

THE REPUBLIC OF INDONESIA

BASIC DESIGN REPORT
ON
CONSTRUCTION GUIDANCE SERVICE CENTER
IN IRRIGATION & DRAINAGE ENGINEERING (C.G.S.C)

MARCH, 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

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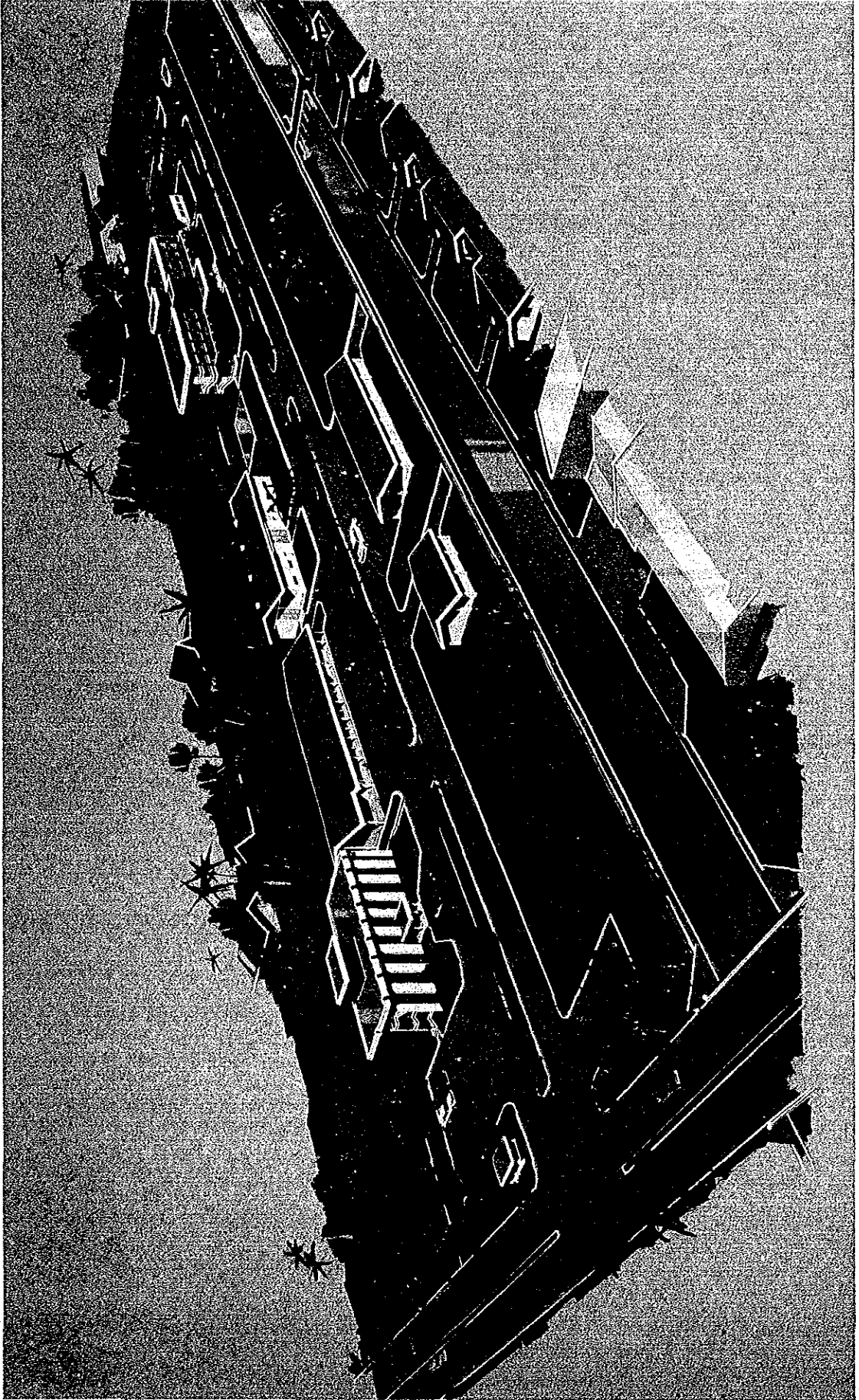
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CONSTRUCTION GUIDANCE SERVICE CENTER

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PERSPECTIVE VIEW



LOCATION MAP

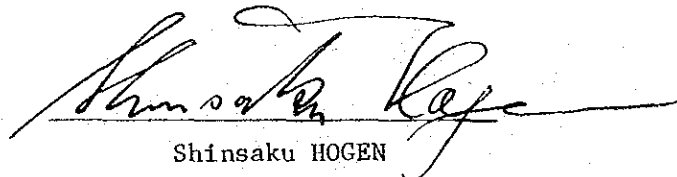
PREFACE

The Government of the Republic of Indonesia, with a view of improving the level of irrigation and drainage engineering of the country, formulated a project to establish a Construction Guidance Service Center for providing necessary informations and training to Indonesian technicians, and requested the Government of Japan for a grant-aid necessary for this Center.

Following the above request, the Japan International Cooperation Agency dispatched a team headed by Mr. Nobuo FUSAYAMA, Director of Kyoto Agricultural Engineering Laboratory, Ministry of Agriculture, Forestry & Fisheries, and 3 others from the 24th of November 1978 for 12 days to conduct a basic design survey of the above Center. Based on the findings of the above survey and the discussion with the officials concerned of the Indonesian Government, the survey team has formulated the present report.

I hope that the report will be found useful for the establishment of the Center, and will contribute not only to the increase in food production of the region but also to the promotion of mutual friendship between our two countries.

March 1979



Shinsaku HOGEN

President

Japan International Cooperation
Agency

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CHAPTER I -- PURPOSE OF SURVEY AND PARTICULARS

1-1 BASIC DESIGN SURVEY

1-1-1 PURPOSE

In response to the request of the Government of the Republic of Indonesia in February and July 1978 respectively, for an assistance in establishing a Construction Guidance Service Center in Irrigation and Drainage Engineering, a basic design survey team was dispatched by the Government of Japan from November 24 to December 5, 1978.

The basic design survey team exchanged views with concerned Indonesian government officials, surveyed local conditions and collected relevant data on construction materials and equipment for the purpose of sounding out a suitable scope of facilities for the Center and for preparation of the basic design thereof to be proposed for an appropriation of the Grant Aid under the 1979 fiscal year national budget.

1-1-2 BACKGROUND OF REQUEST FOR ASSISTANCE

The increase of agricultural food production and the enhancement of self subsisting thereby are one of the most important factors in the economic policy of Indonesia. The improvement of agricultural substructures is therefore being urged and the irrigation and drainage projects concentrated upon. However, there has been a chronic shortage of competent experts in this field and hence posed problems in efficiency, safety and durability.

In order to remedy the above situation, the Government of Indonesia, preparing a construction site at Bekasi City located east of Jakarta, has requested the Japanese government for an assistance in establishing a Construction Guidance Service Center in Irrigation and Drainage Engineering aiming at promoting engineering expertise in irrigation and drainage constructions along with the introduction and distribution of up-to-date know-how.

1-1-3 SCOPE OF SERVICE OF THE SURVEY TEAM

As explained hereto in paragraph (1-1-1), the assignment of the survey team has lain in working out a basic plan on the requirements of facilities and equipment in the subject Center to be covered by the Grant Aid of the Japanese government.

The scope of technical assistance deemed to be required for the operation of the Center facilities after completion of construction, such as dispatch of Japanese experts, receiving of trainees, and provision of appurtenant instruments and equipments has duly been taken into account in making out the basic design but the details of technical assistance have been left to a survey and discussion to be made under separate technical cooperation basis which is expected to be undertaken in the near future.

1-1-4 ORGANIZATION OF THE SURVEY TEAM

Chief - Nobuo Fusayama

Director of Kyoto Agricultural Engineering
Laboratory, Ministry of Agriculture, Forestry &
Fisheries

Member - Susumu Murakami

Senior Official
International Cooperation Division,
International Affairs Department,
Ministry of Agriculture, Forestry & Fisheries

Member - Shinya Osumi

Architectural Department,
Nippon Koei Co., Ltd.

Member - Hirohide Shibuya

Electrical Engineering Department,
Nippon Koei Co., Ltd.

1-1-5 ITINERARY OF THE SURVEY TEAM

<u>Date</u>	<u>Day</u>	<u>Activities</u>
24 Nov.	Friday	Tokyo to Jakarta Discussion on itinerary schedule and scope of survey with Mr. Nakao (Embassy of Japan), Mr. Shinoura (JICA) and Mr. Masumoto (expert)
25 Nov.	Saturday	Courtesy call to Assistant Direct- or General of Water Resources Development, Ministry of Public Works

<u>Date</u>	<u>Day</u>	<u>Activities</u>
25 Nov.	Saturday	Discussion with the officials of Directorate of Irrigation (Discussion on itinerary, explanation on system of grant aid, and exchange of views on functions and purpose of establishing the Center)
26 Nov.	Sunday	Discussions among the team members (Preparation of agenda and questionnaires)
27 Nov.	Monday	Discussion with officials of Directorate of Irrigation (Supplemental explanation on grant aid, questions and answers, request of data and information)
28 Nov.	Tuesday	Survey of proposed construction site at Bekasi City Inspection of Jatilhur Irrigation Project
29 Nov.	Wednesday	Inspection of the facilities of Institute of Hydraulic Engineering (DPMA) at Bandung City Discussion with Messrs. Masumoto and Yamashita
30 Nov.	Thursday	Discussion with officials of Directorate of Irrigation (Scope of facilities for the Center) Investigations on the local construction conditions

<u>Date</u>	<u>Day</u>	<u>Activities</u>
1 Dec.	Friday	Discussion among the team members (Preparation of interim report draft)
2 Dec.	Saturday	Discussion with official of Directorate of Irrigation (In- terim report)
3 Dec.	Sunday	Discussion among the team members (Summing up)
4 Dec.	Monday	Courtesy call and report on the mission to the Japanese Embassy Call and report to JICA office Submittal of Interim Report to Directorate of Irrigation Investigations on the local con- struction conditions Dinner party hosted by the survey team
5 Dec.	Tuesday	Depart Jakarta to Tokyo

**1-1-6 LIST OF NAMES OF THE INDONESIAN OFFICIALS
CONCERNED**

1) Directorate General of Water Resources Development,
Ministry of Public Works

Ir. H. Nainggolan Assistant Director General W.R.D.

Ir. Oesman Djojoadinoto	Director of Irrigation
Ir. Gatot Soenaryo	Chief, Sub Directorate Construction Guidance I, D.O.I.
Mr. Aziz Bockings Ma.	Chief, Sub Division Technical Assistance, D.C.W.R.D.
Drs. Muhammad Nur	Chief, Foreign Aid Administration Unit, D.O.I.
Mr. Sumardjo	Staff Member of D.O.I.
Mr. Bambang Sigit	Staff, Sub Directorate Construction I, D.O.I.
2) Japanese Experts	
Mr. Arata Masumoto	Irrigation Expert (Leader)
Mr. Kiyoshi Yamashita	Irrigation Expert (Replacing leader)
Mr. Akiyoshi Noda	Hydraulic Engineering Expert

1-1-7 PROCEDURES AND DISCUSSION

a) ON GRANT AID COOPERATION

The survey team explained to Ir. Oesman Djojoadinoto, Director of Irrigation, Directorate General of Water Resources Development and other officials on the survey team's purpose of survey and assignment, the regulations and procedures regarding the Japanese government's Grant Aid cooperation, the Japanese government's fiscal year and the expected execution time schedule, which received full understanding of the attendants. They have also expressed concurrence on that the details of technical cooperation required at the operation stage after the Center's

completion of construction would be left to a separate survey and discussion in the future.

b) ON SCOPE OF FACILITIES IN THE CENTER

The survey team exchanged views with the officials of the Directorate of Irrigation on the background, objective, functions and its effect regarding the establishment of the Center and has worked out the basic conception as described in Chapter-3 hereafter.

Discussions were made based on a proposal prepared by the Indonesian side to which suggestions were proposed by the survey team.

The main consideration of the survey team has been to cover by the Grant Aid not only the construction of required building facilities but to include instruments and equipment required for the smooth operation of the Center as much as the budget may allow. It was mutually agreed that in the preparation of the basic design, the building facilities would be given the first priority and the instruments and equipment would be incorporated in order of priority.

The Indonesian side made a strong request to include an emergency power source in power supply system and a water well in water supply system for the Center considering the local conditions, to which survey team agreed to consider the matter in the basic design.

c) **ON EXTENT OF CONSTRUCTION**

The extent of construction to be provided by the Japanese government and the works to be executed by the Indonesian government have been determined as indicated in the Interim Report which has been so defined in conformance with the regulations of the Grant Aid.

d) **ON BUDGET FOR CONSTRUCTION**

The survey team explained that the proposed Center project could be implemented only after the finalization of the Japanese government budget for fiscal year 1979 and that the amount of appropriation could not be cleared before the finalization.

The Indonesian side expressed their understanding while emphasizing their great concern on the realization of the Project and therefore special consideration of the Japanese government on its implementation.

e) **ON EXECUTION TIME SCHEDULE**

The survey team further explained that the construction work would be commenced after the finalization of the budget, the Exchange of Notes, the preparation of detailed design and the tendering though the time of Exchange of Notes could not be fixed at the moment and also that Grant Aid cooperation is basically to be concluded within a single fiscal year and carrying forward of undisbursed sums would be limited.

The Indonesian side expressed their full understanding on the above conditions.

Further to the survey team's explanation that arrangement among the Indonesian government agencies, establishment of an executing agency and preparation of the required local fund should have been settled, the Indonesian side informed that the arrangement among the government agencies has been already concluded, and they have already made a request for the required fund and also that the executing authorities would be the Directorate of Irrigation.

1-2 INTERIM REPORT

The survey team prepared an Interim Report based on the hereto explained discussions with the government officials, and received their concurrences, whereupon the representatives of both parties affixed their signatures in the delivery and acceptance letter.

Hereinafter shown is the complete contents of the Interim Report.

**CONSTRUCTION GUIDANCE SERVICE CENTER
IN THE REPUBLIC OF INDONESIA**

FOREWORD

We, as a mission dispatched by the Government of Japan through Japan International Cooperation Agency, have the pleasure of presenting herewith an interim report on the basic design of the Construction Guidance Service Center with warm thanks to the officials at Directorate of Irrigation for kind cooperation extended to us during our stay.

We wish to express our intention to make out a basic design of this Center based upon the discussions and information here to help promote technical expertise in the field of irrigation/drainage construction along with contribution to further friendship between the two countries.

(The Mission)

We acknowledge with thanks receipt of an interim report on the Construction Guidance Service Center prepared by the Japanese Basic Design Survey Team and our concurrence on the contents stated therein.

In view of the importance of establishing this Center, we wish to have a kind consideration and cooperation of your Government on this project and hope this opportunity

will further strengthen the relationship of both countries.

(Directorate of Irrigation)

December 4, 1978

NOBUO FUSAYAMA
Leader of Japanese Basic
Design Survey Team

For DGWRD
OESMAN DJOJOADINOTO
Director of Irrigation

N. Fusayama

O. Jojoadinoto

**INTERIM REPORT
ON
BASIC DESIGN OF CONSTRUCTION GUIDANCE SERVICE CENTER**

December 4, 1978

1. PREFACE

In response to a request of the Government of the Republic of Indonesia for an assistance in establishing the Construction Guidance Center (hereafter referred to as the Center), a basic design survey team (hereafter referred to as the Mission) has been dispatched by the Government of Japan through Japan International Cooperation Agency, an official agency responsible for the implementation of cooperation programs. The Mission, headed by Mr. Fusayama, Director of Kyoto Agricultural Engineering Laboratory, Ministry of Agriculture, Forestry & Fisheries, stayed in Indonesia from November 24th to December 5th, and exchanged views with concerned Indonesian officials (hereafter referred to as the Government) on the various aspects of the Center, collected relevant information and surveyed the local conditions and the construction site.

2. SUMMARY

Major items discussed and agreed upon are the following:

- a) Explanation on Grant Aid;
- b) Function of the Center;
- c) Scope of facilities covered by Grant Aid;
- d) Works to be carried out by the Government;
- e) Other particulars.

3. EXPLANATION ON GRANT AID

The Mission explained the extent of assistance to be covered by the Grant Aid, conditions involved therein and the procedure to be taken to the understanding of the Government.

4. FUNCTION OF THE CENTER

The Center aims at promoting and coordinating technical expertise in the field of irrigation/drainage construction through monitoring, training of field engineers and standardization of material quality and construction workmanship.

The following are the outstanding activities at the Center:

- a) Collection, control and distribution of technical data and information as an information center;
- b) Overall monitoring of constructions;

- c) Automatization of overall monitoring and constructions by an electronic computer system and development of programs therefor;
- d) Testing on quality of construction materials;
- e) Hydraulic model tests;
- f) Periodical training of field engineers and inspectors;
- g) Other technical assistance.

5. SCOPE OF FACILITIES COVERED BY GRANT AID

a) Buildings

	<u>Remarks</u>
Information Center	3-4 storied, w/foundation piles
Dormitory	3-storied, w/foundation piles
Laboratory	1-storied
Repair Training Shop	"
Garage for Heavy Equipment	"
Garage	"
Hydraulic Laboratory	"
Guard House	"

b) Other Structures

Water reserve tank for hydraulic test

- c) Instruments and Equipment to be supplied for
 - Soil mechanics study
 - Concrete testing

Asphalt testing

Micro-photo processing

Machine engineering study

Machine repair training

Heavy equipment operation training

Notes: 1. Electronic computer system and instruments and equipment for hydraulic study which are indispensable for operation of the Center will be considered in a future stage in consideration of construction schedule of the buildings.

2. Furniture, office utensils and consumables are not included.

6. WORKS TO BE CARRIED OUT BY THE GOVERNMENT

In conjunction with the regulations of the Grant Aid, the following shall be carried out or provided by the Government:

- a) Acquisition of a land and clearing and grading thereof;
- b) Supply of electric power, water, telephone and gas line to the site;
- c) Custom clearance and inland transportation of imported goods from the port of disembarkation to the site;
- d) Access road to the site if required.

7. EXECUTION TIME SCHEDULE

The Mission drew attention of the Government to the following points regarding the execution time schedule in

relation to the procedure of the Grant Aid:

- a) All disbursement of the Grant Aid shall duly be made in single fiscal year unless otherwise extended;
- b) Exchange of Notes (E/N) for the Grant Aid is expected to be done in July through September, 1978;
- c) For detail design and tendering/contracting for construction, at least 3 months and 2 months respectively will be required after E/N and the remaining time is for construction.

8. OTHER PARTICULARS

- a) During the course of discussions, the Government requested a kind consideration of the Government of Japan on the following items:

In view of frequent power failure on the power distribution lines around the site, an emergency power source is requested in the central substation in the Center,

Lifts (elevator) are requested in the Information Center and Dormitory buildings,

Water treatment facilities is requested in consideration of raw quality of delivered water to the site.

The Mission will further study the above consulting concerned Japanese officials.

b) The Government made it clear that concerned governmental officials are well informed on this project and local budgetary arrangement is being processed on his part.

c) Acting agency for execution of this project will be Directorate of Irrigation under the jurisdiction of Directorate General of Water Resources Development, Ministry of Public Works.

CHAPTER 2-- SCOPE OF CONSTRUCTION GUIDANCE SERVICE CENTER IN IRRIGATION AND DRAINAGE ENGINEERING

2-1 BACKGROUND OF ESTABLISHMENT OF THE CENTER

The Indonesian economy is still in a developing country economy though undergoing rapid changes with primary industries as its main industry and the agriculture is a major life resources of most of her population. While the Indonesian Government is aiming at the development of national economy through industrialization, the weight which agriculture holds is outstanding and therefore the development of Indonesian economy cannot be attained disregarding the development of agriculture.

The gross domestic product in 1976 at constant 1973 market prices amounted to Rp. 8.1 trillion in which the share of agricultural sector accounted for about 31 %. Agriculture has an important role in export as well (30 %). Besides 60 % of the working population are engaged in agriculture.

On the aspect of economical growth, growth of GDP during 1971 - 1975 at constant 1973 market prices hit 36 % and agriculture alone which shares 31 % of the GDP has grown 16 % which together with that of mining & quarrying industry has sustained the overall GDP growth.

On agricultural production, agricultural food products accounted for 60 % of the whole. In the agricultural food products, rice is the largest accounting for about 50 % while cassava, maize and sweet potatoes are the other important products.

The staple of diet of the people is rice followed by cassava but the production of rice is still under the self sustaining line and in order to sustain the yearly population growth of 2.6 % they have been importing 700 million dollars worth of rice yearly.

Therefore, the enhancement of self subsistence by increasing agricultural food products through the improvement of agricultural structure has been one of the major items in the economic policy.

Better supply of food and clothing has been one of the major items in both the 1st 5 year economic plan which started in 1968 and the 2nd 5 year plan which started in 1974, and it is presumed to be the same in the 3rd 5 year plan which is scheduled to start from 1979.

Looking at it from the viewpoint of improvement of *infra-structure* for increase in agricultural food productions, the islands of Jawa and Madura have been already cultivated to almost its full capacity and have only a minor acreage left for future cultivation but there are large areas of uncultivated land in the other island territories which are deemed to become the major objects of development.

Further, the present crop yield per unit area is estimated at about 1/3 that of Japan and the increase in the yield through extension of irrigation and drainage system and use of chemical fertilizers will be an important policy.

However, in the country's present condition, there has been a chronic shortage of experts to tackle these basic requirements and therefore in order to improve the situation the previously noted request (1-1-2) has been made by the Government of Indonesia. The Japanese government on its part, considering that the establishment of the Center would contribute to the increase in agricultural food productions, decided to dispatch the survey team for the implementation of the construction of the Center on a Grant Aid base.

2-2 EFFECT OF ESTABLISHMENT OF THE CENTER ON IRRIGATION AND DRAINAGE UNDERTAKINGS

As explained hereto, the increase of food products is one of the most important national policy of Indonesia of which substance may be summarized into the following 3 factors:

- a) Increase of production in the islands of Jawa and Madura by introducing intensive rice planting agriculture;
- b) Creating paddy fields through land reclamation in Kalimantan and Sumatra;
- c) Planting of dry field rice with use of machineries for cultivation;

In the administrative organization, the Directorate General of Water Resources Development in the Ministry of Public Works is responsible for the execution of the planning and execution of the development projects. (Ref. organization chart in Appendix I.)

Scope of work of the Directorate General of Water Resources Development are summarized into the following 4 categories;

- 1) Irrigation and Drainage Development;
- 2) Development and reclamation of deltaic and swampy areas;
- 3) Flood control, river training and river improvements;

4) River basin planning and development.

The departments to enforce the above works within the Directorate General of Water Resources Development are:

- A) Directorate of Planning & Programming;
- B) Directorate of River;
- C) Directorate of Swamp;
- C) Directorate of Irrigation;
- E) Directorate of Logistic;
- F) Directorate of Hydraulic Engineering;
- G) Assistant Director General.
(Ref. organization chart - Appendix I.)

The subject Construction Guidance Service Center for Irrigation and Drainage Engineering will be established under the jurisdiction of the Directorate of Irrigation.

Since Indonesia has been suffering from the shortage of competent experts and the low standard of engineering in the field of irrigation/drainage constructions lacking standardization and systematization of construction and supervision and proper collection and control of technical data, the establishment of a central organization in the administrative structure together with physical facility to render engineering guidance service have long been called for.

The subject project is considered to meet right Indonesia's needs and we believe that through the activities in the Center, the irrigation and drainage engineer-

ing expertise would be enhanced and hence contribute to the increase in agricultural food products.

The survey team has made every effort to work out an effective planning of the building facilities and instruments and equipment with a clear understanding on the objective and functions of the Center.

CHAPTER 3 – BASIC DESIGN

3-1 FUNCTIONS OF THE CENTER

The Center will be established as an execution organization under the jurisdiction of the Directorate of Irrigation, Directorate General of Water Resources Development aiming at promoting technical expertise in the field of irrigation/drainage undertaking through technical advices, guidance and training.

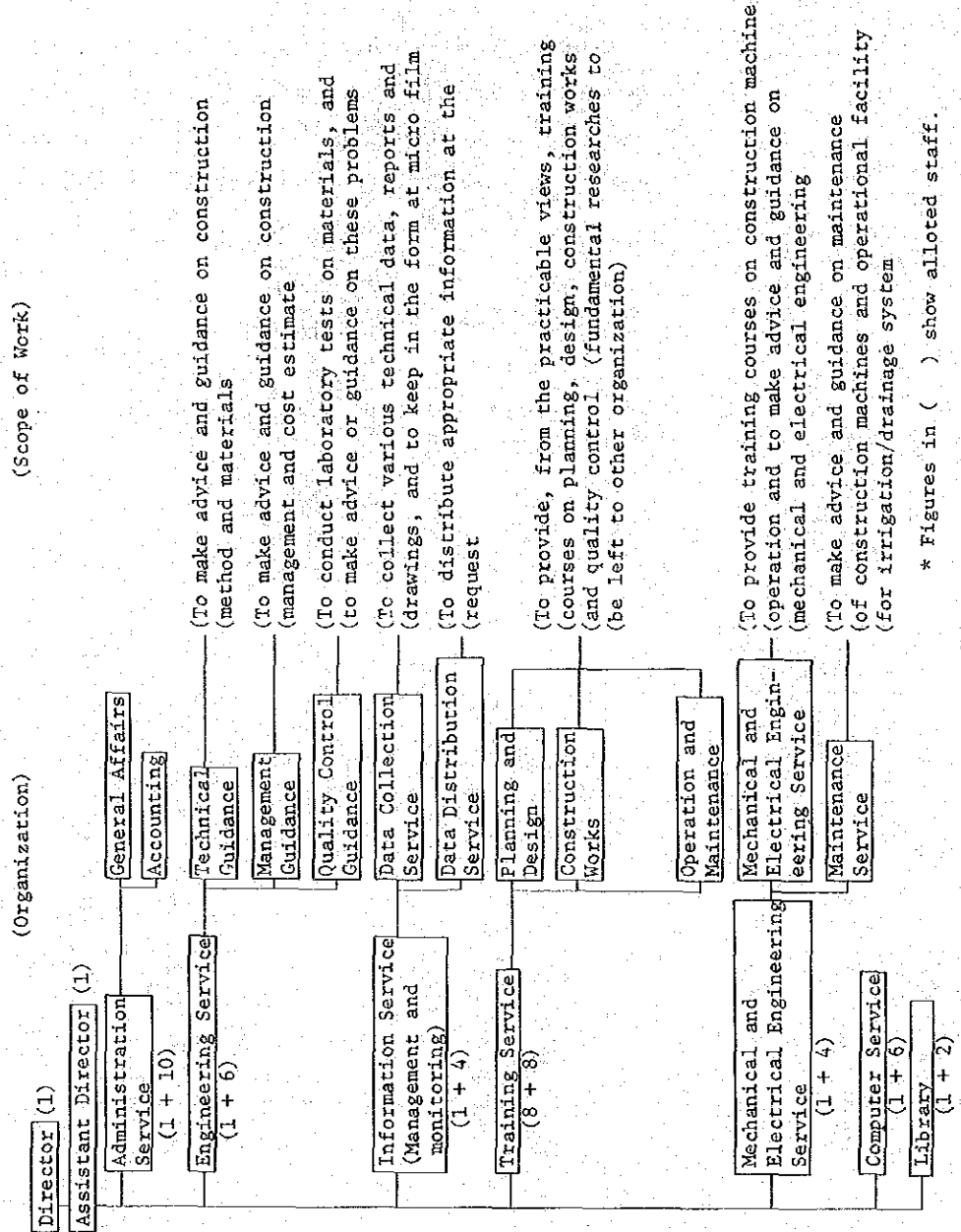
To fulfill the purpose, the following activities will be performed at the Center:

- (a) Overall monitoring of irrigation/drainage constructions;
- (b) Collection, control, distribution and monitoring technical data;
- (c) Standardization of construction methods, material qualities and cost estimation;
- (d) Automation of data control and cost estimate by computer system and development of programs therefor;
- (e) Upgrading technical expertise of field engineers and inspectors through periodical training and lectures;
- (f) Testing construction materials;
- (g) Other technical assistance.

3-2 ORGANIZATION OF THE CENTER

The Center will be organized as shown in the following chart with allotted staff and function to each section.

ORGANIZATION AND SCOPE OF WORK OF CONSTRUCTION GUIDANCE SERVICE CENTER



3-3 OUTLINE OF THE CENTER

3-3-1 SCOPE OF FACILITIES

Facilities to be constructed and supplied consist of two major items; one building and the other instruments and equipment required for training, studying, testing and data processing on operation of the Center.

3-3-2 BUILDINGS

(a) Buildings (incl. appurtenant facilities)

<u>Name</u>	<u>Floor area (m²)</u>	<u>Function</u>
Information Center	1,736	Also as an administrative division. For collection, control, distribution and monitoring technical data. Electronic computer system and micro-photo equipment to be provided.
Dormitory	2,217	Training and lodging quarters for field engineers and inspectors on periodical training. Max. accommodation: 60 persons (3 persons max. in one bed room). Central lecture room to be provided.
Laboratory	1,142	For training, study and testing on irrigation/

<u>Name</u>	<u>Floor area (m²)</u>	<u>Function</u>
		drainage constructions. Concrete, soil and asphalt test rooms and machine engineering room to be provided.
Machine Repair Training Shop	208	For training on repair and maintenance of construction equipment.
Garage for Const. Equipment	490	Garage for construction equipment for operation training.
Hydraulic Laboratory	600	For studying basic hydraulics.
Guard House	16	To control entrance and exit of people and vehicle.

(b) Outdoor Constructions

- A water reservoir for Hydraulic Laboratory,
- Outdoor power distribution, water supply, drainage and hydrants,
- Roads, pavements, gardening, gate and fence.

3-3-3 INSTRUMENTS AND EQUIPMENT

Each building shall be provided with the following study, testing training or data processing instruments

and equipment:

- (a) Information Center : Electronic computer system
Micro-photo equipment
- (b) Laboratory : Concrete test equipment
Soil test equipment
Asphalt test equipment
Machine engineering equipment
- (c) Machine Repair
Training Shop : Tools and equipment for
machine repair
- (d) Garage for Const.
Equipment : Major construction equipment
- (e) Hydraulic Laboratory : Equipment for study of basic
hydraulics (Future in-
stallation)

3-3-4 DESIGN PRINCIPLE

The basic design of the Center shall be made out based upon the following considerations:

- (a) For a smooth start of operation of the Center, required building facilities and instruments and equipment shall be provided as much as possible;
- (b) Suitable perspective shall be given to the scale and scope of service of the Center as it is the sole institute for construction guidance service under the

Directorate General of Water Resources Development.
Extension of the facilities in the future shall duly
be considered;

- (c) Local conditions and traditions shall be taken into
account as much as possible.

3-4 SITE CONDITIONS

3-4-1 LOCALITIES OF THE SITE

The construction site is located in the suburb of Bekasi City about 20 km east of Jakarta, capital city of Indonesia.

The site has a land area of about 2.5 ha in a narrow shape lying east-west direction having a length and width of about 70 m and 350 m respectively. It faces to one of the main irrigation canals of Jatilhur Project on the north side and Bekasi Bypass road (now under construction) on the east side. West side is an open land.

The site was previously a village surrounded with trees and there is still the similar village on the south side.

Terrain of the site is generally flat except a narrow strip along the irrigation canal on the north side where excavated soil from the canal has been embanked. Therefore grading work on the site will be small.

The open land on the west side could be secured for extension of the Center in the future if the circumstances allow.

3-4-2 GEOLOGICAL CONDITIONS AND SOIL BEARING CAPACITY

Top soil of the land is a laterite and underlayer is clay to a considerable depth.

Referring to a Dutch-cone penetration test (Ref. Appendix III) at the northeast corner of the site for construction of a bridge on the Bekasi Bypass road crossing the irrigation canal, the following could be assumed on the ground of the site :

- (a) Top layer (down to 1 m from the ground face) will have a bearing capacity of around 10 t/m²;
- (b) Underneath the top layer (down to 10 m from the ground face), soil density is quite poor. No foundation can be made here;
- (c) From 10 m downward, soil becomes quite dense.

Considering the above conditions, foundation piles will be required for reinforced concrete building having more than 2 stories. Length of the pile will be around 10 m.

3-4-3 CLIMATIC CONDITIONS

The site is in a tropical rain forest zone. Average monthly temperature does not vary throughout the year staying at around 28° C. The same is the case with relative humidity which ranges 75 - 80%.

Yearly rainfall reaches 2,000 mm though monthly rainfalls decline from April through September as it is in dry season.

There is almost no wind blowing throughout the year since the site belongs to one of the unique "wind-free" regions on earth.

3-4-4 EARTHQUAKE

Since Indonesia is located in the Trans-Asiatic Belt, one of the two major earthquake zones, considerably intense earthquakes occur locally.

For design of earthquake-proof structures, a guide book "A Brief Outline of Seismicity and Earthquake, Engineering Problems in Indonesia" is widely used as a design standard.

In this book, the lateral seismic coefficient is determined according to the place, geology and type of structures.

For structural design of this Center, lateral seismic coefficient could be $K = 0.1$.

3-4-5 TRANSPORTATION

There is an all-weather, asphalt paved, four-lane national highway running from Jakarta through Bekasi city. From Bekasi city to the site a bypass road (Bekasi Bypass) is now being constructed. Therefore access to the site is very easy.

For disembarkation of imported goods, Tanjung Priok port located at 13 km north of Jakarta city could be used. A new bypass road connecting the port to the aforesaid national highway is making inland transportation of imported goods all the more easy.

In addition to these, a railway is running from Jakarta through Bekasi city, however this will rarely be used for this construction because of the remarkable convenience of transportation on roads.

3-4-6 PUBLIC UTILITY AROUND THE SITE

(a) Electric Power

There is a substation (Bekasi Substation) of PLN (PERUSAHAAN UMUM LISTRIK NEGARA) located at about 500 m north of the site from where electric power could be obtained for the Center. Though there is an existing power distribution line from there to the site, it could not be used for the Center as it is because of a small capacity of the cable. A new power distribution cable of a larger ampacity will be required on the existing electric poles. Distribution voltage is 6 kV.

(Ref. Appendixs - III)

(b) Water and Sewerage

There is no city water system nor sewerage system not only around the site but in Bekasi city. Independent water supply and drainage systems are required for the Center.

There are practicably three ways to obtain water; taking water from the irrigation canal on the north side of the site, taking it from Bekasi river running about 500 m west of the site or digging a well. Among these sources, irrigation canal and Bekasi river have their own shortcoming to put into effect, i.e. the canal is dried up once a year in dry season for maintenance and inspection and Bekasi river source poses difficulties of maintenance of pumping station and land acquisition for pipe installation. Digging a deep well seems the surest way though it costs a little more than the others.

Storm water and living waste water could be discharged into the irrigation canal but sewage must be treated in a septic tank before discharging.

(c) Telephone and Gas

Telephone lines could be extended from a telephone station in Bekasi city.

Since there is no city gas system around the site, propane gas will have to be used.

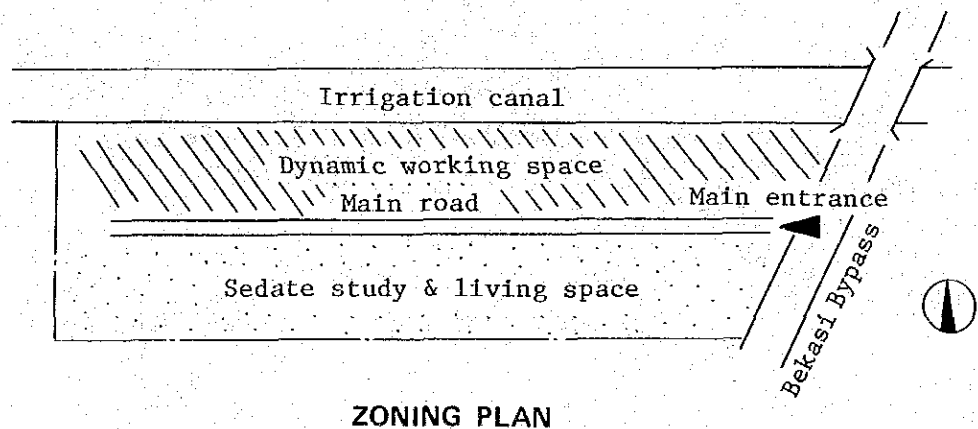
3-5 ZONING PLAN OF THE SITE

Since the land is not so large and narrow in its shape, there is a little constraint in arranging the facilities.

Basic arrangement shall be to put main entrance to the Bekasi Bypass side, to lay a main road through the center of the land and to arrange facilities along both sides (north and south) of this road.

Northern side of the road shall be of a dynamic working zone having such buildings as Repair Training Shop and Garage for Construction Equipment and Construction Equipment Operation Training space.

Southern side of the road shall be of a sedate study and living zone having such buildings as Information Center, Laboratory, Hydraulic Laboratory and Dormitory.



ZONING PLAN

3-6 BUILDING PLAN

3-6-1 DESIGN PRINCIPLE

Living space shall be as spacious as possible in view of high temperature and humidity tropical climate and traditional sense of the local people toward the living space. Outside feature and finishes in and out shall match the tropical climate. Also provisions shall be made for sunshade.

On selecting finishing materials and construction methods, locally available materials and methods prevailing in the region shall be used as far as applicable.

3-6-2 BUILDING PLAN

(a) Information Center

Building shall be 3-storied in consideration of the scale of land, each floor assigned for different functions. Ground floor shall mainly be for administration provided with administration offices, a machine room, telephone room etc. First floor shall mainly be for engineering staff having engineering offices, study or lecture rooms, director's room etc. Second floor shall be an information center having computer rooms, micro-photo rooms, libraries etc.

(b) Dormitory

3-storied same as Information Center. Ground floor shall be public space having a central lecture room

(60 persons accommodation), dining room, kitchen, utilities room etc. First floor and second floor shall be a lodging space having a total bed rooms of 20. Each bed room shall accommodate maximum 3 persons making the total accommodation 60 persons. Each bed room shall be provided with a bath room in consideration of local living customs.

(c) Laboratory

Laboratory shall provide testing rooms for concrete, soil and asphalt which are the major test items in irrigation/drainage constructions along with a machine engineering room to study mechanism of basic construction equipment. The main objective of the test room shall be to train field engineers and inspectors for tests, not to carry out consigned tests.

(d) Repair Training Shop

Since controlling construction equipment operation and maintenance is an important part of construction supervision, it is indispensable to get field engineers and inspectors acquainted with machine repair and maintenance. This shop shall serve for this purpose.

(e) Garage for Construction Equipment

Same as paragraph (d) hereto, it is also indispensable to train the field engineers and inspectors for operation of construction equipment. This garage is to provide a shade for the construction equipment as described in Clause 3-8 hereafter.

(f) Hydraulic Laboratory

This laboratory shall provide facilities to study basic hydraulics.

A water reservoir shall be constructed as an auxiliary facility outside the building for use of water circulation.

(g) Guard House

For controlling entrance and exit of people and vehicle.

3-6-3 FINISH MATERIALS

(a) Information Center, Dormitory

Exterior Finishes

Roof : Membrane waterproofing with insulation

Wall : Cement mortar, paint fin. and wall tile

Door & window : Aluminium made

Interior Finishes

	<u>Floor</u>	<u>Wall</u>	<u>Ceiling</u>
Staff Room,	Terrazzo	Cement mortar	Rockwool
Lecture Room		plaster, paint	accoustic
Dining Room		fin.	tile
Library			
Bed Room			

	<u>Floor</u>	<u>Wall</u>	<u>Ceiling</u>
Computer Room	Vinyl asbestos tile	Cement mortar plaster, paint fin.	Rockwool accoustic tile
Corridor, Staircase	Terrazzo	Cement mortar plaster, paint fin.	Gypsum board, paint fin.
Store Room, Machine Room	Cement mortar	Cement mortar plaster, paint fin.	Exposed concrete, paint fin.
Utility Rooms	Cement tile	Cement mortar plaster, paint fin.	Gypsum board, paint fin.
Kitchen Lavatory, Bath Room	Mosaic tile	Ceramic tile	Gypsum board, paint fin.

(b) Laboratory, Guard House

Exterior Finishes

Roof : Corrugated asbestos cement sheet

Wall : Cement mortar plaster, paint fin.

Door & Window : Aluminium made

Interior Finishes

Floor : Terrazzo

Wall : Cement mortar plaster, paint fin.

Ceiling : Gypsum board, paint fin.

(c) Hydraulic Laboratory

Exterior Finishes : Same as Laboratory

Interior Finishes

Floor : Cement mortar

Wall : Cement mortar plaster, paint fin.

Ceiling : Structure exposed

(d) Repair Training Shop, Garage for Construction Equipment

Exterior Finishes : Same as Hydraulic Laboratory

Interior Finishes : Same as Hydraulic Laboratory

3-6-4 STRUCTURAL DESIGN

(a) Design Principle

- 1) Lateral seismic coefficient shall be $K = 0.1$ as discussed in paragraph 3-4-4 hereto.
Wind pressure shall be $q = 25 \text{ kg/m}^2$.
- 2) Information Center and Dormitory shall be constructed of reinforced concrete. Single floor building shall be of steel structure with masonry wall. For light roof structure, wood construction may be used as applicable.

- 3) Concrete foundation piles shall be provided for Information Center and Dormitory. For single story building, independent or continuous foundations may be used.
- 4) For load-bearing walls, reinforced concrete or concrete masonry unit shall be used and for light or non-load-bearing walls, brick construction may be used.

(b) Conditions for Structure Design

Since there is not yet a comprehensive structure design standard in Indonesia, Japanese standards shall be used as a design basis taking good account of local standards and conditions. Allowable design stresses of structural material shall be determined based upon local construction quality.

- 1) Lateral seismic coefficient : $K = 0.1$
- 2) Wind pressure : $q = 25 \text{ kg/m}^2$
- 3) Compressive strength of concrete : $F_c = 180 \text{ or } 210 \text{ kg/m}^2$
- 4) Tensile strength of re-bar : $t = 1,600 \text{ kg/cm}^2$
or more
- 5) Tensile strength of structural steel : $t = 1,600 \text{ kg/cm}^2$
or more

6) Soil bearing capacity : $P = 10 \text{ ton/m}^2$ on top face of the ground. Load bearing test to be done before construction

7) Bearing capacity of foundation pile : Determined by test piling

8) Assumed live loads (kg/m^2) :

	Floor, Beam	Column, Girder	Earthquake
Staff Rm., Lecture Rm., Library	300	180	80
Bed Room	180	130	60
Store Room, Machine Room	400	300	200

3-7 BUILDING UTILITY PLAN

3-7-1 DESIGN PRINCIPLE

High temperature and humidity tropical climatic conditions shall duly be considered in electrical, mechanical and plumbing design too. Also existing conditions of public utility around the site as described in paragraph 3-4-6 hereto shall be taken into account.

There will not be a great constraints in the design since most of basic materials and equipment for these facilities are available locally.

3-7-2 ELECTRICAL FACILITIES

(a) Power Source

Power could be obtained from the Bekasi Substation which is located at about 500 m north of the site. For this purpose, an existing power line from there to the site could be utilized (Ref. Appendix-III). However, as the existing power cable does not have an extra capacity to supply the required power for the Center, extra cables or replacement of the existing cables will be required. Installation of the power cable and auxiliary equipment will be carried out by Indonesian counterpart. Characteristics of power line is 6 kV, 3-phase, 3-Wire, 50 Hz.

(b) Private Substation

A private substation shall be provided in the Center because of high voltage incoming line and a large power requirement.

The substation shall be constructed in Information Center building as a central power supply station for the whole Center from where power shall be distributed to a distribution board provided at each building and facility.

Capacity of the substation may be about 800 KVA determined by the following assumed power demand of various facilities, simultaneous power demand factor and rating of standard transformer.

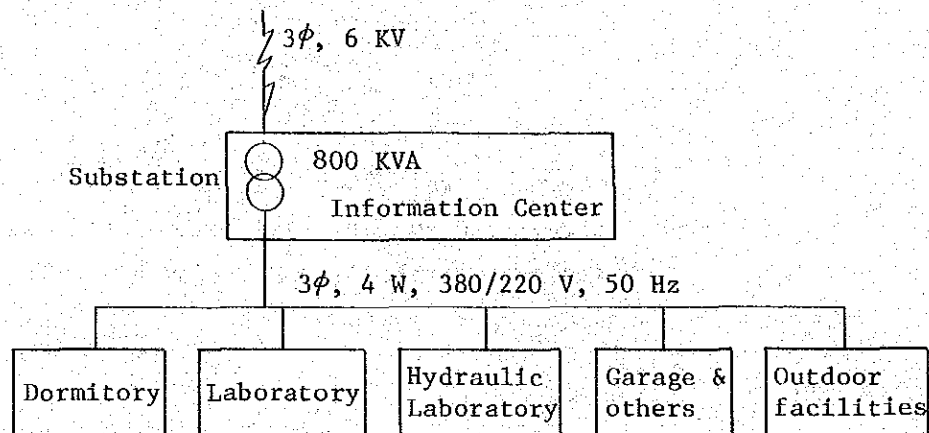
Power Demand		
1) Lighting and receptacles	:	380 KVA
2) Air conditioning facilities	:	370
3) Plumbing facilities	:	170
4) Computer and others	:	130
		<hr/>
Total	:	1,050 KVA*

* This figure does not include extra power demand for a future extension of the Center.

In view of the instability of the power supply system around the site, an emergency power generator shall be incorporated in the substation to supply power for necessary lighting, equipment, computer system.

Outgoing secondary power distribution system shall be of 3-phase, 4-wire, 380/220 V, 50 Hz. If 100 or 127 V is required for certain laboratory equipment due to its rating or stable voltage is required, independent transformer or voltage regulator respectively shall be used.

For electronic computer system, independent power circuit and voltage regulator shall be provided.



(c) Secondary Power Distribution Line

Power cables connecting the substation and power distribution boards at buildings and facilities shall be of direct-buried under-ground cable.

(d) Lighting and Power Receptacles

Lighting shall be done mostly with fluorescent lighting fixtures. Incandescent lighting shall be partially used. In the lighting, emergency lighting system shall be incorporated as required by a safety code in Japan.

Following are the lighting level in the room :

- 1) Staff Room, Lecture Room, Laboratory : 300 Lx
- 2) Meeting Room, Director's Room : 200
- 3) Computer Room : 350
- 4) Machine Repair Training Shop : 150
- 5) Machine Room : 100
- 6) Corridor, Hall : 80
- 7) Store Room : 60

Power receptacles shall be of single phase, 220 V, grounded type and provided for general use, laboratory equipment, air conditioning equipment, kitchen equipment, machine repair equipment etc.

(e) Telephone

Telephone system shall have 13 central office trunks and 60 extensions. The extensions shall be allocated to the buildings as follows :

	Extensions
Information Center	: 40
Dormitory	: 8
Laboratory	: 5
Guard House	: 1
Others	: 6

Telephone exchanger shall be of private automatic branch exchange system, cross bar type and installed in Information Center building.

(f) Other Facilities

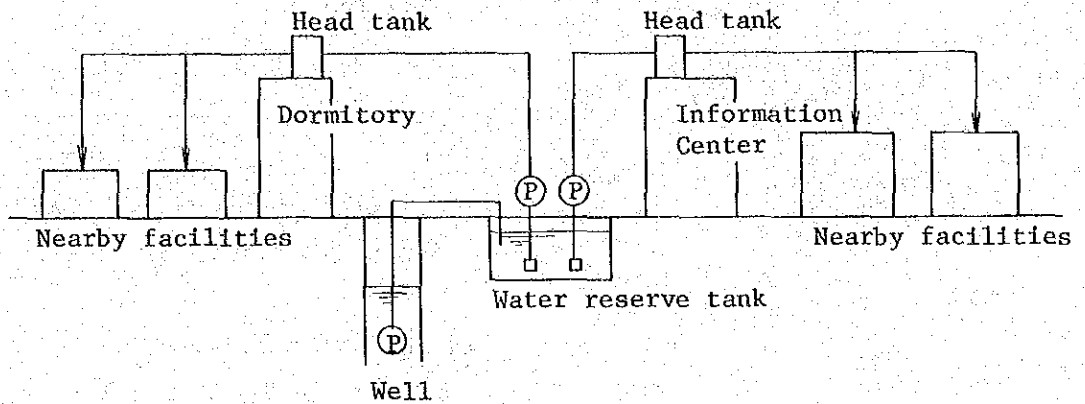
- 1) Fire alarm system shall be provided for Information Center and Dormitory.
- 2) Provision shall be made in Information Center for installation of telex in the future.
- 3) Sound system shall be provided in Information Center and Dormitory. Paging system shall be provided to outdoor as required, which is controlled in Information Center.

3-7-3 PLUMBING AND SANITARY FACILITIES

(a) Water Source and Supply System

A deep well shall be constructed as a water source as discussed in paragraph 3-4-6 hereto. Though depth of the well shall be determined based upon a test boring, it shall be tentatively assumed to be 100 m with a well dia. of 200 mm.

Total water demand in the Center is estimated to be about 30 m³/day. Water distribution system shall be consisted of well, ground water reservoir, pumping equipment and head tanks. Water from the well is first stored in the ground water reservoir from where water is lifted up to two water head tank networks; one on the roof of Dormitory and the other on the roof of Information Center. Other buildings and facilities receive water from the nearest water head tank. It is assumed that because of the depth of the well, water will be pure and potable without necessitating further treatment.



(b) Hydrant

Indoor hydrant system shall be provided in Information Center and Dormitory buildings complying with a safety code in Japan.

Outdoor hydrants shall be arranged along the main road in the site so that all facilities of the Center can be covered by the water shower of hydrant. Hydrant water shall be supplied by a fire pump.

(c) Hot Water Supply System

A large part of hot water supply system is the one for bath rooms in Dormitory building. Storage type boiler having a capacity of around 150,000 kcal/hr shall be provided for hot water generating. Fuel for the boiler will be light oil.

For other smaller hot water demands such as in kitchen

in Dormitory, instantaneous gas water heater using propane gas shall be provided.

(d) Gas

Propane gas bombs shall be provided as required.

(e) Kitchen Equipment

In the kitchen in Dormitory, kitchen equipment catering for about 60 people shall be provided as the dining room is occasionally used for gathering of the Center communities.

(f) Drainage Facilities

Since there is not a city sewerage system around the site, sewage, living waste water and storm water shall be separately treated. Living waste water and storm water shall be conducted to outdoor drainage ditches and discharged into the irrigation canal on the north side of the site. Sewage shall be treated in septic tanks before discharging into the canal or before conducting to drainage ditches. Septic tank shall be designed to effect a sewage treatment of BOD5 90 ppm.

3-7-4 AIR CONDITIONING AND VENTILATION SYSTEMS

Air conditioning system shall provide only cooling. It shall be provided for Information Center, Dormitory and Laboratory buildings. Air conditioning

system in each building shall consist of the following:
For heat source cooling tower shall be used.

Information Center : Mainly by packaged type air
conditioners without air duct
system.

Dormitory : Packaged type air conditioners
for large rooms and fan coil
units for bed rooms.

Laboratory : Packaged type air conditioners
and window type air conditioners
mixed.

A separate air conditioning system shall be provided
for computer rooms.

Ventilation system shall comprise roof fans provided
on the roof of Hydraulic Laboratory and other small wall
fans in bath room, lavatory etc.

3-7-5 OTHER FACILITIES

An elevator (9 persons) shall be provided in Infor-
mation Center.

3-8 INSTRUMENTS AND EQUIPMENT

Design principle for instruments and equipment for training, testing and data processing shall be to provide as much instruments and equipment as possible in order of priority as the circumstances allow in order to facilitate a smooth operation of the Center after the completion of construction as discussed in paragraph 3-3-4 hereto.

As classified in paragraph 3-3-3 hereto, they are basic instruments and equipment in connection with irrigation/drainage constructions and they are further detailed hereafter.

It is noted that instruments and equipment shall be of the nature and in quantities for training and teaching.

1) Micor-photo Equipment

For collection, control and distribution of technical data and drawings:

	<u>Q'ty</u>
Mini-copy camera (Max. A ₀ size)	1
Mini-copy autoprocessor	1
Mini-copy reader printer (for 35 mm)	1
- do - (for 16 mm)	1
Mini-copy reader	2
Diazo fische printer developer	1
Overhead projector	1

	<u>Q'ty</u>
Slide projector (35 mm)	1
Movie projector (16 mm)	1
Movie projector (8 mm)	1
Others	

2) Electronic Computer System

For collection, control, distribution and monitoring technical data and automatizing cost estimate.

	<u>Q'ty</u>
Central processing unit (64 KB)	1
Line printer (240 l/min.)	1
Input/output typewriter	1
Disc pack unit (160 MB)	1
Magnetic tape unit (1600 BPI)	1
Card reader (400 P/min.)	1
Disc pack	3
Card punch (off line)	2
Others	

3) Concrete Test Equipment

Universal testing machine 50 ton	1
Compression tester 200 ton	1
Thermostatic water bath	1
Specimen cutting machine	1

	<u>Q'ty</u>
Core drilling machine	1
Los-Angeles testing machine	1
Specimen high speed finisher	1
Forced stirring machine	1
Concrete mixer (0.2 m ³)	1
Flow tester	1
Vibration type sieving machine	1
Coarse aggregate specific gravity test set	1
Cylinder molds	20
Air meter	2
Sieving set	2
Others	

4) Soil Test Equipment

Triaxial assembly (300 kg)	1
- do - (5 ton)	1
Consolidation test apparatus	1
Direct shear apparatus (200 kg)	1
- do - (100 kg)	1
Water bath	1
C.B.R. laboratory set	1
Mechanical compactor	1
Compaction tester	1
Plate bearing tester	1
Unconfined compression tester	2

	<u>Q'ty</u>
Soil analysis sieve set	1
Electric oven	1
Direct reading balance	3
Distilling apparatus	1
Others	

5) Asphalt Test Equipment

Permeameter	1
Asphalt mixer	1
Triaxial assembly	1
Marshall test apparatus	1
Expansion tester	1
Mechanical compactor	1
Sieving set	1
Furnace	1
Asphalt furnace	1
Direct reading balance	1
Others	

6) Machine Engineering Equipment

Cut model pump, centrifugal	1
- do - , axial	1
- do - , mixed flow	1

	<u>Q'ty</u>
Model pump, centrifugal	1
Model gate, sluice	1
Others	
7) Machine Repair Training Equipment	
Details omitted	L.S
8) Construction Equipment for Training	
	<u>Q'ty</u>
Bulldozer	1
Attachment to bulldozer, ripper	1
- do - , backhoe	1
- do -, rear power control unit	1
Loader	1
Motor grader	1
Vibratory roller	1
Scraper (6 m ³ , pulled type)	1
Sheeps foot roller (pulled type)	1
Fork lift (2.0 ton)	1
Prime mover for dragline	1
Attachment for dragline, cram shell 0.6 m ³	1
Others	

9) Hydraulics Equipment (Future installation)

Current meter (transister type
50 - 150 cm)

Counter and exchange box for
current meter

All direction current meter
(50 - 150 cm)

Counter for all direction C.M.

Water level gage (point, hook)

Pito gage (pipe, ball)

Manometer

Gradient point gage

Partial flume

Pipe line system

Variable gradient canal system

others

3-9 EXECUTION TIME SCHEDULE

	1978			1979												1980												1981					
	11	12		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
BASIC DESIGN																																	
EXCHANGE OF NOTES								(1)	◇																								
DETAILED DESIGN																																	
TENDER/ CONTRACT																																	
CONSTRUCTION																																	

Notes:(1) Date of Exchange of Notes (E/N) is an expected date
 Schedule of Detailed Design, Tender/Contract and
 Construction shall be shifted according to actual
 date of E/N.

3-10 CONSTRUCTION COST ESTIMATE

3-10-1 CONDITIONS FOR ESTIMATE

Following are the assumed conditions considered in making rough estimate of construction costs:

- (a) Exchange rate of Japanese yen at the time of construction will be 230 ¥/ or 230 ¥ = 625 Rp (Rupiah).
- (b) Civil and building works will be carried out by Indonesian sub-contractors and instruments and equipment will be imported from Japan.
- (c) Assuming the construction being undertaken in and around 1980, cost-up of construction and materials above the present ones will be 30 % and 8 % in Indonesia and Japan respectively. As a result, costs of civil and building works which will be entrusted to local contractors will be much the same as the current costs (before the devaluation of Rupiah) combining the change of value of Rupiah (-50 %), fluctuation of Yen value (+15 %) and inflation in Indonesia (+30 %).
- (d) As there is an unpredictable factor in inflation in Indonesia, a contingency sum should be considered for civil and building works. No contingency will be considered for instruments and equipment and for design and supervision fee.

3-10-2 WORKS INCLUDED IN THE ESTIMATE FOR GRANT AID

Following are excluded from the estimate for Grant Aid as they are to be constructed or provided by the Indonesian government:

- (a) Site preparation works including clearing and grading
- (b) Installation of electric power and telephone lines to the site
- (c) Pavement, gardening and gate and fencing
- (d) Furniture, utensils and office stationery
- (e) Transportation and lodging facilities to and at the site for use of Indonesian officials during design and construction period
- (f) Office space at the site for Indonesian officials for construction supervision
- (g) Access roads to the site if required
- (h) Topographical survey, test boring for well and soil investigation including load bearing test
- (i) Custom clearance and inland transportation of imported goods from the port of disembarkation to the site.

3-10-3 CONSTRUCTION COST ESTIMATE (YEN)

(a) Civil and Building Works	(805,500,000)
Information Center	298,300,000
Dormitory	325,600,000
Laboratory	60,200,000
Repair Training Shop	6,000,000
Garage for Const. Equipment	17,500,000
Hydraulic Laboratory	24,800,000
Guard House	1,400,000
Outdoor Constructions	71,700,000
(b) Instruments and Equipment	(314,500,000)
Electronic Computer System	95,000,000
Micro-photo Equipment	15,600,000
Soil Test Equipment	15,300,000
Concrete Test Equipment	24,200,000
Asphalt Test Equipment	11,300,000
Machine Engineering Equipment	4,000,000
Repair Training Equipment	6,300,000
Const. Equipment for Training	140,800,000
Installation Cost	2,000,000
(c) Design and Supervision Fee	(100,000,000)
(d) Contingency	(80,000,000)
<hr/>	
Total	¥ 1,300,000,000

3-11 PRELIMINARY DESIGN DRAWINGS

Preliminary Design Drawings are as follows:

Dwg. No.	Title
1.	PLOT PLAN
2.	INFORMATION CENTER
3.	LABORATORY/HYDRAULIC LABORATORY/GUARD HOUSE
4.	DORMITORY
5.	REPAIR TRAINING SHOP/GARAGE FOR CONSTRUCTION EQUIPMENT

