

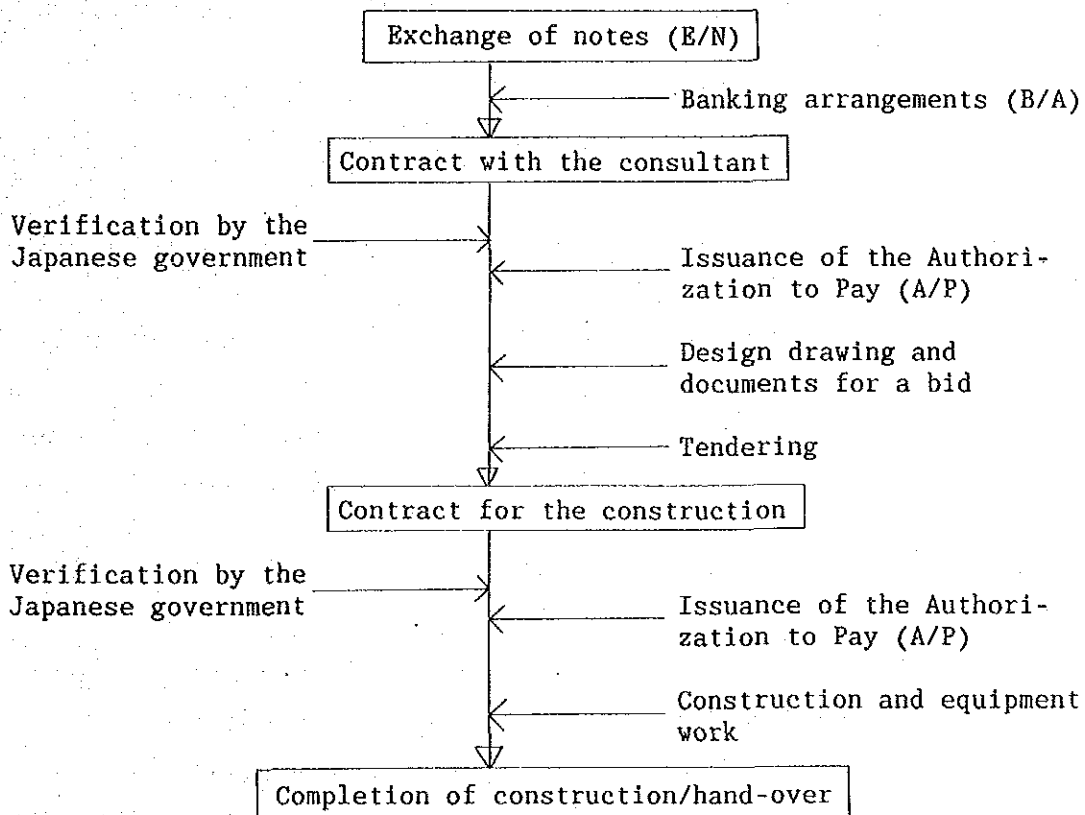
CHAPTER 5 PROJECT EXECUTION PLAN

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5-1 EXECUTION POLICY

For a smooth execution of this project from the exchange of notes through completion of the building work, erection and commissioning of equipment, and hand-over of the project as Grant Aid, it is important that the Philippine government agencies, the Japanese government agencies, the consultant, the general contractor, the local subcontractors, and other agencies concerned have thorough discussions concerning the execution of the project.

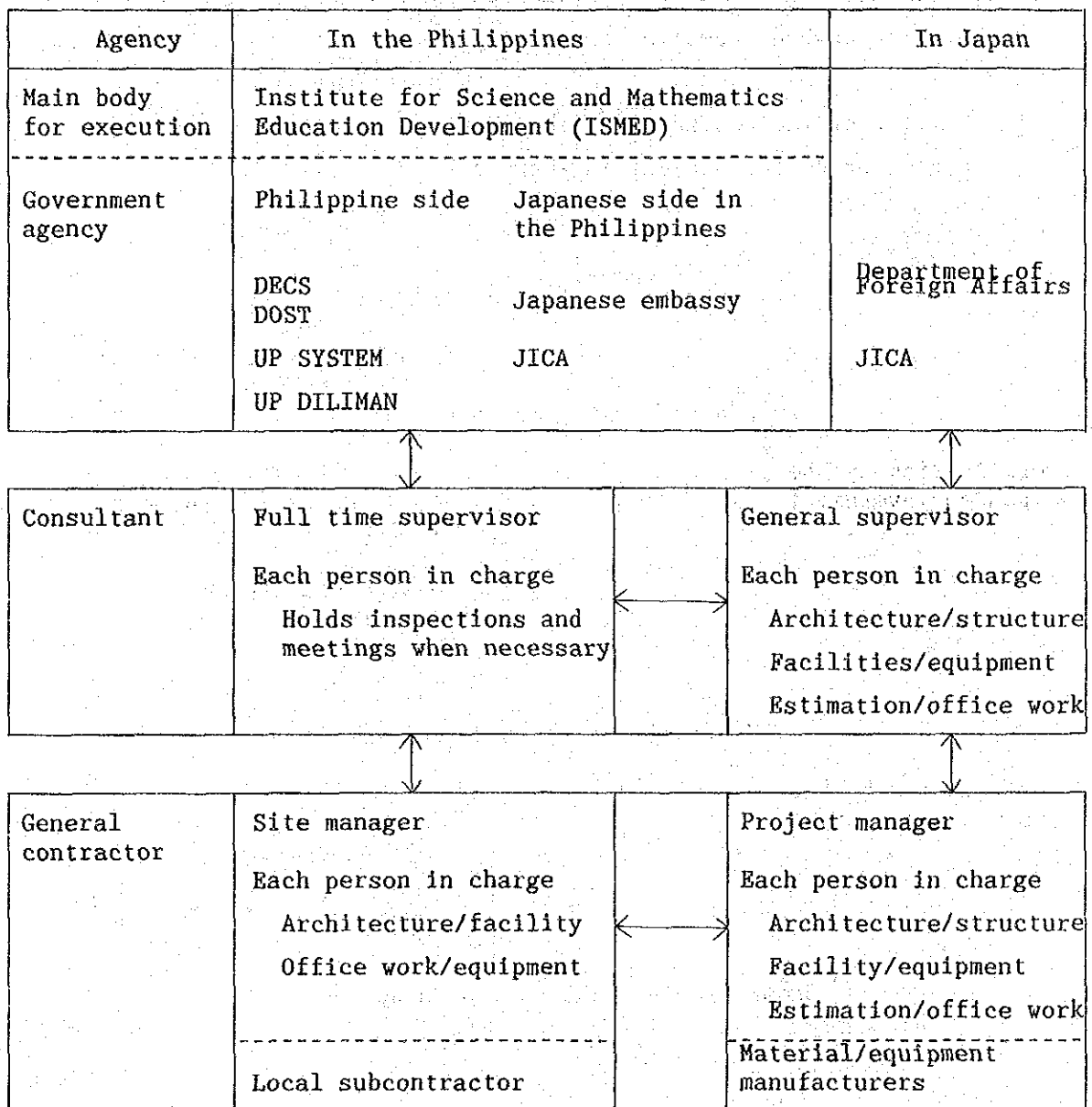
The flow of the project from the exchange of notes to the completion of the project is shown below.



5-2 EXECUTION SYSTEM

ISMED shall be in charge of executing this project. Both the Philippine and Japanese governments, the consultant, the general contractor, and other agencies concerned shall organize an execution system.

Agencies concerned are shown below.



5-3 WORK CLASSIFICATION

(1) Work for which the Japanese Side is Responsible

1) Facilities

① Building

Training building	1
Dormitory	1
Corridor	1

② Work item

Building construction:

Foundation/structure/finishing work

Electrical equipment work:

Internal building work

Water supply and drainage/plumbing work:

Internal building work, septic tank work, and piping work up to the drainage ditch

Air conditioning/ventilation system work:

Internal building work

External work:

Roads, parking lot, outside lights within the site

2) Equipment

① Procurement, transportation, erection, adjustment and hand-over of equipment shall be included in the project.

② Details of equipment

o Lab equipment

- . Biology lab equipment
- . Chemical lab equipment

- . Physics lab equipment
- . Earth science lab equipment
- . Mathematics lab equipment
- . Information science lab equipment
- . Elementary science lab equipment

- o Teaching material equipment
 - . Training material preparation room equipment
 - . Photographing and printing equipment
 - . Audio-visual equipment

- o Auxiliary equipment
 - . Office/administration equipment
 - . Library equipment

- o Vehicles
 - . Micro bus
 - . Light van

(2) Work for which the Republic of the Philippines is Responsible

1) Items relating to buildings

- ① Cutting and removal of existing trees and land preparation
- ② Power supply, telephone line supply, and lead-in of water supply pipes and drainage to the specified locations in the buildings.
- ③ External work (Gate, fence and plants)
- ④ Fixtures, supplies, furniture, and curtains which are excluded from the work for which the Japanese side is responsible.

2) Other services, etc.

- ① Provision of special tax exemption and processing for entry into/departure from the Philippines for the Japanese national groups and individuals engaged in the project.
- ② Provision of tax exemption for construction equipment and materials, and lab equipment to be brought into the Philippines for this project, and also special customs clearance treatment for such items.
- ③ Provision of proper maintenance and control for facilities and lab equipment constructed and prepared for the project.
- ④ Procurement of a building permit prior to the commencement of the work.
- ⑤ Procurement of sites for the temporary site office, work yard, material and equipment storage yard, etc. required for the construction work.
- ⑥ Payment of various expenses
 - . Expenses required for the Bank Agreement
 - . Expenses for lead-in of power and telephone lines
 - . Expenses accompanying procedures for the exemption of taxes.

5-4 CONSTRUCTION SUPERVISING PLAN

(1) Construction Supervising System

In supervising the construction, as technical and administrative negotiations with the Philippine side as well as meetings and coordination for the construction with the staff of the ISMED, DECS, DOST, and UP will be important points, it is necessary that an energetic supervisor with a high level of technical ability be dispatched to the Republic of the Philippines for the entire construction period.

- 1) The site supervisor shall be selected among those who have extensive experience as site supervisors. He must be capable of making appropriate judgements of site conditions and decisions on various aspects of the construction.
- 2) The site supervisor shall understand the construction site, try hard to coordinate between the Philippine government agencies and the subcontractors of both countries, maintain close contact with and make reports to the Philippine government agencies, the Japanese Embassy, and JICA's office in the Philippines so that the work progresses smoothly.
- 3) The site supervisor shall pay special attention to the arrangement of construction equipment and materials in relation to the progress of building construction. In addition, overseeing the construction of quality buildings, strict observation during the construction period, and construction technology transfers to the local subcontractors will be important responsibilities of the site supervisor.
- 4) The major responsibilities of the site supervisor are as follows:

- . Preparing monthly reports which clearly describe the works progress.
- . Determining the building layout and level.
- . Witnessing the earth bearing strength tests.
- . Checking and approving the construction drawings, carrying out bar arrangement inspections, and supervising the placement of concrete.
- . Checking the detailed finishing drawings, and supervising the work schedule.
- . Holding regular meetings and supervising the work schedule.
- . Carrying out inspections for completion (including equipment and materials)
(Inspecting the office and witnessing the inspection by the owner.)
- . Preparing the general report.

- 5) The chief planner and each person in charge of design shall support the work of the site supervisor from Japan.

They shall visit the site whenever necessary to achieve the construction of high quality buildings through design meetings and technical guidance. They shall also hold meetings and discussions with the local government agencies and subcontractors so as to ensure the smooth progress of the construction work.

5-5 CONSTRUCTION PLAN

The construction schedule to be implemented shall be thoroughly studied among people from the Philippine side, the consultant, and the contractor. The scope and details of the work for which each country is responsible shall be confirmed, and an appropriate time to lead-in electric power and connect the water supply shall be determined. It is necessary to establish a well planned schedule including such items as procurement of the construction materials, delivery of such materials to the site, erection, test operation, and adjustment of the equipment and machinery, and timing of hand-over.

(1) Special Characteristics of this Construction

- 1) The rainy season of the Philippine starts in the middle of April and ends around the middle of November. Thus, if earth work and foundation work are to be carried out during the rainy season, it is required that a construction schedule with a thorough consideration of the construction method, wastewater treatment, and daily work schedule be prepared.
- 2) As the foundation is of a direct support structure without piles, construction will commence with the foundation work. Therefore, good coordination between the construction material procurement plan and the building and electrical/mechanical work will be important.
- 3) Thorough discussions and coordination will be required because there are many places where equipment work and construction work have to be simultaneously carried out such as the supply of water and electricity to and the drainage of wastewater from the lab tables, and the audio-visual equipment and electrical equipment work.

- 4) The proposed project site is covered with a lot of trees. Therefore, it is absolutely necessary that these trees be cut and removed by the Philippine side prior to the commencement of construction.

(2) Basic Policy for the Construction

- 1) Each person in charge of building construction and equipment/machinery shall be fully aware of his responsibilities and obligations while carrying out work, to maintain orderly coordination.
- 2) The quality of the buildings shall be assured during the construction.
- 3) The construction equipment and machinery shall be maintained so as to be able to function properly in conformance with their specifications.
- 4) Not only the facilities will be granted, but also the construction technology shall be transferred.
- 5) The contractor shall at all times keep in close contact with the Japanese side and the local people concerned and make reports to ensure the smooth progress.
- 6) At the site, a cooperation system involving the owner, the consultant, and the subcontractors shall be maintained.
- 7) The organization including the Japanese staff, the local staff, and the local subcontractors shall be well understood.
- 8) The construction shall be completed within the specified construction period.

(3) Special Considerations shall be Given to the Following Points:

- 1) Coordination between the erection of an astronomical telescope and the building work.
- 2) Coordination between water supply equipment, wastewater treatment equipment, and electricity supply and building and floor works.
- 3) Discussion and coordination of the work schedule regarding the time for installation of equipment and the places where such work shall be carried out in parallel with the building work.

5-6 CONSTRUCTION MATERIAL PROCUREMENT PLAN

The basic plan is such that local construction methods and materials shall be adopted as much as possible in order to minimize the construction costs. However, those materials which cannot be procured locally, or which don't have the proper performance specifications to satisfy the required conditions, or which are higher in price than if purchased in Japan, shall be procured in Japan.

(1) Conditions of Construction Material Availability in the Philippines

1) Cement:

Cement is produced in accordance with the ASTM standards. Although its quality varies, problems of strength do not exist.

2) Aggregate:

High quality, consisting of gravel and river sand with a small content of mud.

3) Reinforcing bars:

Mainly, irregularly shaped reinforcing bars are manufactured. Quality varies and the price is high.

4) Ready mixed concrete:

In metropolitan Manila, ready mixed concrete can be easily procured.

5) Forming materials:

Concrete lauan panels are manufactured locally.

6) Concrete blocks:

Concrete blocks are commonly used for exterior walls and partition walls. Though Philippine-made blocks are much lower in quality than those made in Japan, they can be used without problems.

7) Lumber:

Oak, tanguile, lauan, apiton, and ipil are available for in parquet floors, decks, doors, and frames.

8) Roofing materials:

The most popular materials are color zinc plate and Spanish tile. When asphalt waterproofing and sheet waterproofing are carried out, heat insulation materials shall be used.

9) Fittings:

Steel sash manufactured from machined angles is mainly used, although aluminum sash is available. A small number of section shapes are available, and the quality and the level of assembly are low.

10) Tiles:

Both wall and floor ceramic tiles are manufactured domestically, but the available number of colors and shapes are limited, and dimensional accuracy and quality are low. The same can be said for plaster tiles.

11) Boards:

Although the number of colors and shapes is limited, rockwool acoustic boards, gypsum boards, cement boards, and decorative melamine boards can be procured locally.

12) Paint:

Paints locally produced are improved to withstand the climatic conditions of the Philippines, and quality is acceptable.

13) Stone:

Marble produced locally is used very often, although specially ordered sizes are costly. The standard size is 10 cm x 15 cm.

14) Lighting apparatus:

A small quantity of incandescent and fluorescent lamps are manufactured locally, but their quality is not satisfactory.

15) Switches outlets:

Mostly imported.

16) Electric cable:

Products which conform to JIS and IEC standards are available, although the number of type is small and quantity is not sufficient.

17) Conduits:

PVC pipes are used. Steel pipes locally manufactured have problems with quality, and only a small quantity of connection parts are available.

18) Panels:

Locally manufactured metal panels completed with imported parts can be procured. However, their quality is low and they cannot meet complicated specifications.

19) Air conditioning units:

A large quantity of wind-type coolers are manufactured, but as for separate-type coolers, the available number of types is small and trouble occurs very frequently.

20) Plumbing equipment:

Local products conforming to the US and Philippine standards can be used for general use. Water faucets often have trouble.

21) Pipes:

Black gas pipes, white gas pipes, PVC pipes, cast iron pipes, and concrete pipes are manufactured locally. Their materials, except for concrete pipes, are imported and expensive. Quality is also a problem.

22) Valves:

Mostly imported.

(2) Materials to be Procured Locally

1) Building:

Cement, sand, gravel, ready mixed concrete, concrete block, forming materials, washed pea gravel, steel

sashes, glass, base and finishing wood materials, paint, terrazzo blocks, and parquet flooring material.

2) Electric equipment:

Portion of cable, manhole & manhole cover, pull box

3) Water supply and plumbing:

Manhole and manhole cover, hume tube, portion of sanitation ceramic piping, water receiving tank

4) Air conditioning/ventilation:

Ceiling fan, PVC pipe

(3) Materials to be Procured in Japan

1) Building

Reinforcing bars, metal fixtures, rockwool acoustic board, cement board, ceramic tile, P-tile.

2) Electrical equipment:

Power distribution panel, cabinet panel, lighting apparatus, switch/outlets, fire alarms, cable, conduit.

3) Water supply and plumbing:

Portion of sanitation ceramic piping, piping material, pumps, valves, elevated water tank, water faucets.

4) Air conditioning/ventilation:

Air-conditioning unit, piping materials, valves.

5-7 EQUIPMENT PROCUREMENT PLAN

In planning equipment procurement, that of costs, maintenance, equipment specifications, and transportation cost are favorable shall be procured locally.

Equipment which cannot be procured locally shall be exported from Japan. In this case, equipment shall be selected based on the condition that manufacturers of such equipment have branches, commercial offices in the Philippine or agencies, and provide after-sales services.

In selecting equipment, the following items shall be considered:

(1) Easy maintenance

- 1) Equipment shall be supplied by manufacturers who can provide consumables and parts easily.
- 2) Equipment shall come from manufacturers who have a solid maintenance system
- 3) Equipment shall be supplied by manufacturers whose price for consumables, parts, and maintenance is low.

(2) Reduction of costs

Prices of wooden products such as study desks, chairs, etc. are lower than those available in Japan, and are therefore more suitable for use in the Center. These products shall be procured in the Philippines. Thus, packing and transportation costs will be reduced.

(3) Special situations for specifications

- 1) Since methods of experiments differ from that of Japan due to differences in the method of educational guidance, some of the experimental devices for physics and dynamics are not manufactured in Japan. Therefore, such devices shall be procured locally.
- 2) Personal computers are preferred to be procured locally because of differences in the language used. The computer hardware can be procured in Japan; however, the application software scheduled to be used is in English, which is difficult to be procured in Japan. Thus, it shall be procured locally.
- 3) Since the voltages used in the Philippines and Japan are different, equipment procured in Japan shall be modified or transformers must be used. Equipment such as hot plates, etc. for which the power source cannot be modified or which don't work well when used with a transformer shall be procured locally.

5-8 EXECUTION SCHEDULE

The execution schedule for the construction of the center shall go through the following three stages after the exchange of notes has taken place between governments of the Republic of the Philippines and Japan.

(1) Execution Design

After the consultant contract has been verified by the Japanese government, bidding documents such as detailed design drawings, specifications, etc. shall be prepared based on the basic design report.

(2) Tender Period

The tender period is defined as the period from the public announcement of a tender, prequalification of bidders, estimation, and opening of bids, evaluation of bids, to the contract for construction.

(3) Construction and Equipment Work

After the construction contract is finalized, the construction work will commence following the verification of the Japanese government. The project shall be complete after construction and adjustment of equipment have been completed.

5-9 MAINTENANCE PLAN

The maintenance system of the facilities is as described in the Outline of the Plan in 3-2 of Chapter 3.

(1) Equipment maintenance plan

1) Equipment maintenance

Fuses, lamps, printing machine roller, cutter blades, VTR head, and camera tubes are considered as equipment and parts subject to equipment maintenance. They will be subject to free maintenance by the contractor for one year after hand-over unless damages are caused by obvious mistakes of the NLRCTT.

However, from the 2nd year thereafter, maintenance costs will be assumed by the center. It is desirable that a maintenance contract for the personal computers, studio equipment in the audio-visual room, and printing machine be made. As for the maintenance costs, 0.4 - 0.8% of the value of the subject equipment is estimated, and it is preferred that such an amount be budgeted.

2) Consumables

Consumables include paper for printing, ink, chemicals used in the labs, cassette tapes (sound and picture), gases, water, and electricity. As consumption volume will vary depending on the level of activities, costs required for consumables cannot be predicted easily. But normally, 0.6 - 1.2% of the total value of the subject equipment and materials is estimated. Therefore, such amounts shall be budgeted.

① Electric charge

. Training building

Contract electricity

$$610 \text{ KVA} \times \text{Demand (0.62)} = 378 \text{ KW}$$

Basic charge (Total of the following three items)

Demand charge

$$378 \text{ KW} \times \text{Peso } 12.60 = \text{Peso } 4,762/\text{mo.}$$

Energy charge

Estimated electric power consumption at the time of calculating the basic charge (According to the calculation of the Manila Electric Power Co.)

$$378 \text{ KW} \times 0.8 \times 270 \text{ hrs.} = 81,648 \text{ KWH/mo.}$$

Up to 200 hrs.

$$378 \text{ KW} \times 200 \text{ hrs.} \times \text{Peso } 0.42 = \text{Peso } 31,752/\text{mo.}$$

Portion exceeding 200 hrs.

$$\begin{aligned} (81,648 \text{ KWH} - 378 \text{ KW} \times 200 \text{ hrs}) \\ \times \text{Peso } 0.39 = \text{Peso } 2,358/\text{mo.} \end{aligned}$$

$$\text{Subtotal} \quad \text{Peso } 34,110/\text{mo.}$$

Currency Exchange Rate Adjustment

Energy charge x 6.28%

$$\text{Peso } 34,110/\text{mon.} \times 0.0628 = \text{Peso } 2,142/\text{mo.}$$

$$\text{Basic charge total} \quad \text{Peso } 41,014/\text{mo.}$$

Power consumption

$$378 \text{ KW} \times 6 \text{ hours} \times 25 \text{ days} = 56,700 \text{ KWH/mo.}$$

Service charge

$$56,700 \text{ KWH/mo.} \times 1.742 \text{ Peso} = 98,771 \text{ Peso/mo.}$$

Total (41,014 Peso/mo. + 98,771 Peso/mo.)

$$\times 12 \text{ mos.} = 1,677,420 \text{ Peso/year}$$

. Dormitory

Contract electricity

$$98 \text{ KVA} \times \text{Demand (0.67)} = 66 \text{ KW}$$

Basic charge (Total of the following items)

Demand charge

66 KW x Peso 12.60 = Peso 831/mo.

Energy charge

Estimated electric power consumption at the
time of calculating the basic charge

(According to the calculation of the Manila
Electric Power Co.)

66 KW x 0.8 x 170 hrs = 14,256 KWH/mo.

Up to 200 hrs

66 KW x 200 hrs x Peso 0.42 = Peso 5,544/mo.

Portion exceeding 200 hrs.

(14,256 KWH - 66 KW x 200 hrs)

x Peso 0.39 = Peso 411/mo.

Subtotal = Peso 5,955/mo.

Currency Exchange Rate Adjustment

Energy charge x 6.28%

Peso 5,955/mon. x 0.0628 = Peso 373/mo

Basic charge total = Peso 7,159/mo.

Power consumption

66 KW x 8 hours x 30 days = 15,840 KWH/mo.

Service charge

15,840 KWH/mo. x 1.742 Peso = 27,593 Peso/mo.

Total (7,159 Peso/mo. + 27,593 Peso/mo.)

x 12 mos. = 417,024 Peso/year

② City water charge

. Training building

Water consumption

$$15 \text{ m}^3 \times 25 \text{ days} = 375 \text{ m}^3 / \text{mo.}$$

Service charge

$$(\text{Fixed up to } 25 \text{ m}^3) = 111.7 \text{ Peso}$$

$$(375 \text{ m}^3 - 25 \text{ m}^3) \times 5.0 \text{ Peso/m}^3 = 1,750 \text{ Peso/mo.}$$

Total (111.7 Peso/mo. + 1,750 Peso/mo.)

$$\times 12 \text{ mos.} = 22,340 \text{ Peso/year}$$

. Dormitory

Water consumption

$$20 \text{ m}^3 \times 25 \text{ days} = 500 \text{ m}^3 / \text{mo.}$$

Service charge

$$(\text{Fixed up to } 25 \text{ m}^3) = 111.7 \text{ Peso}$$

$$(500 - 25 \text{ m}^3) \times 5.0 \text{ Peso/m}^3 = 2,375 \text{ Peso/mo.}$$

Total (111.7 Peso/mo. + 2,375 Peso/mo.)

$$\times 12 \text{ mos.} = 29,840 \text{ Peso/mo.}$$

③ Gas charge

Gas consumption

$$50 \text{ kg Cylinder} \times 14 / \text{mo.} \times 12 \text{ months} = 168 \text{ cylinders}$$

Gas charge

$$\text{Total Peso } 900 \times 168 \text{ cylinders} = 151,200 \text{ Peso}$$

5-10 ESTIMATED PROJECT COST

Estimated construction cost to be borne by the Philippine side

Peso 1,213,900

(Approx. yen 8,530,000)

(1) Electric power lead in	Peso	360,000
(2) City water supply	"	20,000
(3) Removal of existing trees	"	5,000
(4) External work	"	717,500
(5) Furniture/fixtures	"	111,400

Note: Foreign exchange rate (average, May to October, 1987)

1 US dollar = 146.05 Yen = 20.77 Peso

1 Yen = Approx. 7.03 Peso

CHAPTER 6 PROJECT EVALUATION

CHAPTER 6 PROJECT EVALUATION

The government of the Republic of the Philippines has the important tasks of stabilizing its economy and improving industrial productivity in order to overcome the economic difficulties facing the country. To do so, human resources must be developed, particularly the scientific disposition of the people. Therefore, the role played by science and mathematics during basic education is extremely important.

Although re-educating science and mathematics teachers already in service is considered essential to improve the present condition of science and mathematics education, such efforts remain insufficient. Expected results have not yet been achieved due to lack of facilities and equipment. Therefore, the project of constructing the National Learning Resource Center for Teacher Training in science and mathematics is highly significant.

The following effects are expected when the Center is completed and stocked with the required facilities, materials and equipment for the re-education of science and mathematics teachers.

- (1) In the case of science and mathematics education, particularly of science education, the necessity of education centered around practical experiments and exercises requires teachers to learn experimentation techniques. With the proper support structure, the Center will be able to fulfill its target goal as a training institution where science and mathematics teachers already in service can learn useful experimental techniques and methods of stock repletion.
- (2) Formerly, the training of working science and mathematics teachers had been implemented as an additional activity of the Institute for Science and Mathematics Education (ISMED) of the University of the Philippines, creating an additional burden on its staff, facilities, materials and equipment. When completed, this Center will be a fully equipped institute exclusively for training science and mathematics teachers already in service. The new center will be able to accept about 1,000 trainees instead of the yearly average of 430 at present, to expand and upgrade the

quality of training by a large margin and to quicken the propagation of training effects to other regions.

- (3) The Institute for Science and Mathematics Education of the University of the Philippines will be released from re-educating working science and mathematics teachers. It will be able to concentrate its efforts on the research and development of curriculums, education and teaching materials, thereby contributing largely to heightening the standards of science and mathematics education in the Philippines.
- (4) The dormitory facility for trainees and invited lecturers that will be built as part of this project will serve to facilitate the participation of local trainees. It will be useful in reducing participation costs, thereby expanding the scope of training and making it easier to invite lecturers from other regions. Also possible will be the repletion of supplies necessary for training, thus enhancing the overall training effort.
- (5) At present, improvement of the regional training centers is in progress under the Medium-term National Development Plan, which together with this Project will form a nation-wide network for science and mathematics teacher training with this Center a nucleus.

Thus, this Center is extremely necessary as it will contribute to higher levels of science and mathematics teachers in the Republic of the Philippines and to the development of science and mathematics education, and eventually to the national interest of the country by achieving visible results in the development of human resources.

Furthermore, the assistance of Japan will directly affect the result of the Project. It will also definitely contribute to the promotion of friendly relations between Japan and the Republic of the Philippines.

CHAPTER 7 CONCLUSION AND RECOMMENDATION

CHAPTER 7 CONCLUSION AND RECOMMENDATION

This Project, as part of a plan to develop the human resources required to stabilize the economy and improve productivity in the Republic of the Philippines, aims at constructing the facilities and providing the materials and equipment for the National Learning Resource Center for Teacher Training in Science and Mathematics for upgrading the quality of science and mathematics education.

Evaluations made on the effects and continuity after implementation of the Project have proved its value. Therefore, implementation of the Project with grant aid from Japan without delay is highly desirable.

To attain the stated goals of the Project, technical and administrative support from the Government of the Philippines as to the following items is essential.

(1) Securing Personnel

To achieve the objectives of this Project it is necessary to have qualified lecturers conduct training supported by adequate staff. For this purpose, well educated and experienced personnel should be secured and retained.

(2) Securing Funds for Operation and Maintenance

To allow the Center to function optimally and evolve, adequate funds for the continuous operation and maintenance of the Center must be allocated.

(3) Active Use of Facilities, Materials and Equipment

The facilities, materials and equipment should be actively used. Independent efforts to upgrade pedagogical techniques for science and mathematics and to develop appropriate teaching materials should also be continued and expanded.

Hopefully, the Government of Japan, which is rendering assistance for the Center will be in a position to dispatch professionals to the Philippines as the Center's lecturers may need to learn how to operate the equipment to be provided as well as the techniques of the practical experiments and exercises that will be performed using the equipment.

The Government of Japan is expected to sufficiently respond to such a request.

APPENDIX

APPENDIX-1 Minutes of Discussions

- 2 Members of the Basic design Study Team
- 3 List of Philippine Side Interviewers
- 4 Schedule of Basic Design Study Team

M I N U T E S O F D I S C U S S I O N

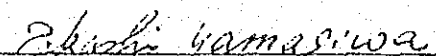
THE BASIC DESIGN STUDY ON THE PROJECT OF CONSTRUCTING
THE NATIONAL LEARNING RESOURCE CENTER FOR TEACHER TRAINING
IN SCIENCE AND MATHEMATICS EDUCATION

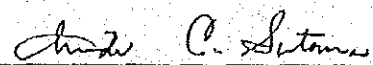
In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study for the project of constructing the National Learning Resource Center for Teacher Training in Science and Mathematics Education (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent the Basic Design Study Team headed by Mr. Takashi YAMAGIWA, Senior Specialist for Curriculum, Lower Secondary School Division, Elementary and Secondary Education Bureau, Ministry of Education, Science and Culture, from July 15th to August 2nd, 1987.

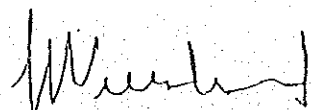
The Japanese Team held a series of discussions and exchanged views on the Project with the concerned authorities of the Government of the Philippines.

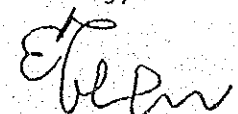
As a result of the study and discussions, both parties mutually agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined toward the realization of the Project.

Manila, July 23rd, 1987


TAKASHI YAMAGIWA
Leader
Basic Design Study Team
Japan International
Cooperation Agency (JICA)


MINDA C. SUTARIA
Undersecretary
Department of Education,
Culture and Sports (DECS)


LELAND S. VILLADOLID
Undersecretary
Department of Science and
Technology (DOST)


ERNESTO G. TABUJARA
Chancellor
University of the Philippines
Diliman

ATTACHMENT

1. The Objective of the Project

The objective of the Project is to construct necessary facilities and provide necessary equipment to implement training programs for elementary, secondary and tertiary school teachers of science and mathematics which will upgrade the competence of teachers, as well as of teacher educators in content, teaching methodology, instructional materials development and research and evaluation as well as other skills such as field work and nature study.

2. Main Activities of the Center

. Teacher-Training

Re-education of Teachers in Service
by Package Courses and Mini-Courses

- Elementary level
- Secondary level
- Tertiary level

. Resource Materials Development

- Teacher-Training Manuals for Trainers
- Instructional Media: Print and Non-Print

3. Responsible and Coordinating Departments for the Project

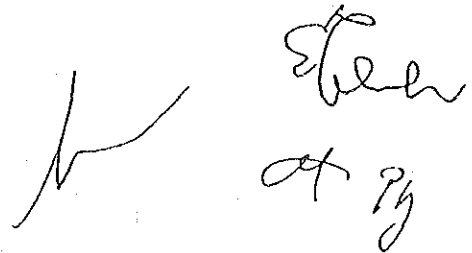
Department of Education, Culture and Sports (DECS)
Department of Science and Technology (DOST)

4. Executive and Implementing Agency for the Project

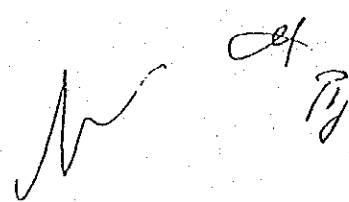
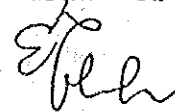
Institute for Science and Mathematics Education Development
(ISMED), University of the Philippines

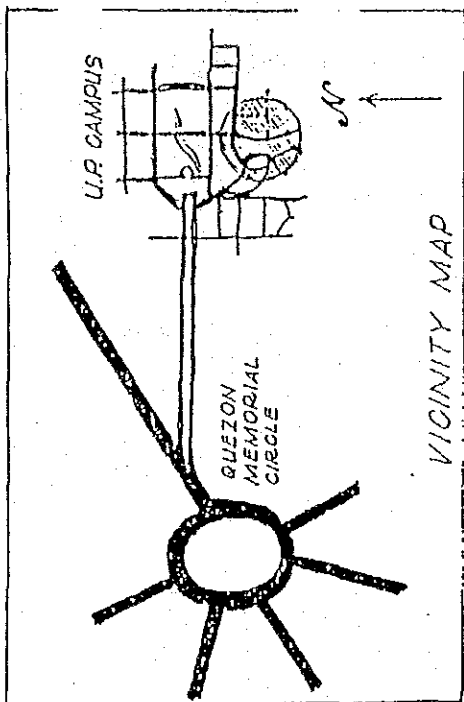
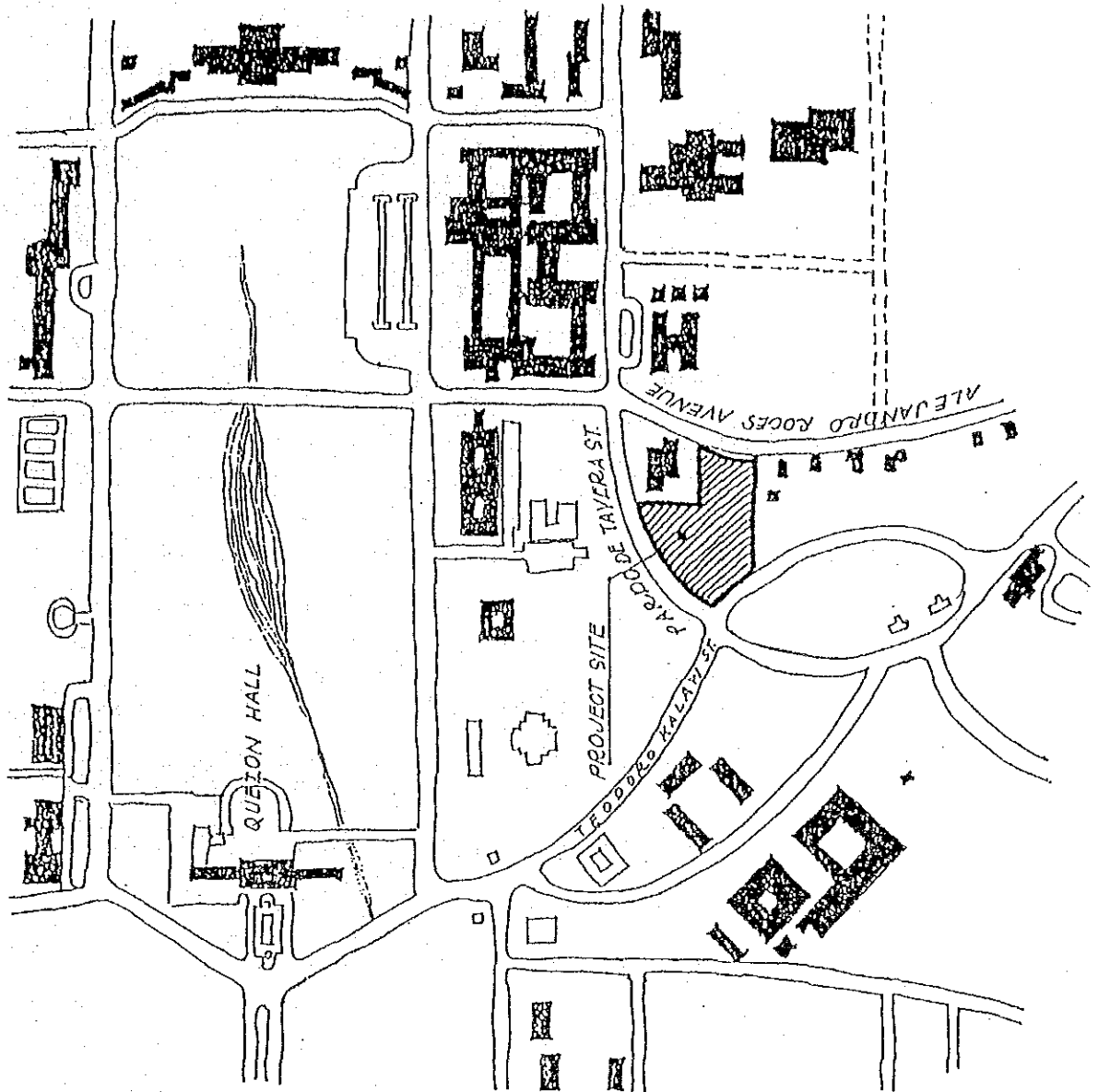
5. Project Site

The project site is located at the University of the Philippines, Diliman, Quezon City, Metro Manila as is shown in Annex 1.

Handwritten signatures and initials in black ink, including a large signature on the left and a set of initials 'Eber' and 'at pg' on the right.

6. The major items of facilities and equipment for the Project are listed in Annex 2.
7. The Team will convey to the Government of Japan the desire of the Government of the Philippines that the Government of Japan takes necessary measures to cooperate in implementing the Project and provide necessary facilities and equipment within the scope of Japan's Grant Aid Program.
8. The Philippine Side has understood the system of Japanese Grant Aid and the necessity of consulting services of a Japanese consulting firm for the implementation of the Project.
9. The Government of the Philippines will undertake to provide the necessary measures as listed in Annex 3 on condition that Grant Aid by the Government of Japan is extended to the Project.
10. The Government of the Philippines will undertake to provide the necessary budget and personnel for the proper and effective operation and maintenance of facilities and equipment provided under the Grant Aid.
11. The Philippine Side expresses its gratitude to the Basic Design Study Team of the Japan International Cooperation Agency (JICA) and to the Government of Japan for the interest shown so far in pursuing this Project to its completion and for the opportunity to undertake a venture in mutual cooperation and goodwill.
12. The Japanese Side expresses appreciation to the Philippine Side and to the Government of the Philippines for the cooperation extended to the Team to enable it to fully undertake its mission to study the various details of the project with a view to insuring its systematic completion.





Sheer at 7/1/50

LOCATION PLAN
SCALE 1:5000

Major items of facilities and equipment

1. Building

1.1 Training Building

1.2 Dormitory

2. Equipment

2.1 Laboratory Equipment

- (a) Biology Equipment
- (b) Chemistry Equipment
- (c) Physics Equipment
- (d) Earth Science Equipment
- (e) Mathematics Equipment
- (f) Information Science Equipment
- (g) Elementary Science Equipment

2.2 Instructional Materials Production Equipment

- (a) Workshop Equipment
- (b) Printing & Photography Equipment
- (c) Audio Visual Equipment

2.3 Auxiliary Equipment

- (a) Administrative Office Equipment
- (b) Library Equipment

2.4 Vehicles

Eber

[Signature]

at 11

Annex 3

Major undertakings to be taken by the Government of the Philippines

1. To secure land necessary for the construction of facilities.
2. To clear and level the site.
3. To provide facilities such as distribution of electricity, water supply, drainage and telephone lines.
4. To bear all expenses inclusive of sales tax and commission fee for Banking Arrangement other than those to be borne by the Grant.
5. To ensure prompt unloading and customs clearance for the goods imported by the contracted Japanese firms for the Project under the Grant.
6. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Grant such facilities as may be necessary for their entry.
7. To exempt Japanese nationals from customs duties, internal revenue taxes and other fiscal levies with respect to the supply of the products and services under the Grant.
8. To properly maintain and effectively use the constructed facilities under the Grant including machinery and equipment.
9. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and the installation of the equipment.
10. Other detailed items:
 - 10.1 Water supply mains to the buildings
 - 10.2 External drainage from the buildings
(including sewage treatment facilities)
 - 10.3 Landscaping
 - 10.4 Exterior facilities (fence, gate, streetlamp)
 - 10.5 Site survey and test boring
 - 10.6 General furnitures



Minutes of Discussions (Explanation of Draft Final Report)

MINUTES OF DISCUSSIONS

OF

THE BASIC DESIGN STUDY

on

THE PROJECT FOR CONSTRUCTING
THE NATIONAL LEARNING RESOURCE CENTER FOR TEACHER TRAINING
IN SCIENCE AND MATHEMATICS EDUCATION
IN
THE REPUBLIC OF THE PHILIPPINES

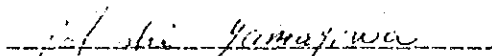
In response to the request of the Government of the Republic of the Philippines for Grant Aid on the Project for constructing the National Learning Resource Center for Teacher Training in Science and Mathematics Education (hereinafter referred to as "the Project"), the Government of Japan decided to conduct a basic design study on the Project and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines the basic design study team headed by Mr. Takashi Yamagiwa, Senior Specialist for Curriculum, Lower Secondary School Division, Elementary and Secondary Education Bureau, Ministry of Education, Science and Culture from July 15 to August 2, 1987.

As a result of the study, JICA prepared a draft report and dispatched a team headed by Mr. Yamagiwa to explain and discuss it from November 1 to November 8, 1987.

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

Manila, November 6, 1987.



TAKASHI YAMAGIWA

Leader

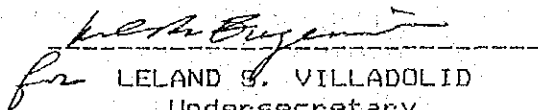
Draft Report Explanation Team
Japan International Cooperation
Agency (JICA)



MINDA C. SUTARIA

Undersecretary

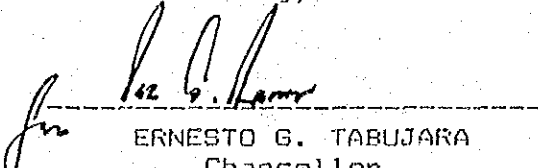
Department of Education,
Culture and Sports (DECS)



LELAND S. VILLADOLID

Undersecretary

Department of Science and
Technology (DOST)



ERNESTO G. TABUJARA

Chancellor

University of the Philippines

A T T A C H M E N T

1. The Philippine side agreed in principle on the basic design proposed in the Draft Final Report with minor but appropriate comments as shown in Annex 1 to be incorporated in the Final Report.
2. The Philippine side has understood Japan's grant aid system and confirmed that the necessary measures will be taken by the Philippine side which are manifested in Annex 3 of the Minutes of Discussions on the project signed on July 23, 1987, on condition that the grant aid by the Government of Japan would be extended to the Project.
3. The Philippine side ensured the provision of the necessary budget for the adequate personnel services, maintenance and operation expenses of the Center.
4. The Final Report (10 copies in English) will be submitted to the Philippine side by the middle of December.

P.S.
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COMMENTS

1. To design a paved sloping walk leading to the buildings (training center and dormitory) that will allow easy and safe access to and use of the facilities on the ground floor by handicapped persons.
2. To plan additional toilets at the north wing of the dormitory building.

at
R. G. L.
W
14

Appendix-2 Members of the Basic Design Study Team

Members of the Team and their roles are as follows:

Name and role

- | | |
|---|--|
| 1. Takashi Yamagiwa
Leader | Senior Specialist for Curriculum,
Lower Secondary School Division,
Elementary and Secondary Education
Bureau, Ministry of Education,
Science and Culture |
| 2. Shizumi Shimizu
Training Program | Senior Specialist for Curriculum,
Elementary School Division,
Elementary and Secondary Education
Bureau, Ministry of Education,
Science and Culture |
| 3. Masanori Furuya
Project Coordinator | Staff Member
Grant Aid Cooperation Division
Economic Cooperation Bureau
Ministry of Foreign Affairs |
| 4. Kazuo Hirukawa
Architectural Planner | Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc. |
| 5. Kiyoshi Kuronuma
Architectural Designer | Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc. |
| 6. Kiyotaka Ohtani
Facilities Designer | Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc. |
| 7. Akira Matsumoto
Training Program
Planner | Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc. |
| 8. Kuniaki Terasawa
Equipment Planner | Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc. |
| 9. Tetsuhito Sato
Cost Estimator | Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc. |

Members of the Explanation of Draft Final Report

1. Takashi Yamagiwa
Leader
Senior Specialist for Curriculum,
Lower Secondary School Division,
Elementary and Secondary Education
Bureau, Ministry of Education,
Science and Culture
2. Itsu Adachi
Project Coordinator
Staff Member
Public Relations Division,
General Affairs Department,
Japan International Cooperation Agency
3. Kazuo Hirukawa
Architectural Planner
Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc.
4. Masato Kobayashi
Equipment Planner
Matsuda, Hirata & Sakamoto
Architects, Planners & Engineers, Inc.

Appendix-3 List of the Philippine Side Interviewers
(Basic Design Study)

A. Department of Education, Culture, and Sports (DECS)

1. Dr. Lourdes Quisumbing Secretary, DECS
2. Dr. Minda C. Sutaria Undersecretary, DECS and Chairman,
Coordinating Com, NLRCTT
3. Dr. Victor Ordonez Undersecretary, DECS
4. Dr. Aurelio P. Elevazo Executive Officer, Secretariat for
International Educational Matters
5. Dr. Nilo L. Rosas Director, BHE
6. Dr. Esperanza A. Gonzales Director, BSE
7. Dr. Juanita Guerrero Director, BEE
8. Dr. Pedro B. Trinidad Assistant Director, BSE
9. Dr. Edith B. Carpio Assistant Director, BEE
10. Dr. Pacita N. Andres Chief, Curriculum Development
Division, BSE
11. Dr. Marcelina M. Miguel Chief, Curriculum Development
Division, BEE
12. Mrs. Adela A. Capistrano Senior Researcher in Charge of
Training Try-out Teachers,
Curriculum Development Division
13. Ms. Lorelyn Santos Bureau of Higher Education
14. Ms. Mary Joan B. Beleno Bureau of Higher Education
15. Mr. Reynaldo Pena Bureau of Higher Education
16. Miss Mercedita L. Aquino Project Assistant, BSE
17. Ms. Lilia A. Diokno Sr. Educational Researcher, BSE
18. Ms. Marilyn S. Santos Project Officer, BSE
19. Miss Luz O. Gallardo Educational Researcher I, BEE
20. Ms. Rosine C. Rivera Educational Researcher, BEE

B. Department of Science and Technology (DOST)

1. Dr. Antonio Arizabal Secretary, DOST
2. Dr. Leland Villadolid Undersecretary, DOST
3. Miss Ester B. Ogena Chief, Science Education and Manpower Resource Development Div., SPI
4. Mrs. Violeta N. Arciaga Sr. Science Research Specialist, SPI
5. Ms. Estrella Ponce de Leon Science Research Specialist II, SPI

C. University of the Philippines - UP

1. Dr. Ernesto Tabujara Officer-in-Charge, Office of the President, UP System Chancellor, UP Diliman
2. Prof. Teresa F. Bernabe Acting Executive Vice Pres., UP System
3. Dr. Emeteria Lee Registrar & Acting Vice Pres. for Academic Affairs, UP System
4. Dr. Agustin Kintanar Vice President for Planning and Finance, UP System
5. Prof. Emerlinda Roman Vice Chancellor for Administration, UP Diliman Campus
6. Dr. Julieta M. Savellano Dean, College of Education
7. Mr. Antonio Cruz Director, Campus Planning Development Management Office
8. Mr. Elias C. Avante, Jr. Chief, Campus Planning Development Management Office

D. Institute for Science & Mathematics Education Development - ISMED

1. Prof. Porfirio P. Jesuitas Director
2. Dr. Leticia P. Cortes Asst. Director
3. Mrs. Josefina LI. Pabellon Science Ed. Specialist, Chairman, Equipment & Teaching Aids Development (ETAD)
4. Mrs. Leonarda B. Pascua Chairman, Bath Workgroup
5. Mrs. Estela Rodriguez Chairman, Physics Workgroup

- | | | |
|-----|------------------------|---|
| 6. | Dr. Marcelita C. Magno | Chairman, Chemistry Workgroup |
| 7. | Mrs. Elvira Galvez | Chairman, Biology Workgroup |
| 8. | Dr. Merle C. Tan | Chairman, Earth/Environment Science Workgroup |
| 9. | Dr. Lourdes Carale | Chairman, Elementary Science Workgroup |
| 10. | Mrs. Lanniene Capalad | Chairman, Microcomputing Workgroup |
| 11. | Mrs. Mary Ann Galvea | Librarian |
| 12. | Miss Ester Bautista | Chief, Publications Section |
| 13. | Mr. Cesar Sagun | Art Supervisor |
| 14. | Mr. Rodolfo Sangel | Precision Instrument Technician, ETAD |
| 15. | Mr. Ruben Borja | Research Assistant, ETAD |
| 16. | Mrs. Miliza Romero | Research Assistant, ETAD |

E. Others

- | | | |
|----|----------------------------|--|
| 1. | Dr. Dolores Hernandez | Director, Regional Center for Educational Innovation and Technology |
| 2. | Mrs. Emerilda D. Lugtu | Principal, Quirino Elementary School (Quezon) |
| 3. | Miss Socorro De Los Santos | Principal, Magsaysay High School (Cubao) |
| 4. | Mrs. Francisca O. Yazon | Chief of Student Services
Philippine Science High School (Diliman) |
| 5. | Ms. Edona Labuna | Philippine Social Science Center |
| 6. | Mr. Andres R. Villamuran | Deputy Executive Director,
Construction Manpower Development Center |

F. Embassy of Japan

- | | | |
|----|-------------------|-----------------|
| 1. | Mr. Koji Kaminaga | First Secretary |
|----|-------------------|-----------------|

G. JICA Manila Office

- | | |
|-------------------------|--|
| 1. Mr. Moriya Miyamoto | Resident Representative
JICA Philippine Office |
| 2. Mr. Katsuhiko Oshima | Deputy Resident Representative
JICA Philippine Office |
| 3. Mr. Kikuo Nishida | JICA Chief Advisor, TUP |
| 4. Mr. Shigeru Takara | JICA Coordinator, TUP |
| 5. Mr. Masashi Fujita | JICA Coordinator, PHRDC |
| 6. Mr. Noriaki Kumai | JICA Expert, CMDC |

List of the Philippine Side Interviewers (Explanation of Draft Final Report)

A. Department of Education, Culture and Sports (DECS)

1. Dr. Minda C. Sutaria Undersecretary, DECS and Chairman,
Coordinating Com, NLRCTT
2. Dr. Aurelio P. Elevazo Executive Officer, Secretariat for
International Educational Matters
3. Dr. Martha A. Mogol Director, BSE
4. Dr. Mamerta R. Mendoze Chief, Staff Development Division, BSE
5. Dr. Edith B. Carpio Assistant Director, BEE
6. Mr. Reynaldo Pena Assistant Chief, BHE

B. Department of Science and Technology (DOST)

1. Dr. Antonio Arizabal Secretary, DOST
2. Dr. Manuel Eujenio Director, Science Education Institute,
DOST
3. Ms. Estrella Ponce de Leon Science Research Specialist II, SPI

C. University of the Philippines - UP

1. Prof. Teresa F. Bernabe Acting Executive Vice Pres., UP System
2. Dr. Paz Ramos Vice Chancellor of Academic Affairs,
UP Diliman Campus
3. Mr. Antonio Cruz Director, Campus Planning Development
Management Office

D. Institute for Science & Mathematics Education Development - ISMED

1. Prof. Porfirio P. Jesuitas Director
2. Dr. Leticia P. Cortes Asst. Director
3. Mrs. Leonarda B. Pascua Chairman, Math Workgroup
4. Mrs. Estela Rodriguez Chairman, Physics Workgroup
5. Dr. Marcelita C. Magno Chairman, Chemistry Workgroup

- 6. Mrs. Elvira Galvez Chairman, Biology Workgroup
- 7. Dr. Merle C. Tan Chairman, Earth/Environmental Science Workgroup
- 8. Dr. Lourdes Carale Chairman, Elementary Science Workgroup
- 9. Mrs. Lanniene Capalad Chairman, Microcomputing Workgroup
- 10. Mr. Rodolfo Sangel Precision Instrument Technician, ETAD

E. Others

- 1. Dr. Dolores Hernandez Director, Regional Center for Educational Innovation and Technology

F. Embassy of Japan

- 1. Mr. Kazuyoshi Yamaguchi Second Secretary, Economic Division

G. JICA Manila Office

- 1. Mr. Katsuhiko Oshima Deputy Resident Representative
JICA Philippine Office

Appendix-4 Schedule of Basic Design Study Team

Day	Month/day	Study details
1	July 15 (Wed.)	<p>Departure of the Study Team</p> <p>Leave Tokyo 10:00 Arrive Manila 13:10 JL-741</p> <p>(Yamagiwa (Leader), Shimizu, Furuya, Hirukawa, Kuronuma, Ohtani, Matsumoto, Terasawa, and Sato)</p> <p>Visit to the Embassy of Japan and JICA Manila Office</p>
2	July 16 (Thu.)	<p>Visit to the Department of Education, Culture, and Sports (DECS)</p> <p>Courtesy call on Dr. Lourdes R. Quisumbing (Secretary of Education, Culture, and Sports)</p> <p>Meeting at the Bureau of Elementary Education (BEE), the Bureau of Secondary Education (BSE), and the Bureau of Higher Education (BHE)</p> <p>Presentation, explanation, and discussion of the inception report</p> <p>Confirmation of agencies concerned and counterparts.</p>
3	July 17 (Fri.)	<p>Visit to the University of the Philippines, Diliman campus (UP-D)</p> <p>Courtesy call on Prof. Teresa F. Bernabe, Vice President of the University of the Philippines</p> <p>Meeting at the Institute for Science and Mathematics Education Development (ISMED)</p> <p>Discussion regarding the background and details of the request for this project</p> <p>Training/material plan Facilities/equipment plan</p> <p>Survey of existing facilities and equipment at ISMED</p>

Day	Month/day	Study details
4	July 18 (Sat.)	<p>Survey of the proposed construction site</p> <p>Survey of similar facilities</p> <p>Visit to the College of Science in the campus of UP</p>
5	July 19 (Sun.)	<p>Sorting of collected information and data</p> <p>Team meeting</p>
6	July 20 (Mon.)	<p>Discussion at DECS with the participation of Dr. Minda C. Sutaria, Undersecretary</p> <p>Meeting at ISMED</p> <p>Organization and budgeting system</p> <p>Meeting for training and materials</p> <p>Detailed discussion of facilities and equipment - (1)</p> <p>Peripheral infrastructure</p> <p>Boring data</p>
7	July 21 (Tue.)	<p>Visit to Quirino Elementary School (Quezon) and Magsaysay High School (Qubao)</p> <p>Meeting at ISMED</p> <p>Organization and budgeting system</p> <p>Detailed discussion of training and materials - (1)</p> <p>Detailed discussion of facilities and equipment - (2)</p> <p>Constitution of each room</p> <p>Minutes of Discussions (Draft)</p>
8	July 22 (Wed.)	<p>Meeting at ISMED</p> <p>Organization and budgeting system</p> <p>Detailed discussion of training and materials (2)</p>

Day	Month/day	Study details
8	July 22 (Wed.) (Cont'd)	Detailed discussion of facilities and equipment - (3) Preparation of Minutes of Discussions Departure of Mr. Furuya
9	July 23 (Thu.)	Meeting at ISMED Detailed discussion of training and materials - (3) Meeting at DECS Exchange of Minutes of Discussions Interim report to the Embassy of Japan and JICA
10	July 24 (Fri.)	Meeting at ISMED Detailed discussion of training and materials - (4) Survey of similar facilities Visit to the main building and the dormitory of INNOTECH Departure of Mr. Yamagiwa, Leader, and Mr. Shimizu
11	July 25 (Sat.)	Meeting at ISMED Detailed discussion of training and materials - (5) Team meeting
12	July 26 (Sun.)	Sorting of collected information and data
13	July 27 (Mon.)	Meeting at ISMED Detailed discussion of training and materials-(6) Detailed discussion of facilities and equipment - (4) Discussion of training plan (request for additional materials) Interim report to JICA

Day	Month/day	Study details
14	July 28 (Tue.)	Meeting at ISMED Detailed discussion and training and materials - (7) Survey of construction conditions Facility plan
15	July 29 (Wed.)	Visit to CMDC (Cavite), TUP, PHRDC Visit to Science High School Survey of construction conditions Facility plan
16	July 30 (Thu.)	Survey of construction conditions Visit to the construction site of the Trade Center and the Labor Safety and Sanitation Center Survey of material and equipment market Facility plan
17	July 31 (Fri.)	Report to DOST, UP, DECS of the departure of the team Final confirmation at ISMED Report to the Embassy of Japan and JICA of the departure of the team Departure of Mr. Matsumoto and Mr. Ohtani
18	Aug. 1 (Sat.)	Survey of construction and material market Sorting of collected information and data
19	Aug. 2 (Sun.)	Departure of the Study Team (Manila - Tokyo PR432) Hirukawa, Kuronuma, Terasawa, and Sato

Schedule of Study Team (Explanation of Draft Final Report)

Day	Month/day	Study details
1	Nov. 1 (Sun.)	<p>Departure of the Study Team.</p> <p>Leave Tokyo 18:00 Arrive Manila 21:40 UA-097.</p> <p>(Yamagiwa (Leader), Adachi, Hirukawa, and Kobayashi).</p>
2	Nov. 2 (Mon.)	<p>Visit to the Embassy of Japan and JICA Manila Office.</p> <p>Discussion regarding study schedule. Explanation of the Draft Final Report.</p> <p>Visit to the ISMED on the campus of the University of the Philippines.</p> <p>Participation of DECS, DOST, ISMED staff. Discussion regarding study schedule. Explanation and discussion of the Draft Final Report.</p>
3	Nov. 3 (Tue.)	<p>Courtesy call on Dr. Antonio Arizabal, Secretary, Department of Science and Technology.</p> <p>Courtesy call on Dr. Minda C. Sutaria, Under-secretary, Department of Education, Culture, and Sports.</p> <p>Participation of staff of the Bureau of Elementary Education (BEE), the Bureau of Secondary Education (BSE), and the Bureau of Higher Education (BHE).</p> <p>Explanation and discussion of the Draft Final Report.</p> <p>Meeting at ISMED</p> <p>Detailed discussion of the Draft Final Report.</p>

Day	Month/day	Study details
4	Nov. 4 (Wed)	<p>Meeting at ISMED</p> <p>Detailed discussion of the Draft Final Report.</p> <p>Courtesy call on Dr. Paz Ramos, Vice President of the University of the Philippines, Diliman campus (UP-D).</p> <p>Meeting at ISMED</p> <p>Drafting of the Minutes of Discussions.</p>
5	Nov. 5 (Thu.)	<p>Report to the Embassy of Japan and JICA Manila Office of the Study results</p> <p>Meeting at ISMED</p> <p>Final confirmation of the Minutes of Discussions.</p>
6	Nov. 6 (Fri.)	<p>Signing and Exchange of the Minutes of Discussions.</p> <p>Field survey.</p>
7	Nov. 7 (Sat.)	<p>Team meeting.</p> <p>Analysis of collected information and data.</p>
8	Nov. 8 (Sun.)	<p>Departure of the Study Team</p> <p>Leave Manila 14:50 Arrive Tokyo 19:35 JL-742.</p> <p>(Yamagiwa (Leader), Adachi, Hirukawa, and Kobayashi)</p>