

3. Minutes of Meeting及Field Reconnaissance Survey Report

Minutes of Meeting
on
Bohol Irrigation Development Project Phase II

In response to the request of technical assistance on Bohol Irrigation Development Project Phase II of National Irrigation Administration (hereinafter referred to as "NIA"), the Japan International Cooperation Agency sent a preliminary study team (hereinafter referred to as "the JICA Study Team") headed by Mr. Isao Nakazawa for the period from January 29 to February 12, 1984.

The JICA Study Team conducted the field reconnaissance survey and exchanged the views on project formulation with the officials of NIA and concerned agencies. The findings and views are summarized in the field reconnaissance survey report attached herewith. The outline of views exchanged between the JICA Study Team and NIA staffs is as follows:

1. NIA agreed upon the findings and views on the project in the section IV and V of the field reconnaissance survey report brought in by the JICA Study Team.
2. NIA and the JICA Study Team agreed upon that the feasibility study on the Phase II Project should be conducted based on premise of the final development plan of the Phase I Project.

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3. NIA requested the JICA Study Team to provide a rain gauge to be installed in the watershed area of Bayongan Dam for the collection of accurate hydrological data. The JICA Study Team agreed to provide the rain gauge. It is requested that installation and maintenance of the rain gauge should be done appropriately by NIA staffs.
4. NIA stated that NIA itself will immediately install the rain gauge, which is borrowed from National Water Resources Council, and river water level gauges required some points in the project area.
5. NIA stated that NIA itself will conduct the land classification and agro-economic survey of the study area (inserted in 4-(3) of Implementing Arrangement).

February 10, 1984

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Mr. ISAO NAKAZAWA
Leader of the
Preliminary Study Team
Japan International
Cooperation Agency



Mr. AVELINO S. RIVERA
Director, Project
Development Department
National Irrigation
Administration

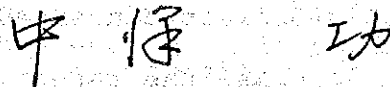
February 10, 1984

Mr. JOSE B. DEL ROSARIO, JR.
Assistant Administrator for Project
Development and Implementation

S i r:

I am pleased to submit herewith the field
reconnaissance survey report on Bohol Irrigation Development
Project Phase II.

Very truly yours,



ISAO NAKAZAWA
Leader, The Preliminary
Study Team, Japan International
Cooperation Agency

I. Background

In response to the request of the Government of the Republic of the Philippines, the Government of Japan sent a preliminary study team (hereinafter referred to as the "Team") headed by Mr. Isao Nakazawa for the Bohol Irrigation Development Project Phase II (hereinafter referred to as "the Phase II Project") through the Japan International Cooperation Agency (hereinafter referred to as "JICA") from January 29 to February 12, 1984.

The feasibility study of the Bohol Irrigation Development Project Phase I (hereinafter referred to as "the Phase I Project"), the Wahig-Pamacsalan River Irrigation Project, was conducted under the technical assistance of JICA from 1977 to 1978. The detail design of project facilities was started in September 1980 with the 9th Yen Package Loan from the Overseas Economic Cooperation Fund. (The project facilities will be constructed with the 11th Yen Package Loan). The basic development plan of the Phase II Project was prepared as a part of the detail design works.

The Team has conducted a field reconnaissance survey of the project area on 1 to 4 of February 1984 and discussed the project with the National Irrigation Administration (hereinafter referred to as "NIA") staffs and other officials concerned.

As the result of the field reconnaissance survey, the Team hereby presents in a summary of findings and views on the Phase II Project.

II. General Conditions of the Project Area

The project area extends to the northern part of the Phase I Project in the northeastern part of Bohol Province and lies in the Ubay and lower Trinidad municipalities, administratively. The Phase II Project area is about 90 m lower in elevation than the Phase I Project. The Phase II Project which is at an elevation of 5 to 30 m is generally flat and slopes moderately toward the national road No. 1 which links Ubay and Trinidad municipalities.

Only a small part of arable land in the project area has been developed for rainfed paddy cultivation and coconut field. The remaining unutilized land is cogon area.

The climate in the project area belongs to the type IV of climatic zone in the Philippines which is characterized by rainfall throughout the year. Mean annual rainfall is approximately 1,800 mm in Ubay with relatively little amount of rainfall from March to May. However, the amount of rainfall significantly fluctuate by the year as well as by the month.

The soils in the project area are composed of clay, clay loam and sandy loam, which mainly originate from sedimentary rocks (shale, sandstone, siltstone, mudstone and marl). All the soils have an acid reaction and are suitable for rice production.

The residents in the project area which is bounded by the national roads linking Alicia and Ubay in the eastern side and Ubay and Trinidad in the northern side have been mainly engaged in agriculture.

III. Agriculture

III-1. General

Agriculture is the main industry in Bohol Province which is a depressed area. Its per capita is 34% of the national mean income. The farm household is estimated at about 7,000 farms as 75% of total farms. Mean farm area is 1.8 ha per household. According to the data in 1982, area of farms is 12,577 ha, of which the cultivated farm area is 3,856 ha in Ubay and Trinidad municipalities. Cultivated farm area is divided into 2,596 ha in paddy fields, 1,195 ha in upland crops, 65 ha in pomiculture and others (pasture land and grassland). Rice as a main crop is generally of low unit productivity. Upland crops are mainly cassava, corn, beans, etc., the standards of raising of which are extremely low.

III-2. Production Basement

Since all existing paddy fields are rainfed, its cultivation is unstable due to the lack of irrigation water during continuous dry weather. It is impossible to control the fertilization due to continuous flowing irrigation. The soils in the southern part of the project area is Ubay clay system which is relatively deep cultivated soil and a little bit poor drainage soil. In the northern part, Ubay sandy loam system extends to the shoreline from around national road. This sandy loam system composed of a deep cultivated soil and a little bit good drainage soil. These soils have some natural nutrition and a conglomerate in some places.

III-3. Paddy Cultivation Technique

The cultivation technique is extensive due to the unstable rice production. Although double cropping is popular such as June to October and December to April, these cropping patterns occur at a time lag of two to three months due to the fluctuation of rainfall. The main cultivation is transplantation of rice seedling except direct planting of rice in some parts. Low productivity is still prevailing because of insufficient fertilization in growth period and insufficient water management of a plot, though relatively careful control has been done before transplantation of rice seedling.

III-4. Characteristics of and Views on the Project Area

- (1) High dependency on paddy cultivation and no other profitable crops aside from rice;
- (2) There extends a wide unutilized area in the flat part of the project area;
- (3) There are big consumption areas nearby such as Cebu city and others.

As a result, the development of irrigation will be able to not only result in effective utilization of unutilized area and improvement of cultivation techniques for paddy and upland crops, but also stabilize the production of some other crops. And also, it is possible to cultivate highly profitable crops required by the market. These cultivation techniques are expected to contribute to the raising of farmers income by the research and extension of the Bohol Agricultural Promotion Center Project.

IV. The Outline of the Development Plan on the Phase II Project

IV-1. General Matter

The result of our field survey leads us to two alternative ideas for the development plan on the Phase II Project.

In alternative one, the project area covers about 5,300 ha in the municipalities of Trinidad and Ubay.

As the principal water resource for irrigation, a storage dam whose effective capacity is about 19 MCM should be constructed at Bayongan in the municipality of San Miguel. However, as the catchment area of the Bayongan Dam is about 12 sq km, which is very small for the project area above, water from Malinao Diversion Dam will be diverted through the main canal of the Phase I Project. As irrigation water is still not enough, small diversion dams will be constructed in the small rivers flowing into and in the project area, such as Cambangay and Capayas Rivers so that water of these rivers may be fully utilized.

In alternative two, the project area includes that of alternative one. In detail, the total project area will become about 11,400 ha, adding about 6,100 ha of potential area located just north of the 5,300 ha mentioned above. To irrigate the whole area, Bayongan Dam capacity will need to be increased up to about 40 MCM and the main canal capacity of the Phase I Project will also need to be restudied. Moreover, irrigation water will be increased by transbasin into Wahig River from Loboc River flowing in the neighboring watershed of the former, so that the whole area will be irrigated.

The Team has studied the two alternatives deliberately and reached the conclusion that alternative two, though it may become viable in the future, might be too premature at this moment because of the following reasons:

- (1) There are no reliable discharge data available at the proposed Loboc Dam site;
- (2) It seems to be rather difficult to adjust diversion with the release to the existing hydropower station downstream;
- (3) The intake work has to be constructed at a point 5 km upstream of the proposed dam site because of the small elevation difference between Wahig River and Loboc River. If this is the case, intake efficiency is so small that water flowing down to the intake can only be utilized for diversion;

- (4) As the watershed of Loboc River is next to that of Wahig River, the rainfall patterns in these two watersheds may be similar to each other. In which case, it is assumed that the runoff pattern is also similar. Therefore, when much water can be diverted from Loboc River into Wahig River, the discharge of Wahig River is also rather large. Therefore, it is possible that water from Loboc River, in connection with Malinao Diversion Dam and the main canal capacity, may be released in vain at Malinao Diversion Dam.

Meanwhile, limestone is exposed at the left abutment of the proposed Pamacsalan Dam site mentioned in the detail design report. From the fact above and others, it seems very difficult to construct the high-dam there.

From all these considerations above, the Team has decided to conduct the feasibility study based on the alternative one.

IV-2. Specified Matter

1. Service Area

The potential area about 11,400 ha is located to north of the Phase I Project. The area of the Phase II Project, as the abovementioned finding, that uses the surplus of diverted water from Malinao Diversion Dam is limited under the way of water utilization in the Phase I Project. Therefore, the service area of the Phase II Project is within the limits of the area encircled by national roads, estimated about 5,300 ha.

The service area should be decided based on more detailed survey on available water from Bayongam Dam, the calculation of surplus water from Malinao Diversion Dam, economic feasibility and so on.

2. Major Structures of the Project

The major structures of the project are as follows:

(1) Bayongan Dam

Dimensions of the Dam to be constructed are as follows:

Dam Type : Earth Fill Dam

Dam Height : 30.0 m

Effective Reservoir Capacity : 19 MCM

(2) Main Canal and Farm Roads

(3) Small Diversion Dams at Cambangay River, Capayas River and so on.

V. The Views of the Team

V-1. The Project Formulation

1. General

The following two points may be premised as long as the Phase II Project area is irrigated utilizing surplus water in the Phase I Project, and as long as the detail design of the Phase I Project is almost finished and construction is scheduled to start in 1985.

(1) The cross section of main canal may not be changed from the detail design except the concrete lining;

(2) Higher priority is placed on the water supply to the Phase I Project.

It may be said that the most important point to make the Phase II Project successful is to satisfy the two conditions above and to minimize waste water at Malinao Diversion Dam. The reasonable and timely way of control at Malinao Diversion Dam must be established to enlarge

water utility under such strict conditions. Daily basis water balance study is necessary to find such way of abovementioned control and to confirm the realistic service area. The concrete service area will be confirmed depending on the result of this daily basis water balance study.

2. Water Utility Plan

The reasons for applying daily basis water balance study are as follows:

- (1) The capacity of Malinao Diversion Dam is about 5 MCM, which is rather small and equivalent to 5 days' quantity of the proposed main canal capacity. Malinao Diversion Dam is full if rainfall of about 50 mm is observed in the whole watershed. As rainfall over 50 mm/day is observed about 10 times in an average year, a certain amount of waste water has to be taken into consideration for water balance study;
- (2) Discharge in the water balance study of 5 days' or 10 days' basis is averaged, while real discharge varies daily. Thus, it is possible that waste water in reality would be diverted and stored in Bayongan Dam. This would lead us to take larger service area which cannot be fully irrigated in reality.

The daily basis water balance study will be done by following manners:

- (1) Water requirement is calculated based on the suitable cropping pattern and effective rainfall. It is proper to apply Gabi rainfall data representing the service area in the Phase II Project;
- (2) Discharge in Wahig River and Pamacsalan River is calculated by the new runoff analysis made from all the available observation data adding newly acquired ones after the detail design. If

discharge by the runoff analysis is extremely moderate compared with the real one, careful study must be needed again so that we may not overestimate the service area.

The concrete service area should be confirmed through the daily basis water balance study abovementioned. After this, layout of canal and road networks will be studied. In the dry season, the total service area might not be covered because of rather tight water utility in both the Phase I and the Phase II Project areas.

3. Water Management Plan

Malinao Diversion Dam in the Phase I Project will be constructed on the confluence of Wahig and Pamacsalan Rivers with catchment area of about 138 sq km and will be expected to have considerable potential annual runoff. Consequently, it is considered that how to control the sharp fluctuation of discharge closely influences the effectiveness of the Phase II Project.

- (1) Since the irrigation service area is a double cropping area in a year, it is most important that Bayongan Dam reservoir should be filled immediately before starting a land preparation in both the wet season and the dry season;
- (2) As the result of small storage capacity of Malinao Diversion Dam, it is considered that in the case of small flood (daily rainfall of 50 mm or more), even though at the start of rain the dam reservoir is empty, wasteful water would be inevitably discharged over storage volume. Therefore, at this time, it is necessary to systematize conveyance of water to the extent possible to Bayongan Dam, fully utilizing the section of the main canal at the proper time.

4. Bayongan Dam Axis

The Team surveyed two alternative dam axes at Bayongan River. One is the proposed axis (alternative one) in the detail design report, and the other (alternative two) is located just upstream of the proposed one.

The alternative one is better than the alternative two for the following views and reasons:

- (1) As for the alternative two, the abutments of both banks are very thin topographically. Therefore, the crest elevation for the alternative two cannot be so high as that for the alternative one;
- (2) One of the important points of the Phase II Project is to use surplus water effectively flowing into Bayongan Dam from Malinao Diversion Dam through the main canal and to irrigate the maximum service area of the Phase II Project. The reservoir capacity of the alternative one is bigger than that of the alternative two;
- (3) Similarly regarding the ratio of the reservoir capacity to the dam volume, the alternative one is more advantageous than that of the alternative two because that of the alternative one is larger than the alternative two;
- (4) 24 core drillings have been carried out along the alternative one dam axis by NIA.

Judging from the result of core drillings, there is no problem as the foundation of the earth fill dam. Further core drilling for the geological survey may not be necessary as long as the dam axis is not changed.

V-2. The Views on Preparation Work for the Phase II Project

1. Topographic Map

Mapping at the scale of 1/4,000 with 1 m contour interval for the Phase II Project is needed to cover the proposed area surrounded by the national roads.

Mapping at the scale of 1/4,000 with 5 m contour interval for watershed of Bayongan Dam is also required, and checking elevations at the reservoir area for accuracy is necessary.

2. Hydrological Data Collection

Runoff data observation at Bayongan Dam site, Cambangay and Capayas Diversion Dam sites are not available. Runoff data for available water at each diversion dam site are indispensable.

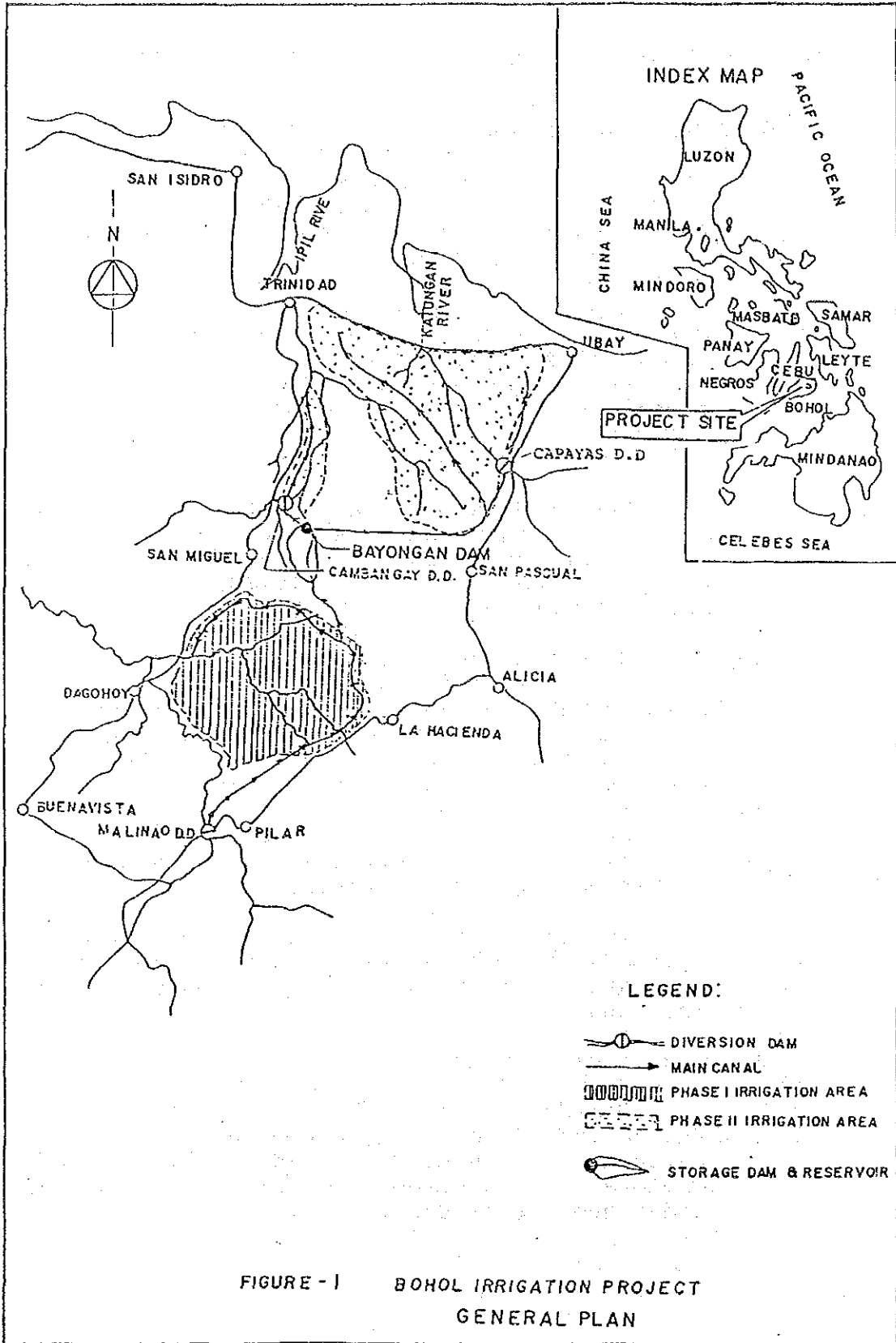
Rainfall data are collected from two existing points in the service area. Rainfall gauge in Gabi Experiment Station is considered to be typical of rainfall pattern in the service area, however, this is available for a short period only.

From the point of view of the dam operation, a rainfall station is necessary within Bayongan Dam watershed.

In the light of the above conditions, hydrological observations in order to obtain accurate data at the abovementioned points are needed.

3. Geological Survey

Geological survey, core drilling and excavation of test pit, has been conducted at Bayongan Dam site and then only seismic exploration is needed in order to obtain the wider geological data.



4. Implementing Arrangement

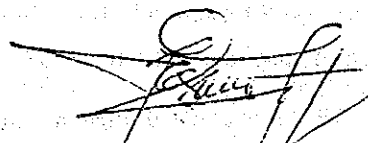
Implementing Arrangement for the Technical Cooperation
between
The Japan International Cooperation Agency
and
The National Irrigation Administration
for
The Feasibility Study on Bohol Irrigation Development Project Phase II
in
The Republic of the Philippines

Agreed upon between
The Japan International Cooperation Agency
and
The National Irrigation Administration

February 10, 1984

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Leader of the Preliminary Study Team
Japan International Cooperation Agency



MR. JOSE B. DEL ROSARIO, JR.
Asst. Administrator For Project
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Implementing Arrangement for the Technical Cooperation
between
The Japan International Cooperation Agency
and
The National Irrigation Administration
for
The Feasibility Study on Bohol Irrigation Development Project Phase II
in
The Republic of the Philippines

I. Introduction

In response to the request of the Government of the Republic of the Philippines, the Government of Japan has decided to conduct the feasibility study (hereinafter referred to as "the Study") on Bohol Irrigation Development Project Phase II in the Republic of the Philippines and exchanged the Note Verbal on the Study with the Government of the Republic of the Philippines concerning the implementation of the Study.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study, in accordance with the relevant laws and regulations in force in Japan.

On the part of the Government of the Republic of the Philippines, the National Irrigation Administration (hereinafter referred to as "NIA") shall act as counterpart agency to the Japanese study team (hereinafter referred to as "the Study Team") and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The present document sets forth the implementing arrangement between JICA and NIA under the above-mentioned Note Verbal exchanged between the Government of Japan and the Government of the Republic of the Philippines.

II. Implementation of the Study

The Study shall be implemented in accordance with the Scope of Work attached herewith (Appendix).

III. Undertakings of the Government of the Republic of the Philippines

In accordance with the Note Verbal exchanged between the Government of Japan and the Government of the Republic of the Philippines, the Government of the Republic of the Philippines shall accord privileges, immunities and other benefits to the Study Team and take necessary measures to facilitate smooth conduct of the Study through the authorities concerned.

1. The Government of the Republic of the Philippines shall be responsible for dealing with claims which may be brought by the third parties against the members of the Study Team and shall hold them harmless in respect of claims or liabilities arising in the course of or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims or liabilities arise from the gross negligence or willful misconduct of the above-mentioned members.
2. NIA shall, at its own expense, provide the Study Team with the following in cooperation with other agencies concerned:
 - (1) Available data and information related to the Study, including final project planning of the Phase I project.
 - (2) Counterpart personnel to participate in the various activities for the Study.
 - (3) Suitable office space with necessary equipment in the NIA Central Office and the study area.
 - (4) Credentials or identification cards to the members of the Study Team.
 - (5) When available, appropriate number of vehicles with drivers.

3. NIA shall make necessary arrangements with the governmental and non-governmental organizations concerned for the following:
 - (1) To secure the safety of the Study Team.
 - (2) To provide the necessary facilities to the Study Team for the remittances as well as utilization of funds introduced into the Philippines from Japan in connection with the implementation of the Study.
 - (3) To exempt the Study Team from taxes, duties, fees and other charges on machinery, equipment and other materials brought into the Philippines for the conduct of the Study.
 - (4) To allow the Study Team to take copies of all data and documents related to the Study including aerial photographs out of the Philippines to Japan subject to government security regulations.
 - (5) To secure permission for the use of radio communication facilities, if necessary.
 - (6) To assist the Study Team receive medical care without any hindrance as necessary, however any expense shall be borne by the Study Team.
 - (7) To secure permission for the entry into private properties or restricted area, if any, for the conduct of the Study.

4. NIA shall, at its own expense, carry out the following items:
 - (1) Installation of three additional river water level gauges and measurement of water and sediment discharges thereat.
 - (2) Additional core drilling, if necessary, seismic prospecting on the proposed dam and structure sites and relevant laboratory tests.
 - (3) Land classification and agro-economic survey of the study area.

IV. Undertakings of the Government of Japan

In accordance with the Note Verbal exchanged between the Government of Japan and the Government of the Republic of the Philippines, the Government of Japan, through JICA, will take necessary measures for the implementation of the Study.

1. JICA shall, at its own expense, send the Study Team to the Republic of the Philippines.
2. JICA shall pursue technology transfer to the Philippine counterpart personnel in the course of the Study.

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Appendix

Scope of Work for the Feasibility Study on Bohol Irrigation Development Project Phase II

I. Objective of the Study

The objective of the Study is to verify technical and economic feasibility of the project and to formulate a viable irrigation development plan. The Phase II project is to irrigate the area utilizing surplus water resource which is provided by the on-going Phase I project (Wahig-Pamacsalan Irrigation Development Project) including other possible sources in the northeastern part of Bohol Province.

The study area of approximately 7,000 ha. is located at the downstream of the Phase I project. It is defined as the area to be fed by the proposed Bayongan Dam.

II. Scope of the Study

The Phase II project is conducted based on premise of the final project contents of the Phase I project.

The Study consists of two stages. In the first stage, topographic maps of the project area, a prerequisite of the Study, will be prepared. In the second stage, data collection and field survey for the project formulation will be carried out, and then project analysis and formulation will be conducted on the basis of results of the above-mentioned studies.

III. Outline of the Study

The activities to be undertaken by JICA will be as follows:

1. First Stage

- (1) To conduct ground control point survey and leveling survey necessary for the topographic mapping.
- (2) To conduct topographic mapping of approximately 170 km² covering

the irrigation service area at the scale of 1/4,000 with 1 m contour interval and of the reservoir area at the scale of 1/4,000 with five (5) m contour interval including the necessary supplementary contour lines.

2. Second Stage

(1) To collect and review available data and information relevant to the Study on the following items.

- 1) Irrigation and Drainage
- 2) Meteorology and Hydrology
- 3) Topography
- 4) Geology
- 5) Soil
- 6) Agriculture
- 7) Agro-economy
- 8) Socio-economy
- 9) Others

(2) To carry out field investigations and surveys on the following items.

- 1) Meteorology and Hydrology
- 2) Topography and Geology
 - i) Topographic and geological surveys of the Bayongan dam
 - ii) Topographic and geological surveys of the major structures for the irrigation and drainage systems
- 3) Irrigation and Drainage
 - i) Inventory survey on the existing irrigation, drainage, road and other facilities
 - ii) Delineation of the irrigation area
 - iii) Preliminary route selection for main and secondary canals

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4) Agriculture and Agro-economy

- i) Investigation of soils, land use and land capability
- ii) Present farming practices including the cropping pattern and crop yields and production, etc.
- iii) Marketing system and prices of agricultural products
- iv) Farm economy and agricultural supporting system

5) Construction material

Availability and quantities of concrete aggregates, embankment materials and other construction materials

6) Others

(3) To carry out the following analyses and comparative studies, and to formulate an optimum irrigation development plan.

- 1) Land use planning
- 2) Proper crops and formulation of cropping patterns, and irrigation farming practices
- 3) Irrigation requirement and drainage discharge
- 4) Utilizable surplus water resources provided by use of the various facilities of Phase I project
- 5) Design of the proposed dam, irrigation facilities and other structures
- 6) Most suitable construction method of the proposed dam and irrigation facilities and other structures
- 7) Organization for operation and maintenance of the project
- 8) Implementation schedule of the project
- 9) Estimation of cost and benefit of the project
- 10) Economic and financial analyses
- 11) Others

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IV. Report

1. Inception Report

Twenty (20) copies of the Inception Report in English will be submitted to NIA within one (1) month after the commencement of the study.

2. Progress Report

Twenty (20) copies of the Progress Report in English will be submitted to NIA at the end of field work in the Philippines.

3. Draft Final Report

Twenty (20) copies of the Draft Final Report will be submitted to NIA at the end of home office work in Japan.

4. Final Report

Fifty (50) copies of the Final Report in English will be submitted to NIA within two (2) months after receiving the comments of NIA on the Draft Final Report.

V. Study Schedule

The Study, in principle, will be carried out in accordance with the attached Tentative Study Schedule.

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5. 収集資料リスト

1. Five-Year Philippine Development Plan, 1983-1987; Goals, Strategies and Policies. National Economic and Development Authority, May 1982.
2. Five-Year Philippine Development Plan, 1983-1987; Technical Annex. National Economic and Development Authority, May 1982.
3. Detail Design Report on Bohol Integrated Agricultural Development Project. Overseas Economic Cooperation Fund. January 1982
 - 1) Main Text
 - 2) Annex A Detail Design for Wahig-Pamacsalan Irrigation Project
 - 3) Annex B Study Report on the Phase II Project
 - 4) Annex C Hydrology and Geology
 - 5) Annex D Conceptual Design
 - 6) Annex E Project Implementation (Copy)
 - 7) Annex F Agriculture and Economy
4. Socio-Economic and Physical Profile (of the Province of Bohol for 1982). Province of Bohol
5. Stream Guaging Report: Location; Confluence of Wahig & Binabaye Rivers. NIA-BIP, Bohol.
6. Stream Guaging Report. Location; Confluence of Wahig & Pamacsalan Rivers. NIA-BIP, Bohol.
7. Stream Guaging Report: Location; Pamacsalan River NIA-BIP, Bohol
8. Stream Guaging Report: Location; Bagon-an River. NIA-BIP, Bohol
9. Rain Guaging Report: Location; Barangay Cafugdaan, Municipality of Pilar, Bohol. NIA-BIP, Bohol

10. Annual Table of Daily Rainfall: Name of Station; Dagohoy Rainguage Station (1957 - 1980)
11. List of Existing Communal & Private Irrigation System (Gravity) for Municipalities covered by BIP-Stage II.
12. Agro-Econ. Survey Number of Farmer, Sizes, Tennure and Uses 1982.
13. Communal Irrigation Projects - Project Profile - .
National Irrigation Administration
14. Soil Map, Bohol Province (prepared by NIA Bohol Provincial Office)
15. Land Use of Bohol Island (Soil and Land Resources Appraisal and Training Project) (prepared by NIA Bohol Provincial Office)
16. Bayungan Reservoir Area. NIA (prepared by NIA Bohol Provincial Office)
17. Bohol Irrigation Development Projects Map (prepared by NIA Bohol Provincial Office)
18. Layout Showing the Diff. Gauging Station (prepared by NIA Bohol Provincial Office)

JICA