BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR REHABILITATION
OF THE APRON OF ANGAT AFTERBAY
REGULATOR DAM
IN
THE REPUBLIC OF THE PHILIPPINES

NOVEMBER 2000

JAPAN INTERNATIONAL COOPERATION AGENCY
CTI ENGINEERING INTERNATIONAL CO., LTD.
PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study on the Project for Rehabilitation of the Apron of Angat Afterbay Regulator Dam and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines a study team from March 9 to April 19, 2000.

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

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

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

November 2000

[Signature]

Kunihiko Saito
President
Japan International Cooperation Agency
Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Rehabilitation of the Apron of Angat Afterbay Regulator Dam in the Republic of the Philippines.

This study was conducted by CTI Engineering International Co., Ltd., under a contract to JICA, during the period from March 3, 2000 to December 25, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of the Philippines and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

J. Kawakami
Toshiki Kawakami
Project manager,
Basic design study team on
the Project for Rehabilitation
of the Apron of Angat Afterbay
Regulator Dam
CTI Engineering International Co., Ltd.
OUTLINE OF THE PROJECT
Angat Afterbay Regulator Dam to be Taken at the Left Bank

The Downstream of the Dam to be Taken at the Right Bank

PHOTOGRAPHS OF THE PROJECT SITE
# ABBREVIATIONS

## Organizations/Agencies

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AMRIS</td>
<td>Angat Maasim River Irrigation System</td>
</tr>
<tr>
<td>BIO</td>
<td>Bulacan Irrigation Office</td>
</tr>
<tr>
<td>DENR</td>
<td>Department of Environmental and Natural Resources</td>
</tr>
<tr>
<td>DPWH</td>
<td>Department of Public Works and Highways</td>
</tr>
<tr>
<td>DA</td>
<td>Department of Agriculture</td>
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<tr>
<td>GOJ</td>
<td>The Government of Japan</td>
</tr>
<tr>
<td>GOP</td>
<td>The Government of the Philippines</td>
</tr>
<tr>
<td>ICC</td>
<td>Investment Coordination Committee</td>
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<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<tr>
<td>LWUA</td>
<td>Local Water Utilities Administration</td>
</tr>
<tr>
<td>MERALCO</td>
<td>Manila Electric Company</td>
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<tr>
<td>MWSS</td>
<td>Manila Water and Sanitation System</td>
</tr>
<tr>
<td>NEDA</td>
<td>National Economic and Development Authority</td>
</tr>
<tr>
<td>NIA</td>
<td>National Irrigation Administration</td>
</tr>
<tr>
<td>NPC</td>
<td>National Power Corporation</td>
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<tr>
<td>NTC</td>
<td>National Telecommunications Commission</td>
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<tr>
<td>PAGASA</td>
<td>Philippine Atmospheric, Geophysical and Astronomical Services Administration</td>
</tr>
<tr>
<td>PNP</td>
<td>Philippine National Police</td>
</tr>
<tr>
<td>RWSA</td>
<td>Rural Water and Sanitation Association</td>
</tr>
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## Acronyms

<table>
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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>A/P</td>
<td>Authorization to Pay</td>
</tr>
<tr>
<td>B/A</td>
<td>Banking Arrangement</td>
</tr>
<tr>
<td>BOT</td>
<td>Built, Operation and Transfer</td>
</tr>
<tr>
<td>BT</td>
<td>Built and Transfer</td>
</tr>
<tr>
<td>CIS/PIS</td>
<td>Communal/Pump Irrigation Systems</td>
</tr>
<tr>
<td>ECC</td>
<td>Environmental Compliance Certificate</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>EL</td>
<td>Elevation</td>
</tr>
<tr>
<td>E/N</td>
<td>Exchange of Notes</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GNP</td>
<td>Gross National Product</td>
</tr>
<tr>
<td>IEE</td>
<td>Initial Environmental Examination</td>
</tr>
<tr>
<td>MOA</td>
<td>Memorandum of Agreement</td>
</tr>
<tr>
<td>NIS</td>
<td>National Irrigation System</td>
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<tr>
<td>O&amp;M or O/M</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>ODA</td>
<td>Official Development Assistance</td>
</tr>
<tr>
<td>SAL</td>
<td>Structural Adjustment Loan</td>
</tr>
<tr>
<td>SWIM</td>
<td>Small Water Impounding Management</td>
</tr>
<tr>
<td>TTS</td>
<td>Telegraphic Transfer Selling</td>
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<td>VAT</td>
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