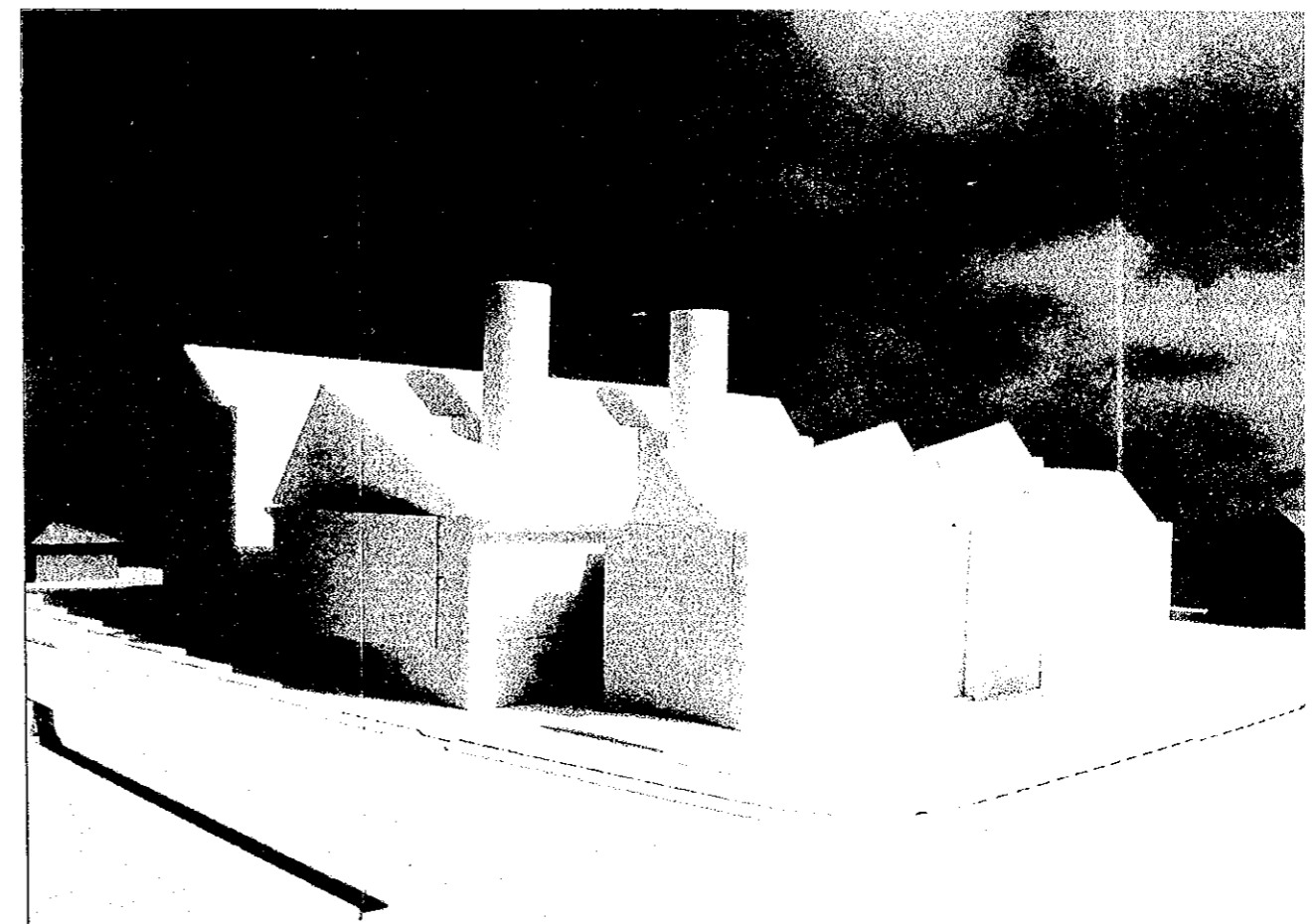
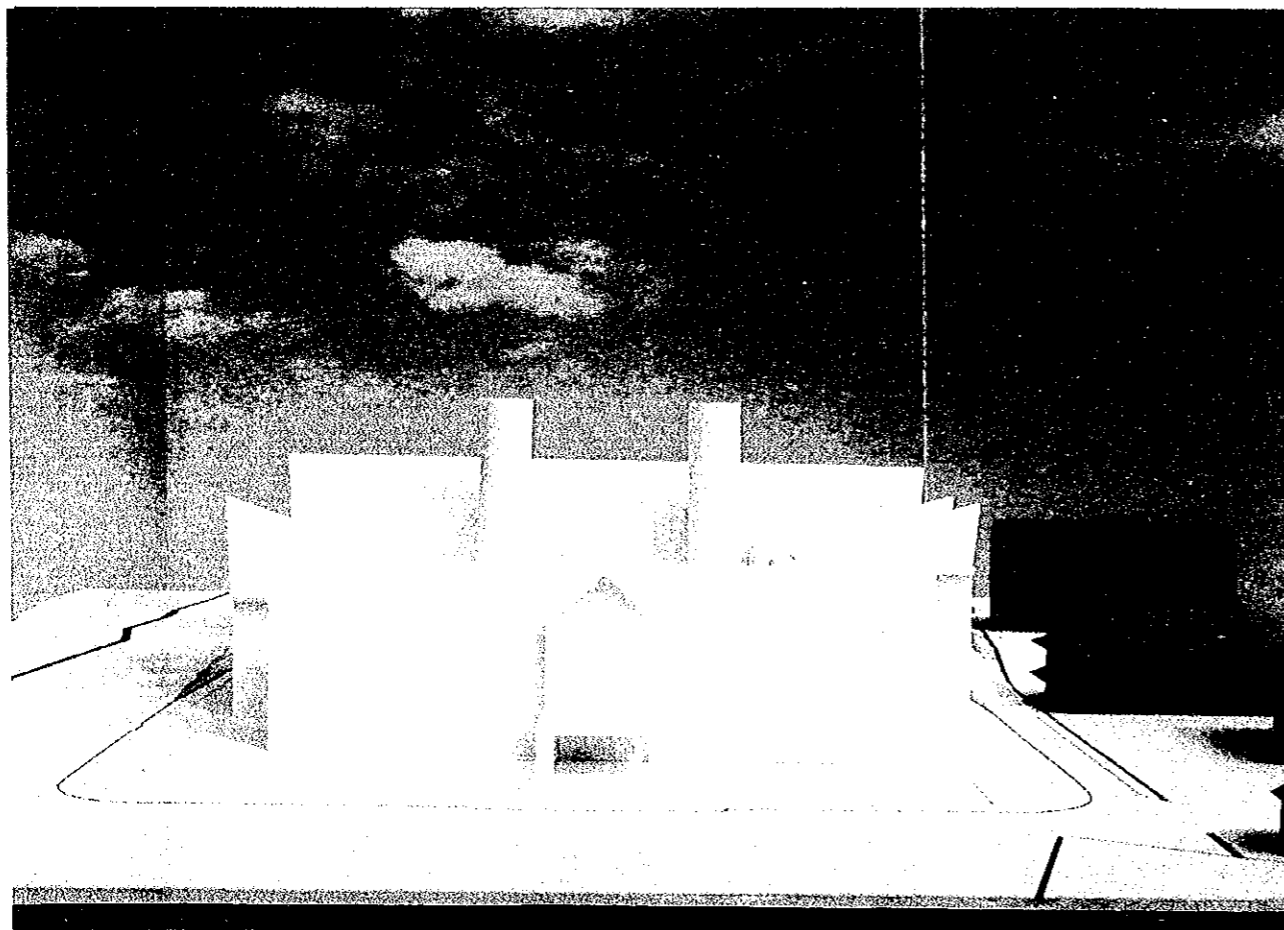
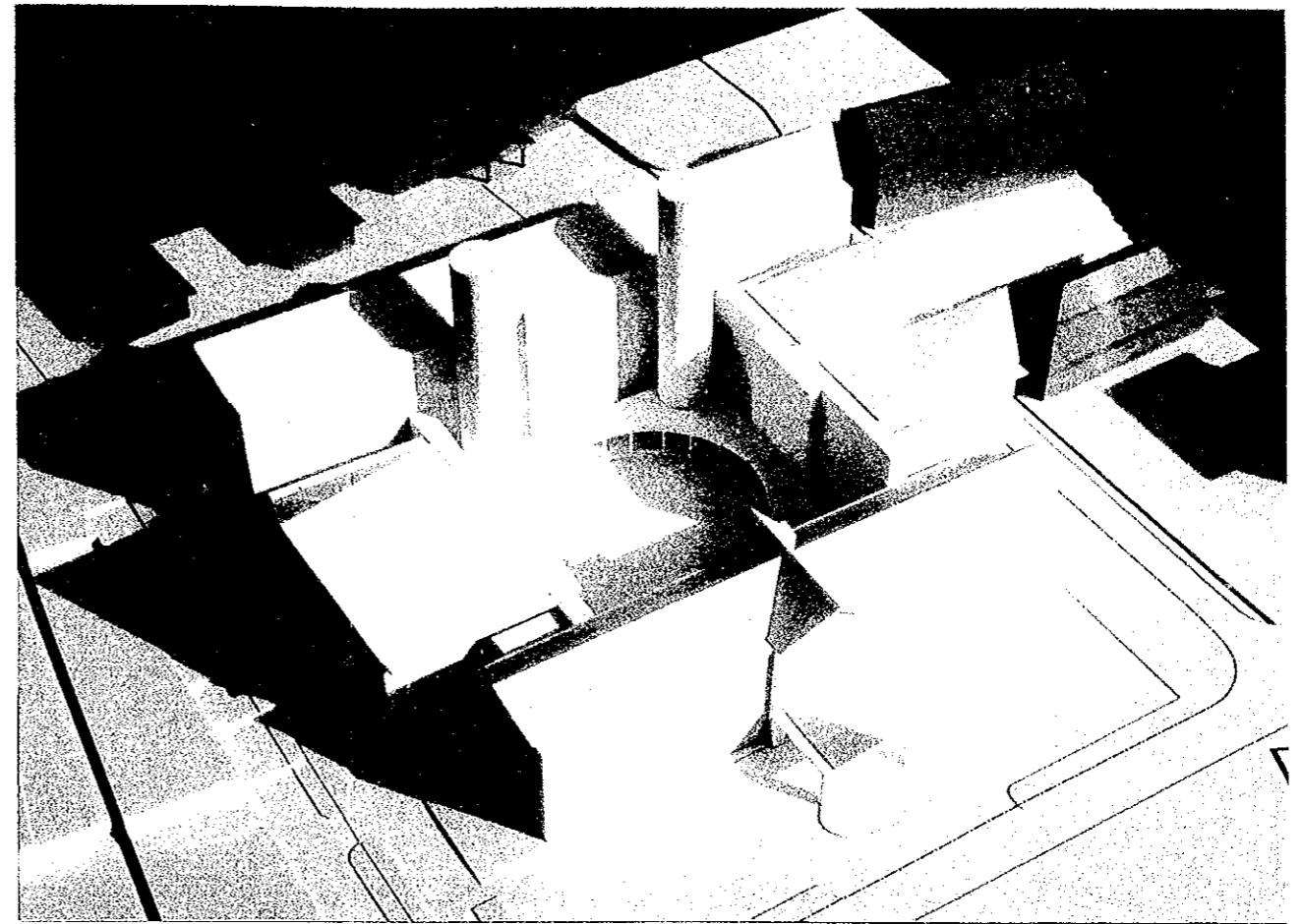
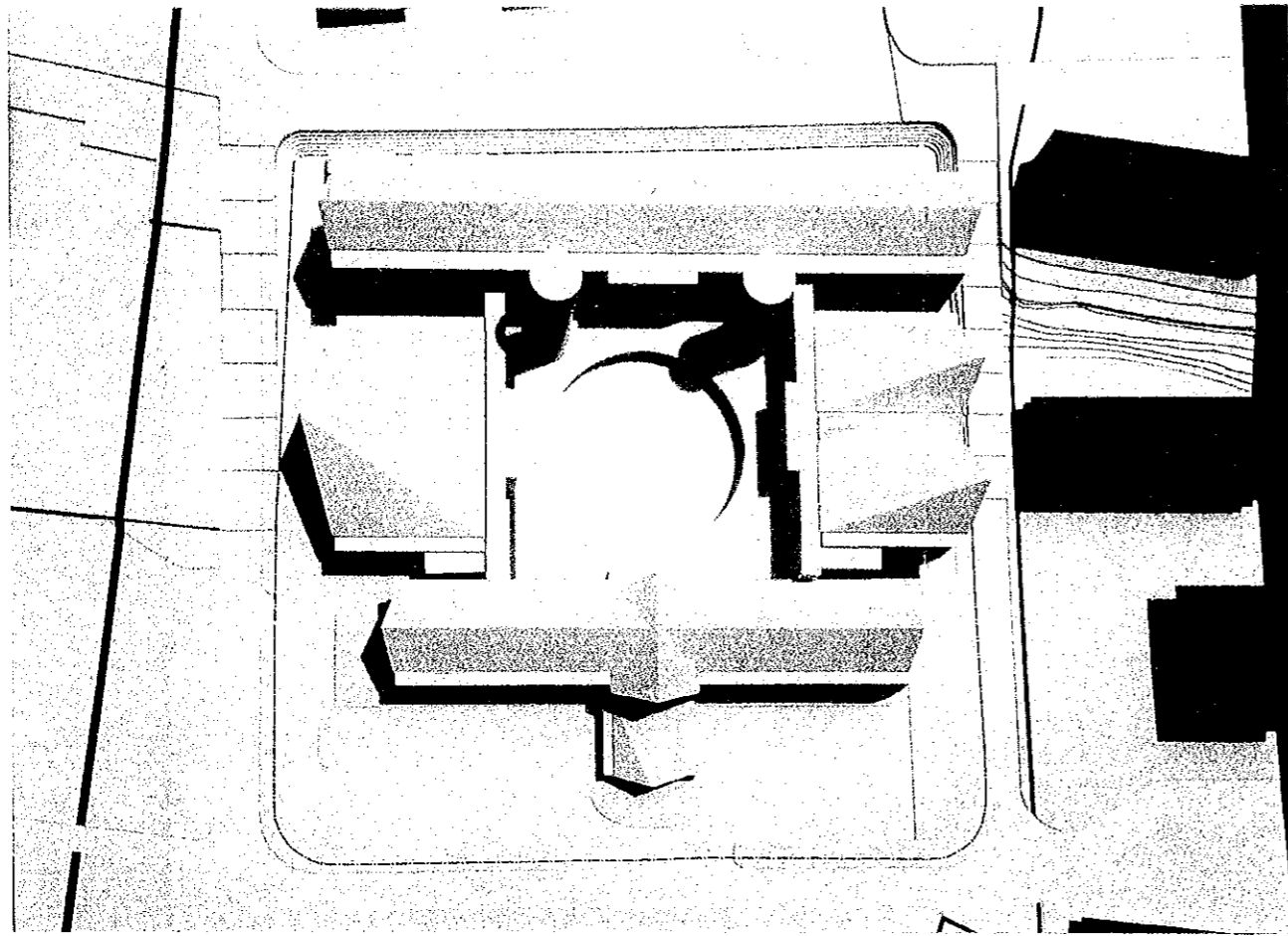


THE PROJECT FOR DEVELOPMENT OF  
SCIENCE AND MATHEMATICSTEACHING FOR  
PRIMARY AND SECONDARY EDUCATION  
IN THE REPUBLIC OF INDONESIA

PACIFIC CONSULTANTS INTERNATIONAL

Perspective





THE PROJECT FOR DEVELOPMENT OF  
SCIENCE AND MATHEMATICSTEACHING FOR  
PRIMARY AND SECONDARY EDUCATION  
IN THE REPUBLIC OF INDONESIA

PACIFIC CONSULTANTS INTERNATIONAL

Model Photos



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**CHAPTER 1**  
**BACKGROUND OF THE**  
**PROJECT**

## CHAPTER 1 BACKGROUND OF THE PROJECT

### 1-1 Background of the Request

In 1984, 6 years compulsory education in primary school was declared in the Republic of Indonesia (hereinafter called Indonesia) and accomplished in the late 80's. Furthermore, in the 6th Five Year National Development Program (REPLITA VI) started from 1994, the Government of the Republic of Indonesia (hereinafter called GOI) puts high priority to provide 9 years compulsory education by adding 3 years secondary school education, and aims to accomplish 9 years compulsory education by 2009. In order to achieve the targeted rate of secondary school attendance of 100 % in 2009 from 51.79% in 1993, it is necessary to resolve problems systematically such as shortage of qualified teachers, equipment, textbooks, and to fulfill the big demand for new secondary school facilities. As the compulsory education period has been extended to 9 years, it is also necessary to improve science and mathematics education by altering the curriculum in order to meet the progress of scientific technology. Since teacher's training and licensing system were amended in 1994, primary and secondary school teachers are required to finish 2 more years and 4 more years to obtain DII and SI licenses respectively after senior high school graduation. As such, most of the current science and mathematics teachers are not qualified. Therefore, in addition to Pre-service training for new teacher's education, In-service training to qualify those unlicensed teachers is urgently necessary.

Under such circumstances, GOI requested to the Government of Japan in 1994 for Project-Type Technical Cooperation (PTTC) in order to improve the implementation system for science and mathematics teaching and to develop In-service and Pre-service training systems, and subsequent Grant Aid program for the construction of the facilities and supply of equipment for FPMIPAs at 3 IKIPs in Bandung, Yogyakarta and Malang. JICA has been dispatching specialists since 1989 to DGHE (Directorate General of Higher Education) and in response to the said request, JICA dispatched a Project Formation Study Team in May 1995, Basic Study Team in November 1995, Preliminary Study Team in April 1997, and Long Term Study Team in March 1998.

Recently the Implementation Discussion Team visited Indonesia from 6 July to 16 July 1998 and the Record of Discussion (R/D) was concluded and signed.

As the direction of the PTTC program has been established, the Government of Japan confirmed the necessity and urgency of the Grant Aid Project, decided to conduct a Basic Design Study, and entrusted the study to the Japan International Cooperation Agency

(JICA). JICA dispatched a Basic Design Study Team to Indonesia from 3 August to 6 September 1998 to formulate the basic design for the project.

## 1-2 Components of the Request

In accordance with the Implementation Discussion Team's meeting with the Indonesian side, items as per PDM (Table 1-1) were concluded as to the outlines of PTTC project. Grant Aid project should be based on the contents of PTTC's cooperation ensuring the following goals and it has been agreed that the main components of the Project are to construct new FPMIPA (Faculty of Science and Mathematics Education) facility for IKIP-Bandung and supply equipment for 3 IKIPs (IKIP-Bandung, IKIP-Yogyakarta and IKIP-Malang).

[Outlines of the Project]	
① Overall Goal	: Science and mathematics education at primary and secondary levels in Indonesia is strengthened.
② Project Goal	: Level of science and mathematics education is improved by pre-service and in-service training of primary and secondary school's teachers.
③ Output of the Project	: Educational circumstances required for pre-service and in-service training will be improved by providing facilities and the equipment necessary for science and mathematics education in IKIP-Bandung, IKIP-Yogyakarta and IKIP-Malang.
④ Activities of the Project	:
a) Contents of the Request	: Provision of facility and equipment required for science and mathematics education in the above 3 IKIPs
b) Undertakings by Indonesian Side	: Organization of systems required for pre-service and in-service training under assistance by PTTC
⑤ Project Site	: Java Island (Bandung, Malang and Yogyakarta)
⑥ Direct and Indirect Beneficiaries	: Direct Beneficiaries: 3 IKIP's students and current primary and secondary school's teachers. Indirect Beneficiaries: Primary and secondary school's students.

According to the request shown in the project application from GOI (1996) in regard to the provision of IKIP-Bandung facility, specific contents and/or size of each facility were not been stated. Only rough contents and approximate size of each facility had been studied by

IKIP-Bandung side. However, total facility composition such as 4 departments laboratories (Physics, Chemistry, Biology and Mathematics), ordinary classrooms, and administration are classified to some degree without any clear detail. When the Basic Design Study Team visited IKIP-Bandung, the proposal showing the contents of the facility had been submitted and on this basis, discussions were made in regard to facility planning as stated hereinafter. In the proposal of IKIP-Yogyakarta and IKIP-Malang, since renovation of existing facilities had been included and studies and discussion were made in this regard.

As for provision of equipment for 3 IKIPs, the request list of equipment from each IKIP had been submitted. However, those contents and quantities were not consistent among the 3 IKIPs, not sufficient and moreover, study and analysis on budget was considered to be insufficient. Therefore, detailed discussions with the study team were proceeded in each IKIP and equipment lists were rearranged as described hereinafter.

**CHAPTER 2**  
**CONTENTS OF THE**  
**PROJECT**

## **CHAPTER 2 CONTENTS OF THE PROJECT**

### **2-1 Objectives of the Project**

The project aims to improve the overall science and mathematics education in Indonesia in coordination with Project Type Technical Cooperation (PTTC) by construction of a facility in IKIP-Bandung and supplying of equipment to 3 IKIPs i.e. IKIP-Bandung, IKIP-Yogyakarta and IKIP-Malang, which were selected from 10 IKIPs located in Indonesia, and to achieve the overall goal to strengthen “①In-service training, ②Pre-service (Faculty) training, and③Operational capability of FPMIPA”.

The Grant Aid project aims to improve the educational situation in coordination with PTTC project by constructing the new facility in IKIP-Bandung and supplying of equipment to 3 IKIPs.

### **2-2 Basic Concept of the Project**

#### **2-2-1 Policy of the Cooperation**

##### **(1) Contents of the Project and Basic Concept**

As the result of discussion with 3 IKIPs and Directorate General of Higher Education (DGHE), the contents of the request were concluded as construction of a new FPMIPA Building and supplying of equipment in IKIP-Bandung, and supplying of equipment to the existing FPMIPA facilities in IKIP-Yogyakarta and IKIP-Malang. The detail of contents are as described in the minutes of discussion (M/D) and the following points have been confirmed to be the basic concept for the contents of the Project.

- 1) Renovation works for the existing facilities in IKIP-Yogyakarta and IKIP-Malang shall only be minor renovation works required for the installation of equipment to be provided by the Project and renovation works such as repairing of wall cracks and maintenance of water supply facilities shall not be included as renovation in view of defects liability of the previous construction works.
- 2) According to Japan's Grant Aid policy, any provision of infrastructure situated outside of the site shall not be included for the building construction in IKIP-Bandung and shall be the undertaking of the Indonesian side.



- 3) Supplying of equipment to the new chemistry building in IKIP-Yogyakarta is subject to confirmation by the Draft Report Explanation Team scheduled in December 1998 that the building is completed or will be completed soon.
- 4) Procurement of equipment shall be based on the equipment list studied at IKIP-Bandung, which shall be considered as the standard equipment list, and equipment for IKIP-Yogyakarta and IKIP-Malang shall be adjusted to the same level as that of IKIP-Bandung. No research equipment shall be supplied. Study of the equipment plan shall continue in Japan considering the opinion from the Project Type Technical Cooperation team.

## **(2) Items to be Noted for Basic Design**

The following important points are to be noted for the implementation of the Basic Design

- 1) For facility planning of FPMIPA IKIP-Bandung, it is necessary to meet the basic conditions required for science and mathematics teaching training and, after discussing with PTTC concerned and Indonesian counterpart, propose what will be the required function for the new facility in order to implement new teaching and training.
- 2) As aforesaid, the equipment to be supplied shall satisfy the level of equipment required for current teacher's training. However, inclusion of equipment considered indispensable in the future shall be studied.
- 3) As for the construction and procurement situation, considering the unstable economic situation in this country, a basic design study has been conducted in order to secure reasonable accuracy for the cost study. However, during the detailed design stage, a more accurate study will be conducted in order to reconfirm the result of this study.
- 4) Regarding facility planning in IKIP-Bandung, preliminary topographical survey and soil survey were conducted by the Indonesian side. However, it became clear that such survey results were not sufficient and a further survey was required. JICA and the Consultants amended their contract in order that the additional survey could be conducted by entrusting it to a local firm during the Basic Design Period. The result should be utilized in order to proceed the Basic Design rationally.
- 5) It was explained that the provision of water supply, electric power, telephone lines to the site boundary should basically be undertaken by the Indonesian side, however,

the Draft Report Explanation Team should judge feasibility of the budget secured as from next fiscal year by the Indonesian side.

- 6) Coordination with Project Type Technical Cooperation should be well noted for establishment of the implementation of the Project.

### **2-2-2 Study Result and Examination of the Contents of the Request.**

The contents of the request from Indonesia for this Project are classified as follows:

- ① New facility construction for FPMIPA IKIP-Bandung
- ② Procurement of educational equipment for IKIP-Bandung, IKIP-Yogyakarta and IKIP-Malang for FPMIPA

The result of the study and examination of the contents of the above request through Basic Design Study is described as follows:

#### **(1) Facility Construction (IKIP-Bandung)**

##### **1) Contents of the Request**

At the beginning stage of the Basic Design Survey in IKIP-Bandung, a proposal titled "PROPOSAL OF LABORATORY, WORKSHOP, CLASSROOM AND SUPPORT FACILITIES PROVISION, IKIP-BANDUNG JULY 1998" was submitted. According to this proposal, zoning of facilities was rather rough and listed as follows, however, the number and area of laboratories and classrooms are rationally calculated based on curriculum to some degree. Even total floor area had not included the common space such as corridors and stairs, it became almost 13,000 m<sup>2</sup>, and therefore it was necessary to review the requirement of each room in detail and reduce size of the facility as a whole.

<b>IKIP-Bandung</b>		(m <sup>2</sup> )
(1)	Laboratory	
	a. Biology Laboratory (6 Rooms)	1,200
	b. Physics Laboratory (5 Rooms)	1,000
	c. Chemistry Laboratory (6 Rooms)	1,200
	d. Computer Room (2 Rooms)	400
	e. Secondary Teaching Labo.(2 Rooms)	200
	f. Primary Teaching Labo.(2 Rooms)	200
	<b>Sub-total</b>	<b>4,200 m<sup>2</sup></b>
(2)	Workshop (3 Rooms) Sub-total	235
(3)	Classroom (incl. AVA Room, 28 Rooms) Sub-total	1,990
(4)	Office, Staff Room, Meeting Room Sub-total	2,750
(5)	Storage (8 Rooms) Sub-total	205
(6)	Supporting Facility (Auditorium, Dormitory, Cafeteria etc.) Sub-total	3,505
	<b>Total</b>	<b>12,885 m<sup>2</sup></b>

## 2) Study and Examination of the Contents of the Request

### ① Contents of the Facility

Based on the proposal submitted by IKIP-Bandung, discussion and studies were proceeded and numbers and scale of each room were confirmed. As the result of a series of discussions and studies, the initial proposal has been improved with a reduction of the room numbers; for example, laboratories such as Intermediate and Advanced Physics laboratories were combined in the Physics Department, and Organic and Bio & Food laboratories in the Chemistry Department. As such, the total number of laboratories has reduced to 19 from 23 as originally requested. The result of the study and examination are summarized in Annex-2 of Minutes of Discussion (Contents of Requested Facility).

### ② Determination of Facilities Scale

For each facility, detailed discussions were made with the counterpart in terms of number of persons allocated, experiment table and other furniture layout. Also, for each laboratory, further detailed discussions were continued in coordination with equipment planner and utility planner and scale of each facility was confirmed. As a result of the study and discussion, numbers and area of each facility were determined as shown in Table 2-4 and the total floor area is about 12,500 m<sup>2</sup>.

In particular for the size of each laboratory, in order to establish reasonable scale of each facility, detailed discussions were made with staff of each department, and experiment table and equipment layout was studied and discussed based on the detailed layout plan as prepared. Also for the other rooms and facilities, number of persons occupying each room and its function were reviewed and a rational size was attempted to be established (for detail refer to 2-3-2 hereinafter).

### ③ Scope of Works

Discussions were made with the Campus Planning Committee members of IKIP-Bandung and campus future development plan was confirmed. Also, through a series of discussions, the contents of undertakings (roads, retaining walls etc.), budget allocation and schedule by the Indonesian side were confirmed (for detail, refer to 3-1-3 hereinafter).

### ④ Renovation of Facilities in IKIP-Yogyakarta and IKIP-Malang

- a) Based on the request of renovation list proposed by IKIP-Yogyakarta and IKIP-Malang, existing facilities were investigated and items of renovation were selected based on a principle that minor renovation required for the installation of equipment was to be included in the Project. After investigation, each renovation item was discussed whether it was applicable or not, then the result was summarized as a memorandum to each IKIP for confirmation of discussion.
- b) Requested renovation items such as Air Conditioner, Ventilation Fan and Fume Hood were considered to be necessary in order to maintain the room condition properly for equipment and such items are considered to be included in the equipment list.
- c) As for the Multi-Purpose Room in IKIP-Malang, this facility is considered to be the center of activities with many people attendance (around 250 people) such as seminars and ceremonies, therefore AV equipment and dark curtain are considered to be installed.

## (2) Equipment Procurement (IKIP-Bandung, IKIP-Yogyakarta, IKIP-Malang)

### 1) Contents of the Request

A standard equipment list was prepared by the study team for the discussion with the Indonesian side. The said list has become the basis for the selection and quantity estimation for each department in IKIP. The list was based on the 1996/1997

equipment list prepared by IKIP-Bandung which was determined based on the curriculum and course syllabus of FPMIPA.

## 2) Study of Equipment

The results of the discussion with the Indonesian side based on the above standard equipment list are as follows:

### ① Preparation of Priority List by each IKIP

Initially, it was the Consultant's idea that the necessity or importance of the equipment should be used as the basis for the selection. Further, the quantity would be determined by the Indonesian side, based on the following experiment categories: demonstration, group and individual. Prioritization of what kind of equipment and its quantity became rather difficult as the Indonesian side regarded individual experiment as important.

Hence, it is important to decide which kind of equipment and what quantity will be given due priority. It is important to note that if the kind of equipment is given more importance, the quantity of equipment will have to be reduced, while on the other hand, if quantity is viewed as more important, the kind of equipment will have to be limited. Many departments in FPMIPA in the 3 IKIPs chose to give preference to the kind of equipment, thus quantities were reduced to the level of group experiment, which was claimed as the minimum quantity allowable by the DGHE, or demonstration experiment. This claim from DGHE was taken into consideration through re-evaluation of the request from each FPMIPA.

### ② Relation with PGSM project

The PGSM project by the assistance of World Bank includes the following project components: 1) renovation of facilities, 2) equipment procurement, 3) support of the evaluation and development of curricula, 4) teacher qualification etc. The equipment procurement component was implemented in 1997 for Malang and Yogyakarta. In 1998, it is scheduled to be implemented in 3 IKIPs. It is noted that some equipment items are duplicated between this Project and PGSM projects but the PGSM project only covers a limited number of equipment. It includes equipment used mainly for research such as Atomic Absorption Spectrophotometer and High Performance Liquid Chromatography Equipment. The equipment procured in 1997 was confirmed as the existing

equipment currently being used. The equipment scheduled for 1998 is still the subject of the ongoing procurement process. If such procurement is confirmed, duplicated items under PGSM Project will have to be adjusted in terms of quantity. The said analytical equipment is costly to maintain and operate, thus may affect the total operating cost of the IKIP.

③ New Building for Chemistry Education Department in IKIP-Yogyakarta

The budget for the completion for the construction of the building for the chemistry education department was to come from the original budget of IKIP-Yogyakarta. The construction started in September and will be completed in January 1999. The construction of the building is crucial for the implementation of this Project. The iron fence door from floor up to ceiling at the steps between first floor and second floor is requested by the study team to provide security to this area.

④ Existing Building for IKIP-Bandung

The implementation of Project Type Technical Cooperation(PTTC) has just started in October 1998. For the smooth execution of the project, a lot of equipment needs to be provided in the existing building.

The available space in the existing building is sufficient for the installation of other equipment if computers and experiment tables are installed in the new building. A space for furniture and some consumables needs to be secured upon completion of the new building, however, it has no big problem to install experimental equipment into existing buildings.

⑤ Existing Equipment

The existing equipment was deleted automatically from the required quantity of equipment in the equipment plan. It must be noted that automatic deletion should not be done completely in consideration of some lower level equipment which needs to be replaced under this Project. Existing equipment excluding those procured under the PGSM Project include older and lower precision-made types, which are affecting proper experimentation. This situation was taken into consideration in case deletion of equipment in the required equipment list needs to be done.

⑥ Planning of equipment

On the basis of the requested equipment list prepared by the Indonesian side, it is important to plan for the same type and quantity of equipment for the 3 IKIPs. For close connection and coordination with the PTTC which is presently ongoing, the equipment plan was finalized after discussion with the members of the domestic committee and technical specialists' team in Japan established for the PTTC project.