

附 屬 資 料

ACRONYMS AND ABBREVIATIONS

ORGANIZATIONS

AKELCO	:	Aklan Electric Cooperative, Inc.
BCGS	:	Bureau of Coast and Geodetic Survey
BMGS	:	Bureau of Mines and Geo-Science
BPW	:	Bureau of Public Works (now DPWH)
BWP	:	Barangay Water Program
CAA	:	Civil Aeronautics Administration
CAPELCO	:	Capiz Electric Cooperative, Inc.
DECS	:	Department of Education, Culture and Sports
DELMES	:	Don Eugenio Ladrado Memorial Elementary School Lambunao, Iloilo
DENR	:	Department of Environment and Natural Resources
DEO	:	District Engineer's Office, DPWH
DPWH	:	Department of Public Works and Highways
DOH	:	Department of Health
GOJ	:	Government of Japan
GOP	:	Government of the Republic of the Philippines
GUIMELCO	:	Guimaras Island Electric Cooperative, Inc.
ILELCO	:	Iloilo Electric Cooperative, Inc.
IWA	:	Ibajay Waterworks Association
JICA	:	Japan International Cooperation Agency
JWD	:	Jordan Water District
KWD	:	Kalibo Water District
LIST	:	Lambunao Institute of Science and Technology
LWUA	:	Local Water Utilities Administration
MIWD	:	Metro Iloilo Water District
MHS	:	Municipal High School
MNR	:	Ministry of Natural Resources
NACIAD	:	National Council on Integrated Area Development
NAWASA	:	National Waterworks and Sewerage Authority (now MWSS and LWUA)
NCSO	:	National Census and Statistics Office
NEDA	:	National Economic and Development Authority
NHA	:	National Housing Authority
NIA	:	National Irrigation Administration

NPC : National Power Corporation
 NWRRC : National Water Resources Council

 PHO : Provincial Health Office
 PSPC : Panay State Polytechnic College
 PWD : Pilar Water District

 RCWD : Roxas City Water District
 RHU : Rural Health Unit
 RWDC : Rural Waterworks Development Corporation
 RWSA : Rural Waterworks and Sanitation Association

 SEAFDEC : South-East Asian Fisheries Development Center
 SIPC : Southern Iloilo Polytechnic College

 UPV : The University of the Philippines in Visayas
 USAID : United States Agency for International Development

TECHNICAL TERMS

MAMSL, mamsl : Meter Above Mean Sea Level

 GI : Galvanized iron (pipe)

 MBGL, mbgl : Meter Below Ground Level

 PNSDW : Philippine National Standard for Drinking Water

 PVC : Polyvynil chloride (pipe)

UNITS

cm : centimeter
 cm/sec : centimeter per second
 cu.m : cubic meter
 cu.m/day : cubic meter per day
 cu.m/month : cubic meter per month

 FTU : formazin turbidity unit

 ha : hectare
 hr : hour

 km : kilometer
 kw : kilo watt
 KWH : kilo watt hour

 l/day or
 liter/day : liter per day

l/min or	
liter/min	: liter per minute
l/sec or	
liter/sec	: liter per second
lps	: liter per second
lpcd	: liter per capita per day
mH	: meter in Height
μ S/cm	: micro siemens per centimeter
mm	: millimeter
m	: meter
m/second	: meter per second
mm/year	: millimeter per year
ohm-m	: ohm meter
sq.cm.sec	: square centimer per second
sq.km	: square kilometer
sq.m	: square meter

附属資料 - 2

LIST OF OFFICIALS AND PERSONS CONCERNED

LOCAL WATER UTILITIES ADMINISTRATIONS (LWUA)

Ricardo T. Quebral	:	Administrator
Porthos P. Alma Jose	:	Ex-Administrator
Vitaliano J. de la Vega	:	Deputy Administrator, Engineering Services
Alfredo B. Espino	:	Manager, Project Management Office
Jesus R. Gomez	:	Manager, Planning Department
Eriberto R. Calubaquib	:	Manager, Water Resources Division, Planning Department
Gerry Sullano	:	Manager, Project Identification Division, Planning Department
Roberto B. Binag	:	Manager, Water Systems Development Division, Planning Department
Salvador C. Ner	:	Prof. Engr. D, Water Resources Division, Planning Department
Cezar P. Cruzado	:	Hydrogeologist, Water Resources Division, Planning Department
Renito Navarro	:	Water Resources Division, Planning Department
Aristotle Doctor	:	Water Resources Division, Planning Department
Armando T. Fernandez	:	Manager, Construction Department
Edwin T. Ruiz	:	Manager, Wells Construction Division, Construction Department
Rolando A. Grospe	:	Asst. Manager, Wells Construction Division, Construction Department
Isagani S. Capalad	:	Prof. Engr. D, Wells Construction Division, Construction Department
Ver Bombeta	:	Drilling Engineer, Wells Construction Division, Construction Department
Franco C. Bula, Jr.	:	WDPO-D, Water District Formation Division, Regulatory Services
Vina Sebastian	:	Water District Formation Division, Regulatory Services

NATIONAL IRRIGATION ADMINISTRATION (NIA)

Domingo B. Dato-on	:	Manager, Operation Division, Regional Office, Iloilo
Sergio Agting	:	Senior Engr. B, Planning Section, Regional Office, Iloilo

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH)

Flomina Tupaz : District Engr., 1st DEO, Iloilo
Rodolfo Canastillo : Asst. District Engr., 1st DEO,
Iloilo
Emilio Rosada : Well Drilling Supervisor, 1st DEO
Iloilo
Rodolfo Pollentes : District Engr., DEO, Guimaras
Modesto D. Intoy : District Engr., DEO, Aklan
Criselda R. Roldan : Civil Engr., DEO, Aklan

MALAY, AKLAN

Hon. Regelio Aguirre : Municipal Mayor
Sergio S. Prado : Vice Mayor

IBAJAY, AKLAN

Hon. Joeben Miraflores : Municipal Mayor
Josue Albar Siñel : President, Iabajay RWSA
Jesus P. Venus : System Superintendent

NEW WASHINGTON, AKLAN

Hon. Eriberto Venus : Municipal Mayor
Dodie Pastrana : General Manager, New Washington
Water District

KALIBO, AKLAN

Hon. Allen S. Quimpo : Municipal Mayor
Robert L. Cheng : Chairman, Board of Directors,
Kalibo Water District
Avelino M. Domingo, Jr. : General Manager, Kalibo Water
District

BANGA, AKLAN

Hon. Segrio T. Rigodon : Municipal Mayor

IVISAN, CAPIZ

Hon. Mely Yap : Municipal Mayor
Renato Quiachon Villareal: Vice Mayor
Romualdo U. Diestre : Municipal Treasurer

PONTEVEDRA, CAPIZ

Hon. Jose Avelino III : Municipal Mayor
Raguel Olandia : Planning and Development Coordinator
Manuel T. Iclang : Member, Board of Directors,
Pontevedra Water District

PILAR, CAPIZ

Hon. Porfirist Perez : Municipal Mayor
Roberto C. Alba : General Manager, Pilar Water District
Remo J. Benliro : Member, Sangunian Bayan

ROXAS CITY, CAPIZ

Hon. Juliano A. Alba : City Mayor
Ardisli A. Ambrosio : Asst. City Engr., CEO
Alberto Pestano : General Manager, Roxas City
Water District

SARA, ILOILO

Hon. Neptali S. Salcedo : Municipal Mayor
Elmo S. Escrupulo : Manager, Municipal Waterworks

LAMBUNAO, ILOILO

Hon. Vicente L. Ramirez : Municipal Mayor
Hon. Raul Roncesvalles : Member, Sangguniang Bayan
Wilfredo G. Pilla : Municipal Planning and Development
Coordinator

LEON, ILOILO

Hon. Ludovico C. Cabado : Municipal Mayor
Florencio C. Sajo, Jr. : Municipal Secretary
Salvador Villan : Municipal Planning and Development
Coordinator
Brenda G. De Guzman : Personnel Officer Designate
Lorna C. Cadiz : Statistician, Office of the Mayor

MIAGAO, ILOILO

Hon. Erlinda N. Britanico : Municipal Mayor
Hon. Alfredo Monsale : Member, Sangguniang Bayan
Rafael Fabilo : Municipal Planning and Development
Coordinator

JORDAN, SUB-PROVINCE GUIMARAS, ILOILO

Hon. Leo T. Espinosa : Municipal Mayor
Cresente Chavez : Ex-Mayor
Remy G. Tamson : General Manager, Jordan Water
District
Glicerio Gaylan : Land Owner, Ipil Spring, Hoskyn

CONGRESSMAN

Hon. Alberto J. Lopez : Congressman, 2nd District,
Province of Iloilo
Gerry B. Yucon : Secretary to Congressman Lopez

PROVINCIAL GOVERNMENT OF ILOILO

Augustus T. Bacabac : Secretary to the Governor
Alfredo de Guzman : Provincial Planning and Development
Coordinator

SUB-PROVINCE OF GUIMARAS

Dr. Catalino Nava : Governor
Dr. Alfredo S. Javier : Guimaras Hospital
Dr. Gregorio Sancho : Asst. Provincial Health Officer,
Guimaras Hospital

ILOILO CITY, ILOILO

Moises G. Molen, Jr. : General Manager, MIWD
Ernesto J. Caberoy : Personnel Officer, MIWD

OTHERS

Gerardo S. Solas : Superintendent, Southern Iloilo
Polytechnic College, Miagao,
Iloilo
Satoru Fukumoto : Asst. Manager, Aquaculture Dept.,
SEAFDEC, Iloilo
Dr. Yoshifumi Yashiro : Aquaculture Expert, SEAFDEC

附屬資料—3 UNIT CONSTRUCTION COST

TABLE-1 Unit Construction Costs

Materials	Unit	In-Place Cost
Pipeline		
for 150 psi		
400 mm (steel)	LM	2,040
350 mm (steel)	LM	1,910
300 mm (steel)	LM	1,120
250 mm (steel)	LM	930
200 mm (steel)	LM	750
150 mm (PVC)	LM	630
100 mm (PVC)	LM	500
for 100 psi		
200 mm (steel)	LM	630
150 mm (PVC)	LM	540
100 mm (PVC)	LM	270
Butterfly Valve		
400 mm	pc.	60,000
350 mm	pc.	49,000
Gate Valve		
300 mm	pc.	15,000
250 mm	pc.	11,000
200 mm	pc.	8,500
150 mm	pc.	5,700
100 mm	pc.	4,500
Reservoirs		
Steel, Elevated	cu.m	5,500
Concrete, Elevated	cu.m	5,800
Concrete, Ground	cu.m	1,930

TABLE-2 Deep Well Construction Cost (Thousand Pesos)

Depth (m)	Casing Size (mm)		
	200	250	300
40	234	306	359
60	413	503	593
80	413	521	629
100	485	629	755
120	557	719	881
140	629	809	989
160	701	899	1,095
180	773	989	1,222
200	845	1,078	1,330

TABLE-3 Deep Well Pump Stations Costs (Thousand Pesos)

kW	Electric Motor Drive	Diesel Engine Drive
7	519	596
15	635	750
22	731	866
29	827	981
37	904	1,096
44	962	1,173
51	1,019	1,250

TABLE-4 Booster Pump Station

$$C = (42.6 - 8.08 \log Q) \times H^{0.305} (\log Q - 0.7)^{(6/H - 0.25)}$$

where, C : Cost (thousand Pesos)
 Q : Design Capacity (lps)
 H : Total Dynamic Head (m)

TABLE-5 Gas Chlorinator

Water Flow Condition	Max. Chlorine Dosage (kg/day)	Unit Cost (Peso)
Constant	22	112,300
Constant	45	136,400
Variable	22	169,100
Variable	45	193,800


TABLE-6 Earth/Concrete Work

Item	Unit	Unit Cost (Peso)
Earthwork		
Rock Excavation	cu.m	170
Common Excavation	cu.m	70
Concrete Work		
Concrete 4,000 psi	cu.m	1,690
Concrete 3,000 psi	cu.m	1,380

IMPLEMENTING ARRANGEMENT ON THE TECHNICAL COOPERATION
FOR
THE GROUNDWATER DEVELOPMENT STUDY IN PANAY ISLAND
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE LOCAL WATER UTILITIES ADMINISTRATION

Manila, December 9, 1987


Forthos F. Alma Jose
Administrator
Local Water Utilities
Administration

山下 生比古
Ikuhiko Yamashita
Leader, Japanese
Preliminary Survey Team
The Japan International
Cooperation Agency

I. INTRODUCTION

In response to the request of the Government of the Republic of the Philippines (hereinafter referred to as "GOP"), the Government of Japan (hereinafter referred to as "GOJ") has decided to conduct the Groundwater Development Study in Panay Island in the Republic of the Philippines (hereinafter referred to as "the Study") and exchanged the Notes Verbales with the GOP concerning the implementation of the Study.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of GOJ, will undertake the Study in accordance with the relevant laws and regulations enforced in Japan. On the part of GOP, Local Water Utilities Administration (hereinafter referred to as "LWUA") shall act as the counterpart agency to the Japanese 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 constitutes the implementing arrangement between JICA and LWUA under the above mentioned Notes Verbales exchanged between the two governments.

II. OBJECTIVES OF THE STUDY

1. To evaluate the groundwater development potential for municipal water supply in Panay Island
2. To transfer technology to the Philippine counterpart personnel in the course of the Study.

III. THE STUDY AREA

The Study area will cover thirteen (13) municipalities in three (3) provinces of Panay Island. Four (4) municipalities will be selected for test well drilling and related investigation.

IV. SCOPE OF THE STUDY

Scope of the Study will include the following:

1. data collection and review
 - 1.1 socio-economy
 - 1.2 land use
 - 1.3 development plans
 - 1.4 physical conditions
 - a. topography
 - b. hydrology and meteorology
 - c. geology and hydrogeology

- 1.5 water supply and demand
- 1.6 water supply facilities
- 1.7 previous studies on groundwater
2. field survey
 - 2.1 reconnaissance
 - a. topography
 - b. hydrology and meteorology
 - c. geology and hydrogeology
 - d. existing water supply facilities
 - 2.2 electrical sounding
 - 2.3 water quality analysis for existing wells
 - 2.4 well inventory and groundwater level observation
 - 2.5 discharge measurement of surface water
3. analysis and evaluation of groundwater and recommendations
 - 3.1 hydrogeological analysis
 - 3.2 groundwater development potential
 - 3.3 water demand forecast
 - 3.4 recommendations
4. test well drilling and related investigation for selected municipalities
 - 4.1 preparation of implementation program
 - 4.2 execution of observation holes
 - 4.3 execution of test well construction
 - 4.4 observation and analysis
 - a. geological loggings
 - b. pumping tests
 - c. water quality analysis
 - d. analysis of test wells
5. groundwater supply system
 - 5.1 conceptual water supply system
 - 5.2 rough cost estimate of the system/

V. STUDY SCHEDULE

The Study will be conducted in accordance with the tentative schedule attached in ANNEX I:

VI. REPORTS

JICA will prepare and submit the following reports to LWUA in English.

1. Inception Report (10 copies)
At the beginning of the field survey
2. Progress Report (10 copies)
At the middle of the field survey

3. Interim Report (10 copies)
At the end of the field survey

LWUA will submit to JICA its comments within one month after the receipt of Interim Report

4. Draft Final Report (10 copies)

LWUA will provide JICA its comments within one month after receipt of the Draft Final Report

5. Final Report (30 copies)

Within two months after receipt of the comments on the Draft Final Report by LWUA.

VII. UNDERTAKING OF GOP

In accordance with the Notes Verbales exchanged between the GOJ and GOP, GOP shall accord privileges, immunities and other benefits to the Japanese Study Team and, through the authorities concerned, take necessary measures to facilitate smooth conduct of the study.

1. (1) GOP shall be responsible for dealing with claims which may be brought by the third parties against the members of the Japanese 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 arising from the gross negligence or willful misconduct of the above mentioned members.

(2) GOP shall secure the safety of the Study team during the implementation of the Study.
2. LWUA 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 shown in IV.1
 - (2) Counterpart personnel
 - (3) Administrative and technical support staff

- (4) Suitable office space in Manila including appropriate furnishings and sub-offices in Panay Island
 - (5) Credentials or identification cards to the members of the Study team
 - (6) Two service vehicles with drivers for entire duration of the Study
3. LWUA shall make necessary arrangements with other governmental and non-governmental organizations concerned for the following:
- (1) To secure the safety of the members of the Japanese Study team
 - (2) To secure permit for the members of the Japanese Study team to enter, leave and sojourn in the Philippines for the duration of their assignments therein
 - (3) To exempt the members of the Japanese Study team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into the Philippines for the conduct of the Study
 - (4) To exempt the members of the Japanese Study team from income tax and charges of any kind imposed on or in connection with any emolument or allowance paid to the members of the Japanese Study team for their services in connection with the implementation of the Study
 - (5) To provide the necessary facilities to the Japanese Study team for remittance as well as utilization of the funds introduced into the Philippines from Japan in connection with the implementation of the Study
 - (6) To secure permission for entry into private properties or other areas for the conduct of the Study
 - (7) To secure permission to take all data and documents related to the Study out of the Philippines to Japan by the Study team
 - (8) To provide medical services as needed and the expenses will be borne by the members of the Japanese Study team.

VIII. UNDERTAKING OF GOJ

In accordance with the Notes Verbales exchanged between GOJ and GOF, GOJ through JICA, shall take necessary measures for the implementation of the Study.

1. To dispatch, at its own expense, Study team to the Republic of the Philippines
2. To pursue technology transfer to the Philippine counterpart personnel in the course of the Study

IX. CONSULTATION

JICA and LWUA shall consult with each other in respect of any matter that may arise in the interpretation or implementation of this arrangement.

JICA