

**THE FEASIBILITY STUDY ON  
THE WESTERN LEGAZPI IRRIGATION AND  
RURAL DEVELOPMENT PROJECT IN THE PHILIPPINES**

***FIGURES***

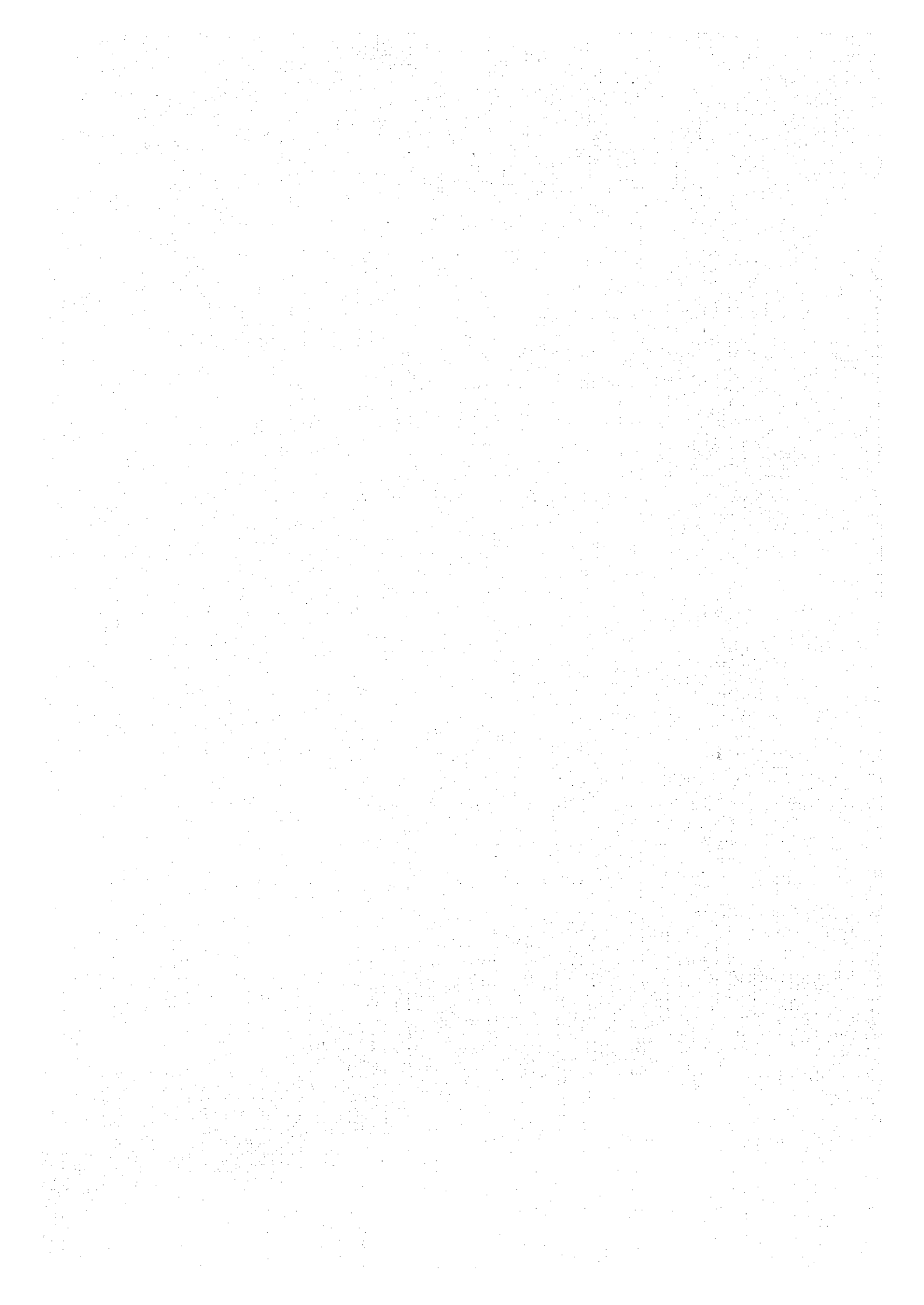
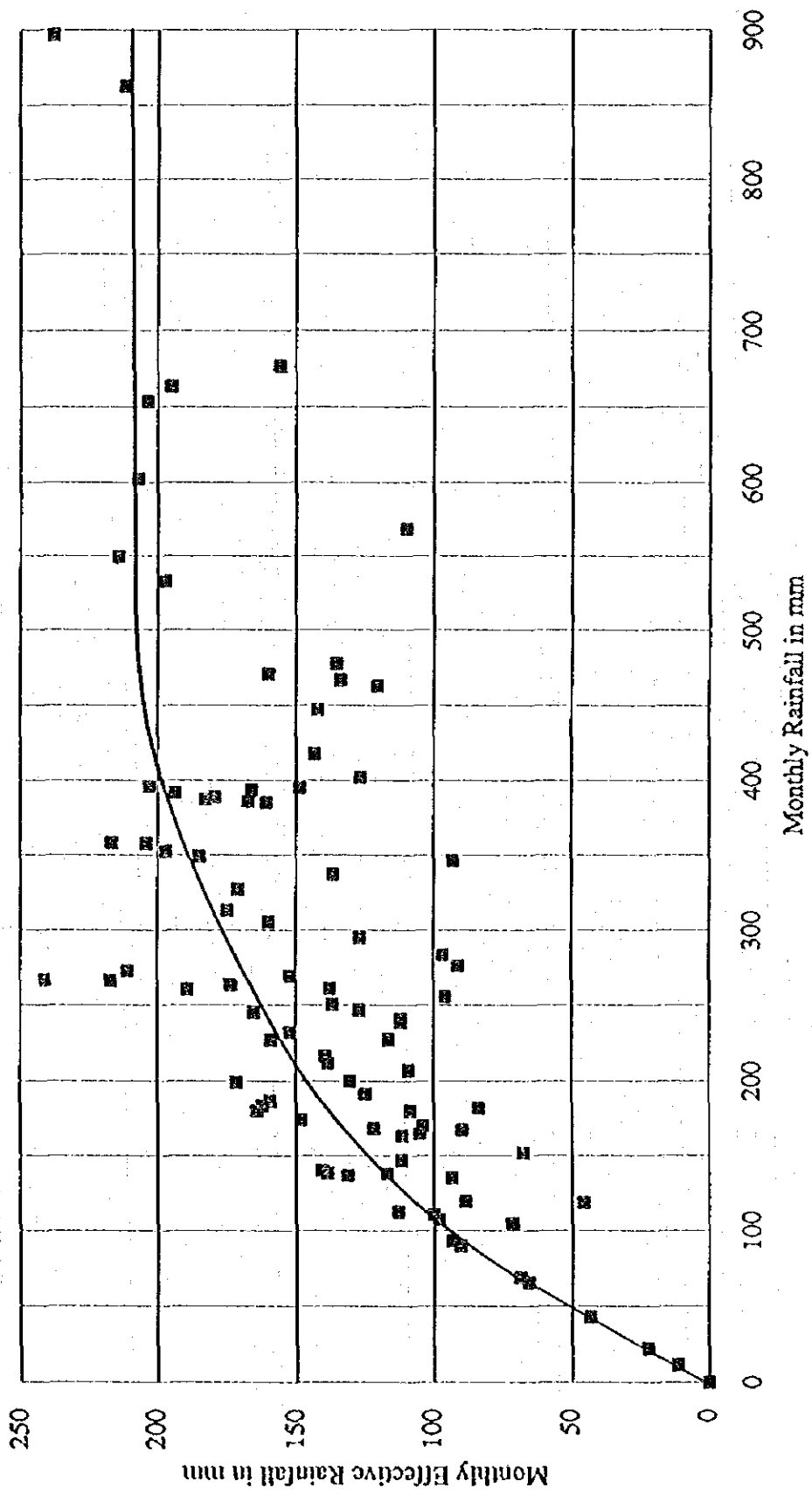


Figure D.5.1 Relation between Monthly Rainfall and Effective Rainfall



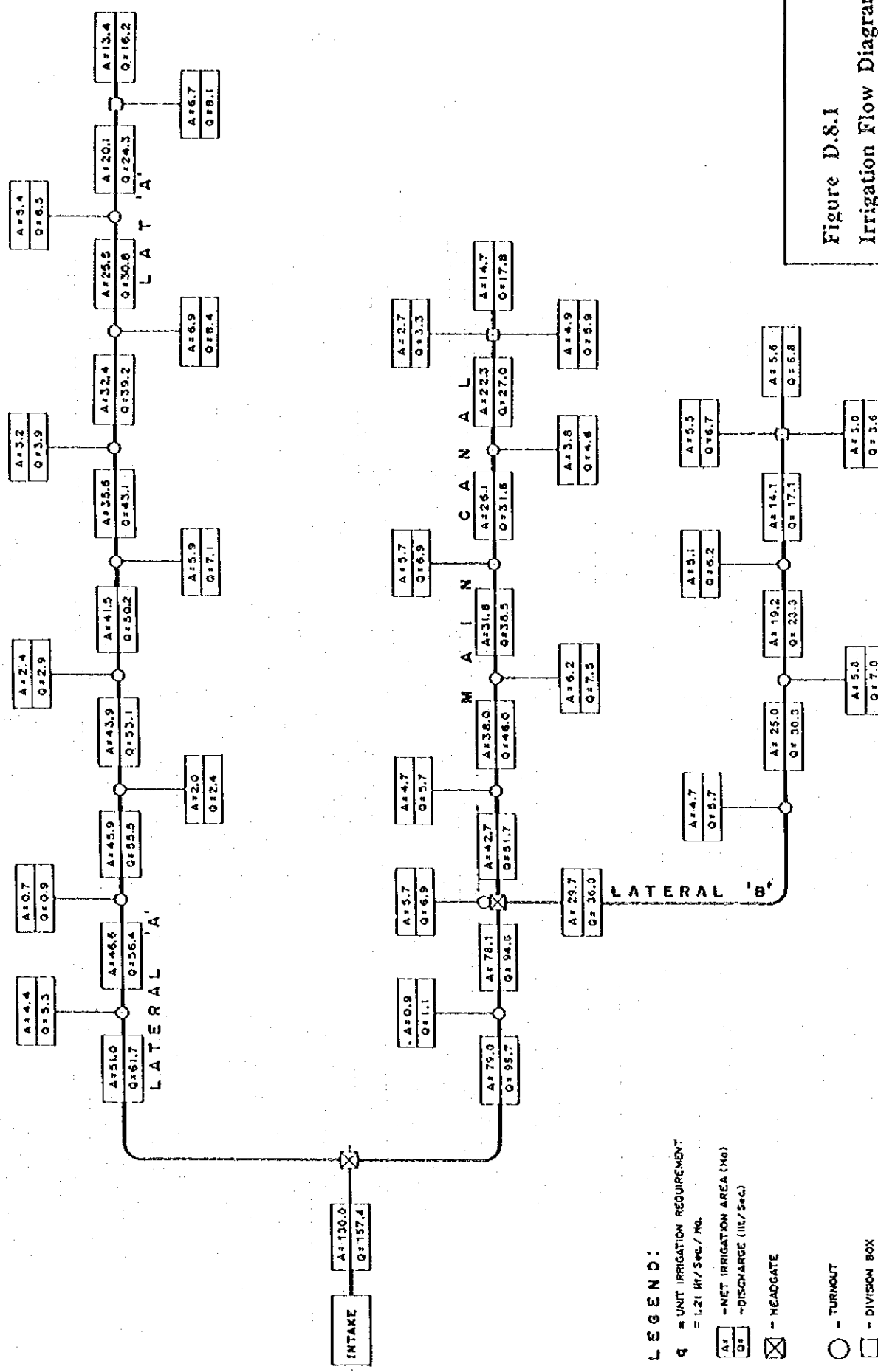


Figure D.8.1  
Irrigation Flow Diagram  
of Camalig Diversion  
Model Project

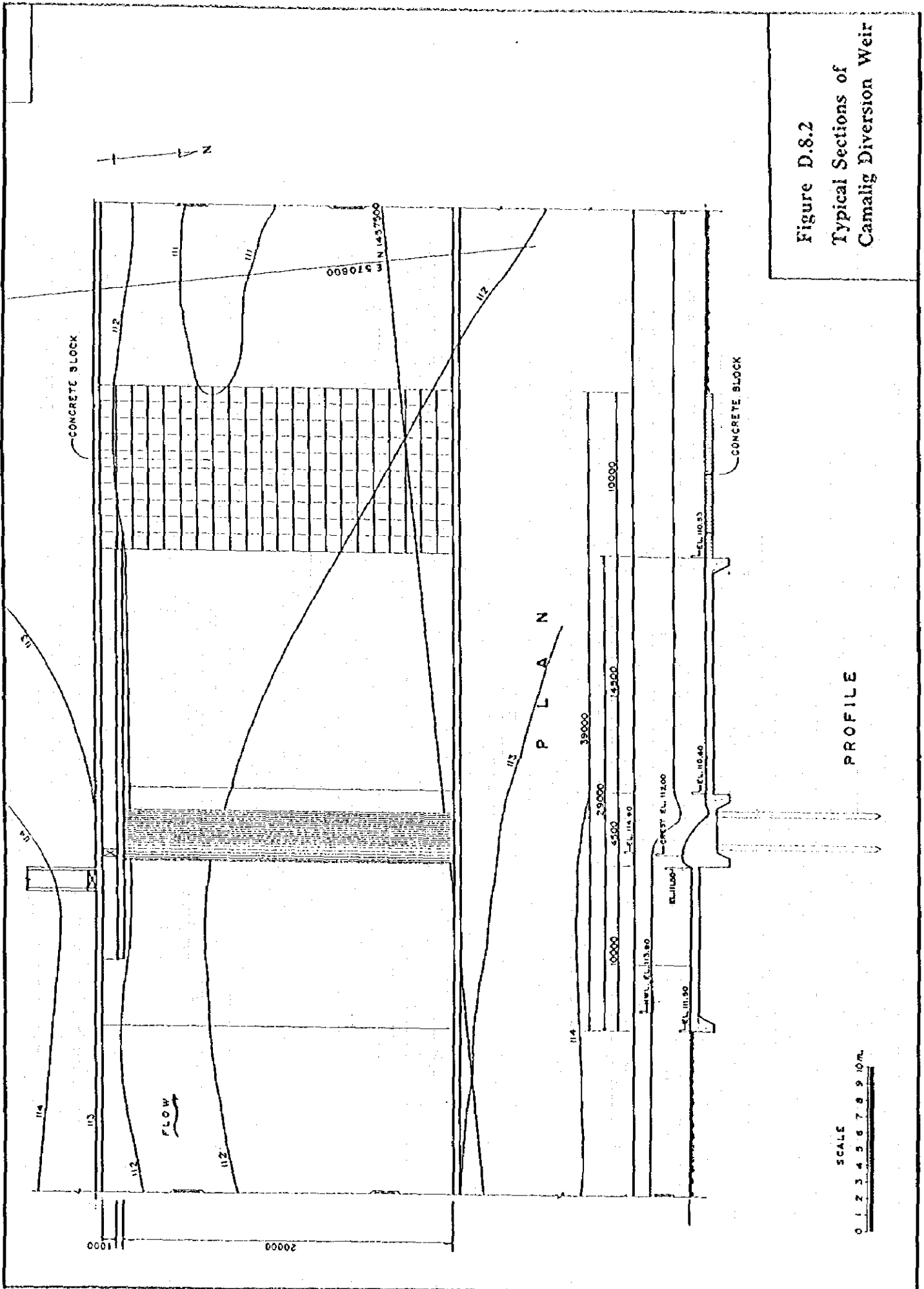


Figure D.8.2  
 Typical Sections of  
 Camalig Diversion Weir

**LEGEND:**

→ FLOW

- A = GROSS AREA (Ha.)
- Q = DISCHARGE (m<sup>3</sup>/sec.)
- DRAINAGE REQUIREMENT
- 9.8 l./11./sec./ha.
- FOR PLAIN AREA
- 125 l./75sec./ha. FOR MOUNTAIN/HILL AREA

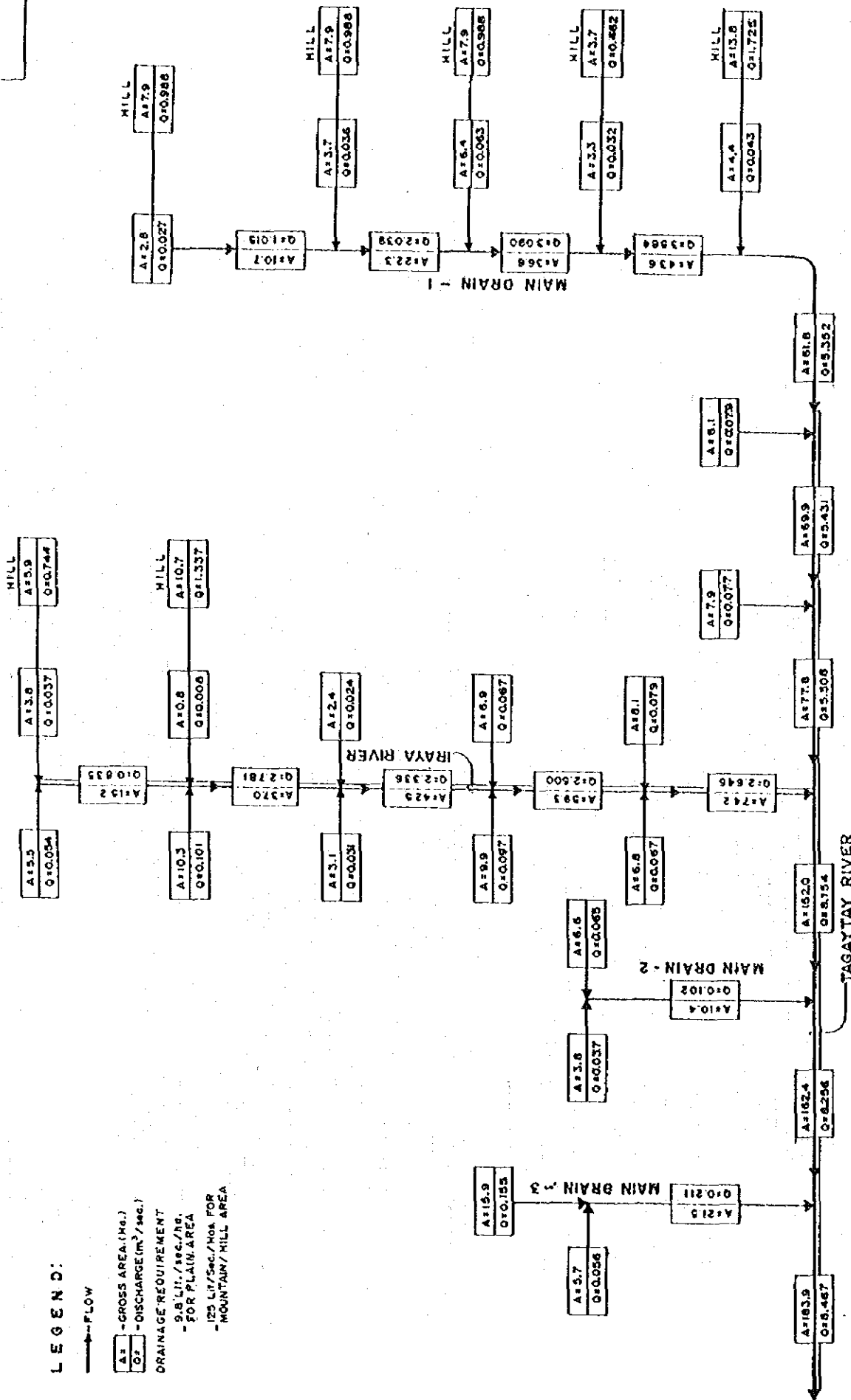
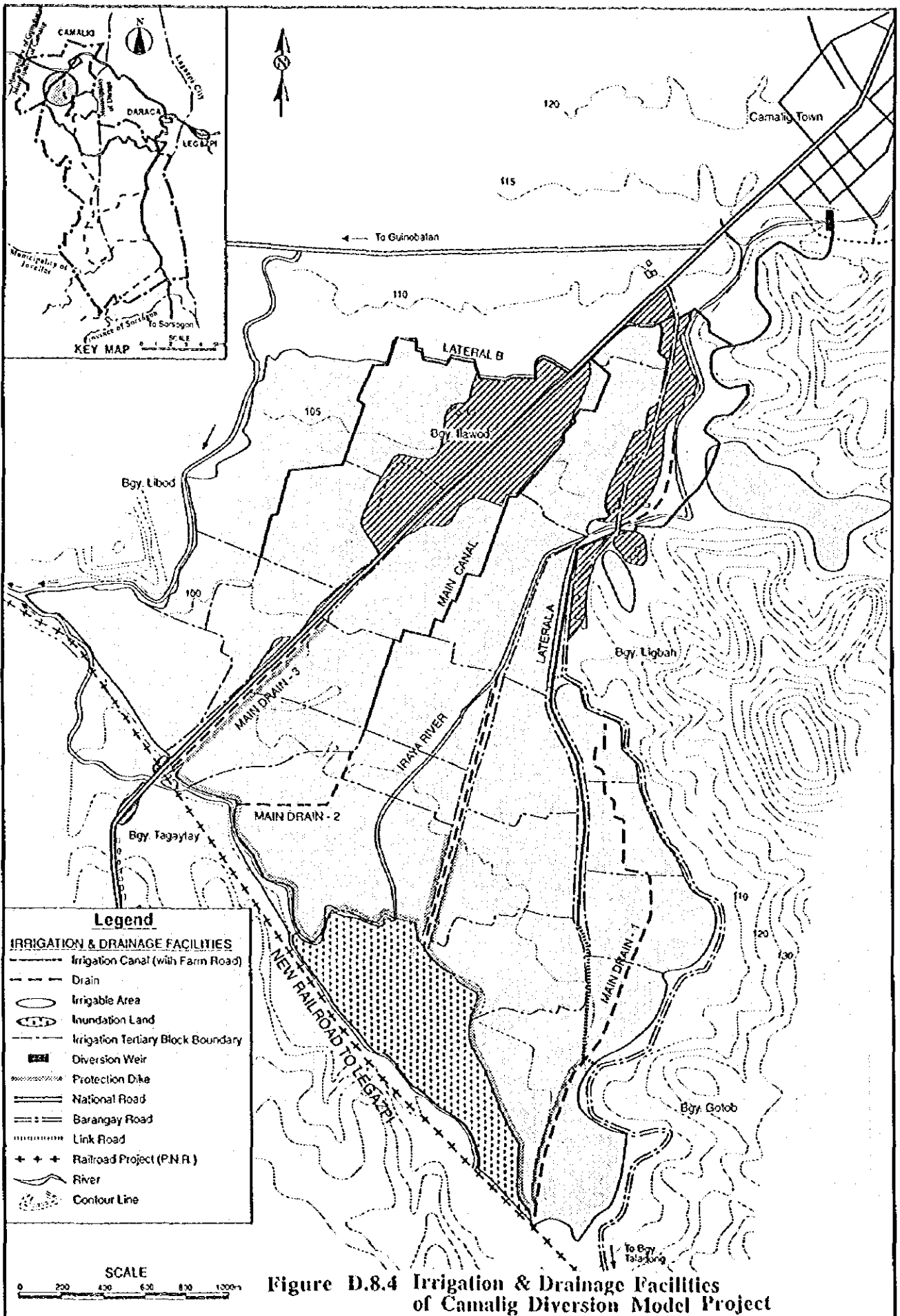


Figure D.8.3  
Drainage Flow Diagram  
of Camalig Diversion  
Model Project



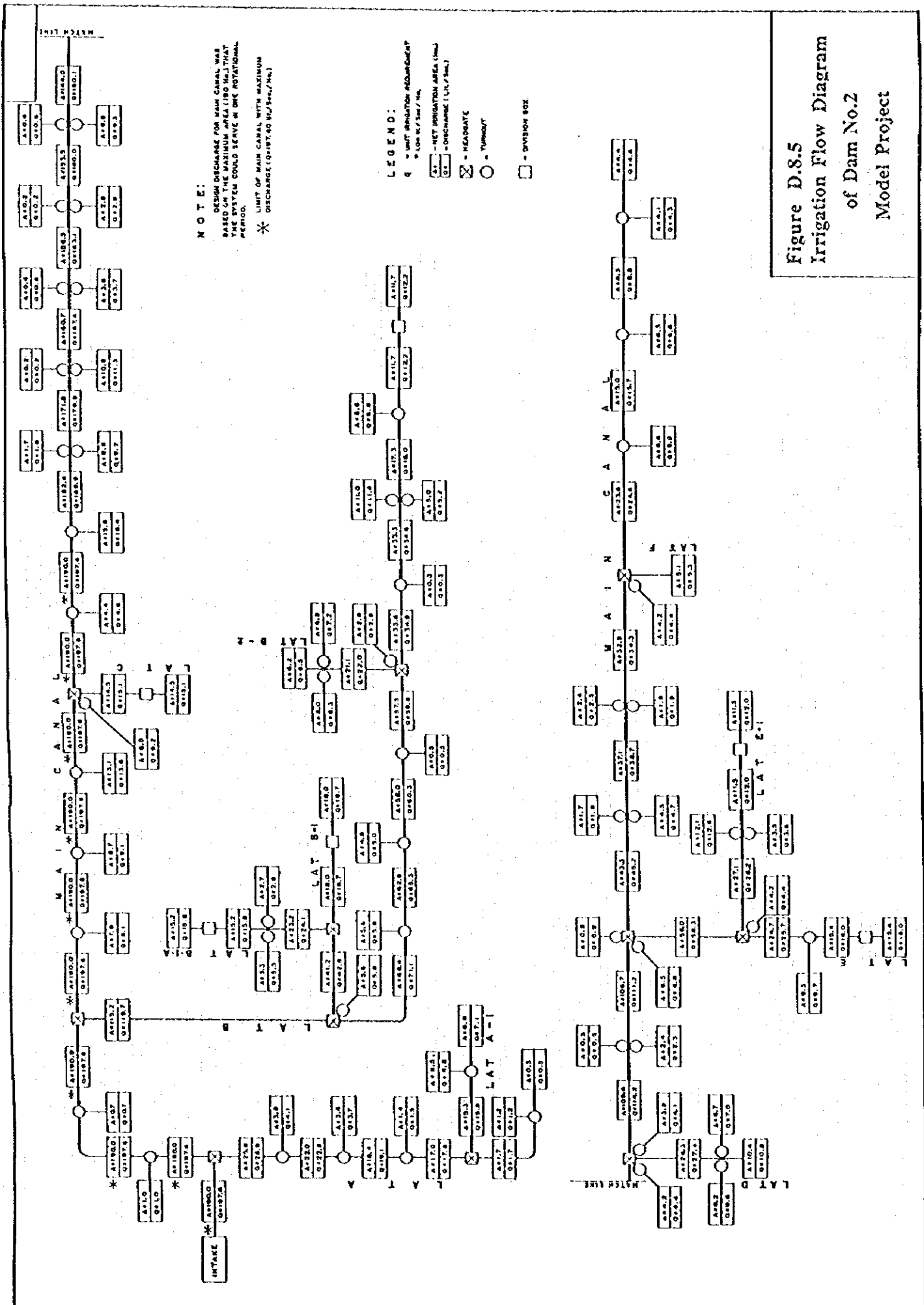


Figure D.8.5  
 Irrigation Flow Diagram  
 of Dam No.2  
 Model Project



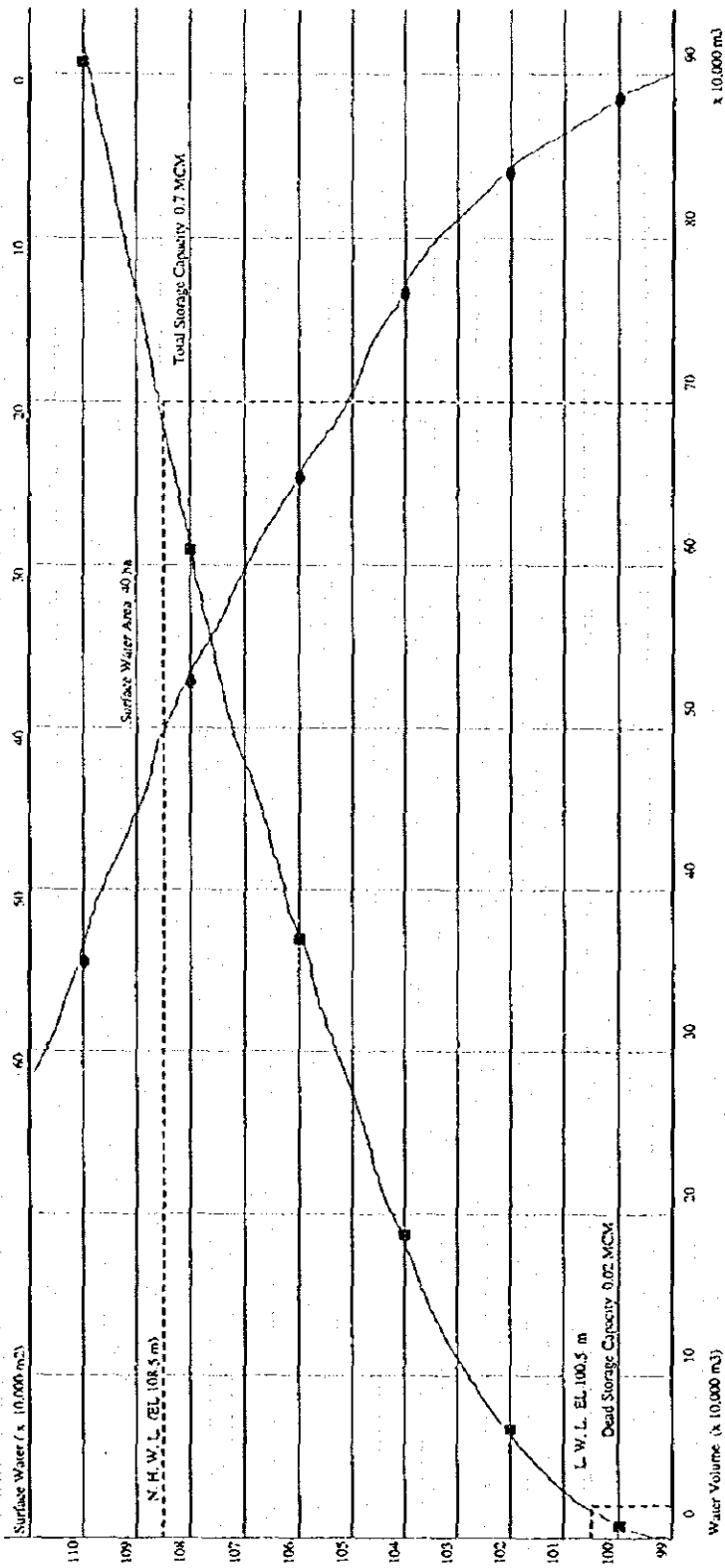
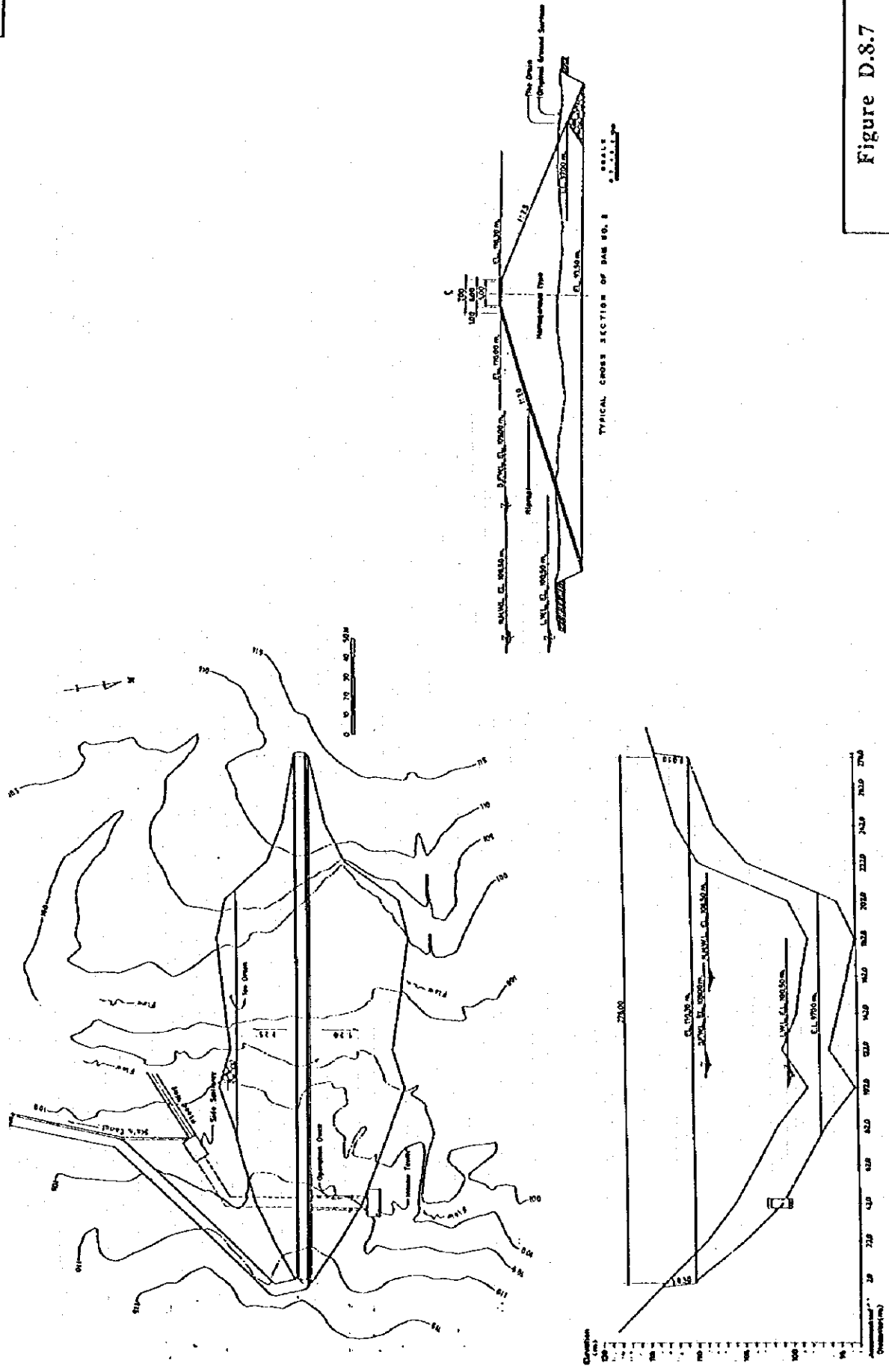


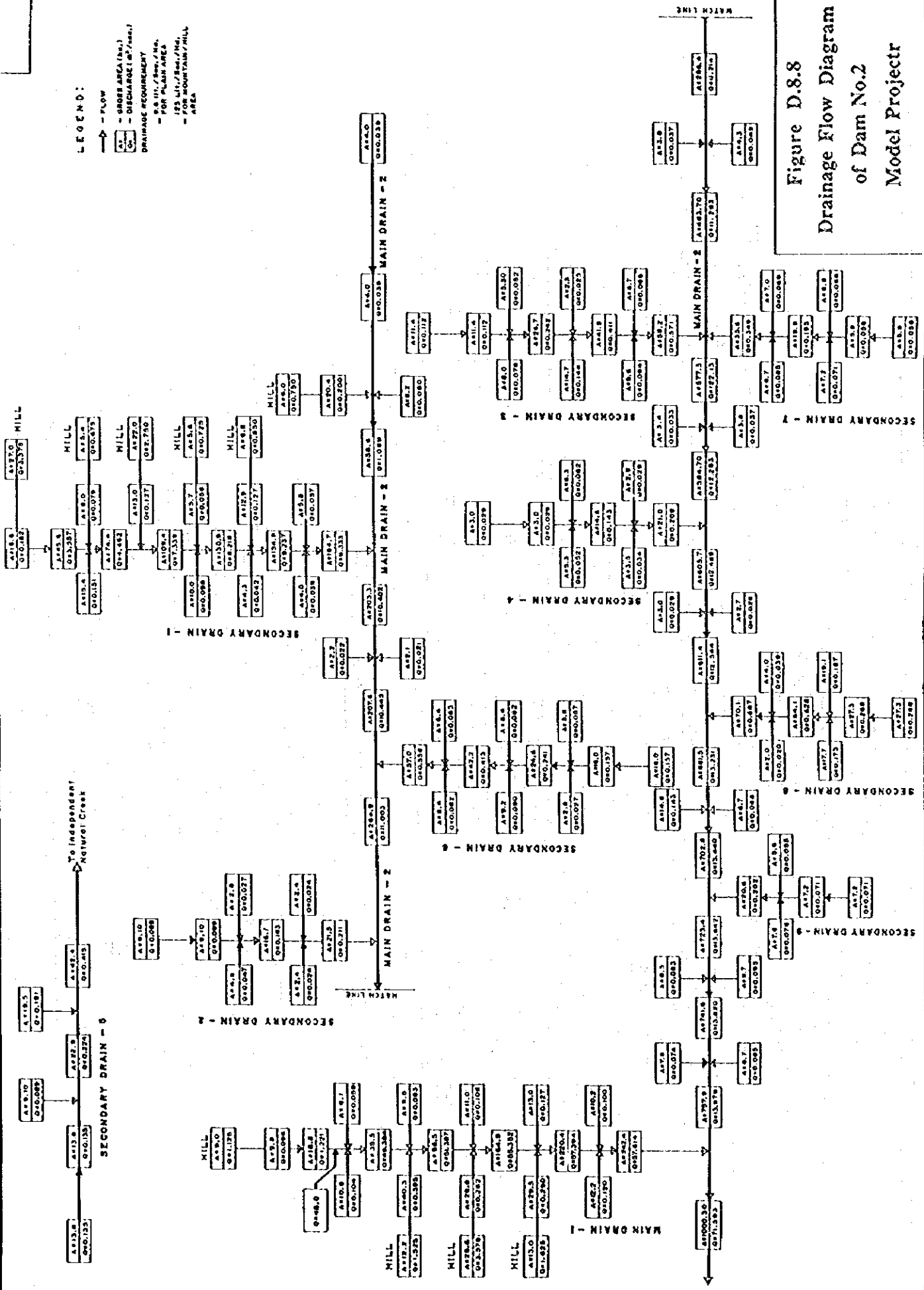
Figure D.8.6 Reservoir Storage Curve of Dam No.2

Figure D.8.7  
 Typical Section of  
 Dam No.2

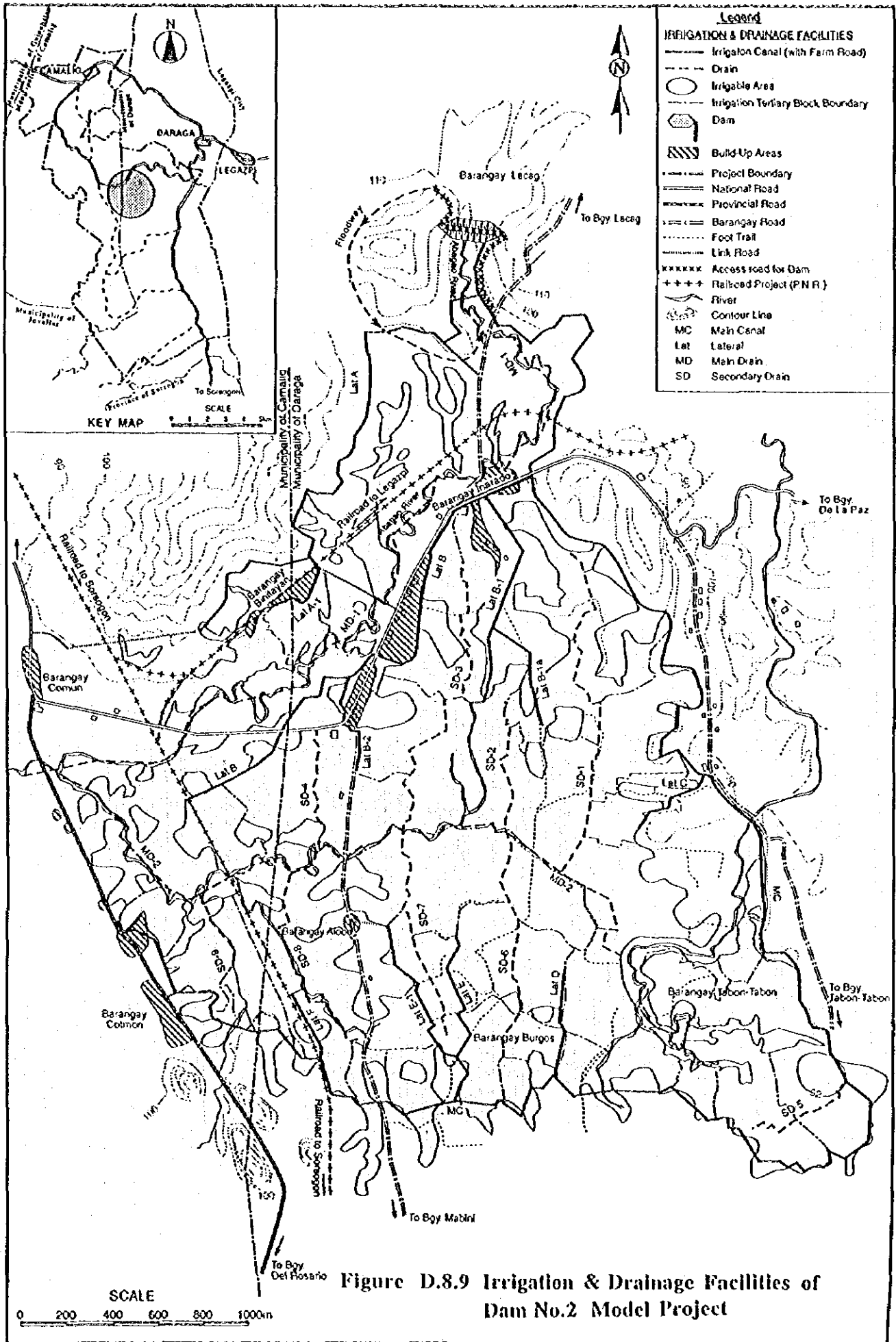


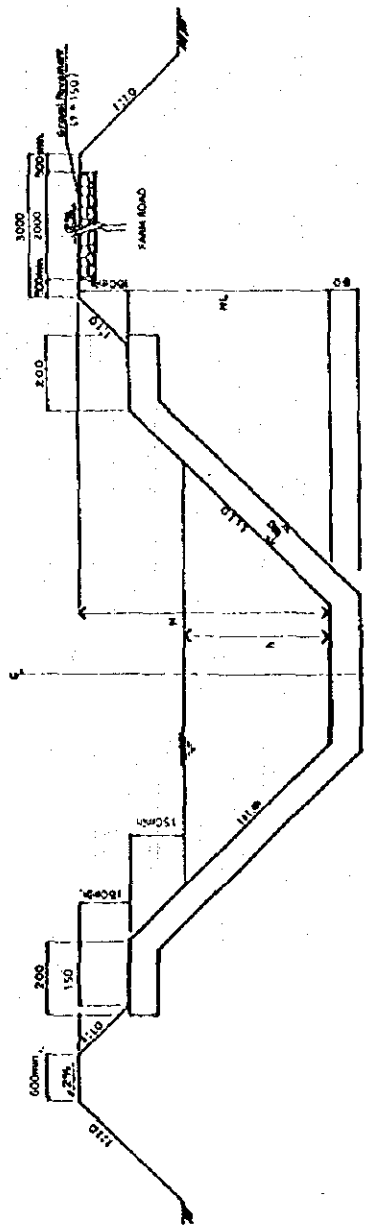
**LEGEND:**

- FLOW
- ▭ - BRUSH AREA (Ac.)
- ▭ - DISCHARGE (cfs/acre)
- ▭ - DRAINAGE REQUIREMENT
- 0.5 IN./SEC./HR. FOR PLAIN AREAS
- 125 IN./SEC./HR. FOR MOUNTAIN/HILL AREAS

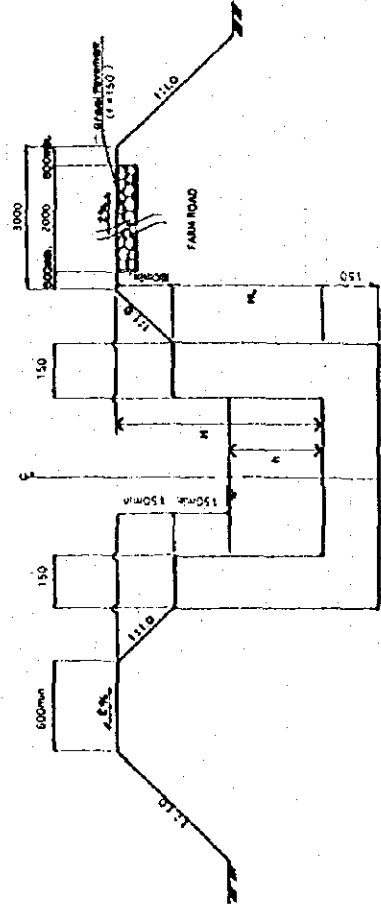


**Figure D.8.8**  
**Drainage Flow Diagram**  
**of Dam No.2**  
**Model Projectr**

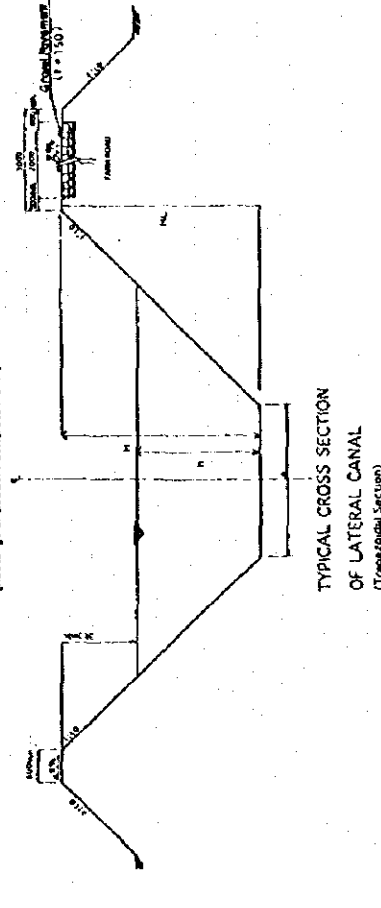




TYPICAL CROSS SECTION  
OF MAIN CANAL  
(Trapezoidal Section/Concrete Canal Lining)



TYPICAL CROSS SECTION  
OF MAIN CANAL  
(Rectangular Section/Concrete Flume)



TYPICAL CROSS SECTION  
OF LATERAL CANAL  
(Trapezoidal Section)

DIMENSION OF MAIN CANAL

(TRAPEZOIDAL SECTION)			(UNIT : mm)	
TYPE	B	H	EL	H
M-I-1	200	250	400	400
M-I-2	200	300	450	450
M-I-3	200	350	500	500
M-II-1	300	300	450	450
M-II-2	300	350	500	500
M-II-3	300	400	550	550
M-II-4	300	450	600	600
M-III-1	400	430	600	600
M-III-2	400	500	650	650
M-III-3	400	550	700	700
M-IV-1	600	500	650	650
M-IV-2	600	550	700	700
M-V-1	700	550	700	700
M-V-2	700	600	750	750
M-VI-1	800	600	600	750

(RECTANGULAR SECTION-FLUME)			(UNIT : mm)	
TYPE	B	H	EL	H
RP-I-1	400	500	650	650
RP-II-1	600	600	750	750
RP-III-1	1000	400	600	550

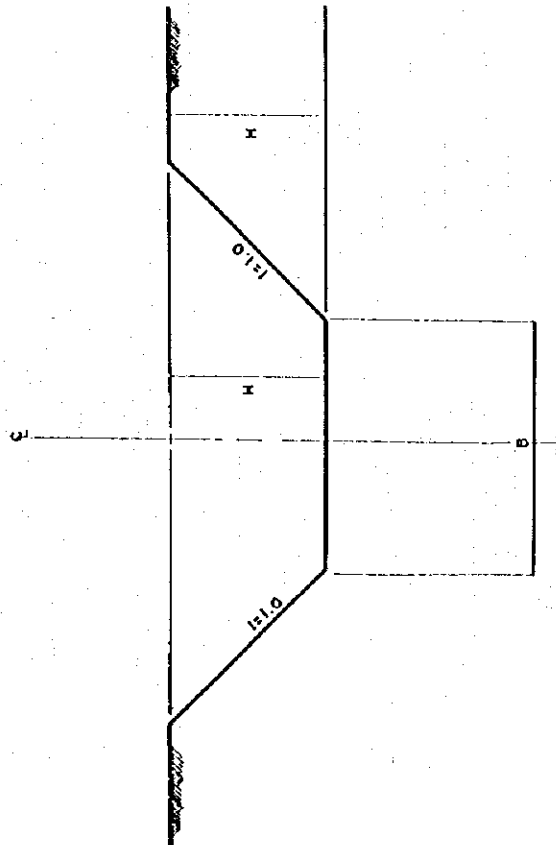
DIMENSION OF LATERAL CANAL

(TRAPEZOIDAL SECTION)			(UNIT : mm)	
TYPE	B	H	EL	H
L-I-1	300	350	350	350
L-I-2	200	400	400	400
L-I-3	200	450	450	450
L-I-4	200	500	500	500
L-II-1	300	450	450	450
L-II-2	300	500	500	500
L-II-3	300	550	550	550
L-II-4	300	600	600	600
L-III-1	400	500	500	500
L-III-2	400	550	550	550
L-III-3	400	600	600	600

Figure D.9.1  
Typical Sections of Canals

DIMENSION OF MAIN & SECONDARY DRAINS

(TRAPEZOIDAL SECTION)		(UNIT : mm)	
TYPE	B	H	R
A-1	500	200	300
A-2	500	300	300
A-3	500	400	300
A-4	500	500	300
B-1	1000	300	300
B-2	1000	400	300
B-3	1000	500	300
B-4	1000	600	300
B-5	1000	700	300
B-6	1000	800	300
C-1	2000	300	300
C-2	2000	400	300
C-3	2000	600	300
C-4	2000	700	300
C-5	2000	800	300
C-6	2000	1000	300
D-1	3000	800	300
D-2	3000	900	300
D-3	3000	1100	300
D-4	3000	1300	300
D-5	3000	1400	300
E-1	4000	800	300
E-2	4000	900	300
E-3	4000	1100	300
E-4	4000	1200	300
E-5	4000	1400	300
F-1	5000	1000	300
F-2	5000	1400	300
F-3	5000	1600	300
F-4	5000	1700	300
F-5	5000	2000	300
F-6	5000	2100	300
F-7	5000	2200	300
F-8	5000	2300	300
F-9	5000	2400	300
F-10	5000	2500	300
G-1	6000	1600	300
H-1	10000	1900	300
H-2	10000	2000	300
H-3	10000	2100	300
H-4	10000	2500	300
I-1	12000	2000	300
I-2	12000	2100	300
I-3	12000	2300	300
I-4	12000	2600	300
I-5	12000	2700	300
I-6	12000	2800	300
I-7	12000	2900	300



TYPICAL CROSS SECTION OF  
MAIN & SECONDARY DRAINS

Figure D.9.2  
Typical Sections of Drains

Stability analysis

Minimum Safety factor  $F_{Smin}$  = 1.323  
 Axis X = 76.000 (m)  
 Y = 142.000 (m)  
 Radius R = 48.500 (m)  
 Resisting moment  $M_k$  = 17052.740 (t<sup>2</sup>m)  
 Starting moment  $M_0$  = 12881.280 (t<sup>2</sup>m)

Layer number	Saturation unit weight (t/m <sup>3</sup> )	Wet unit weight (t/m <sup>3</sup> )	Angle of internal friction (°)	Cohesion (t/m <sup>2</sup> )	Primary factor of cohesion	Earthquake factor	
						$K_h$	$K_v$
1	1.75	1.67	18.00	4.50	0.00	0.15	0.10
2	2.20	2.00	35.00	0.00	0.00	0.15	0.10

Water unit weight = 1.000 (t/m<sup>3</sup>)

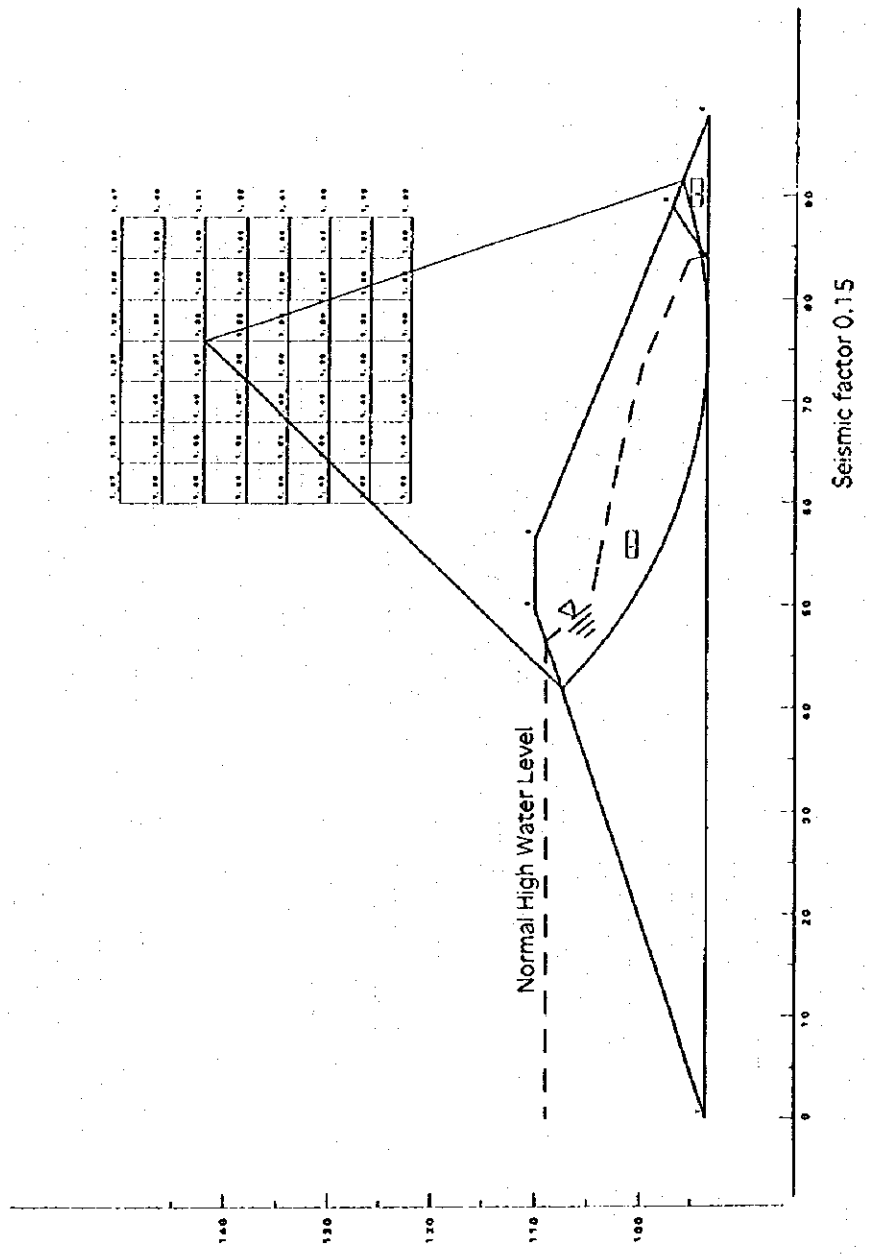


Figure D.9.3  
 Stability Analysis  
 (Normal High Water Level)

Stability analysis

Minimum Safety factor  $F_{min}$  = 1.389  
 Axis X = 31.000 (m)  
 Y = 125.000 (m)  
 Radius R = 31.500 (m)  
 Resisting moment  $M_s$  = 10069.780 (t\*m)  
 Starting moment  $M_b$  = 7245.480 (t\*m)

Layer number	Saturation unit weight (t/m <sup>3</sup> )	Wet unit weight (t/m <sup>3</sup> )	Angle of internal friction (°)	Cohesion (t/m <sup>2</sup> )	Primary factor of cohesion	Earthquake factor $K_h$	$K_v$
1	1.75	1.87	18.00	4.50	0.00	0.15	0.10
2	2.20	2.00	35.00	0.00	0.00	0.15	0.10

Water unit weight = 1.000 (t/m<sup>3</sup>)

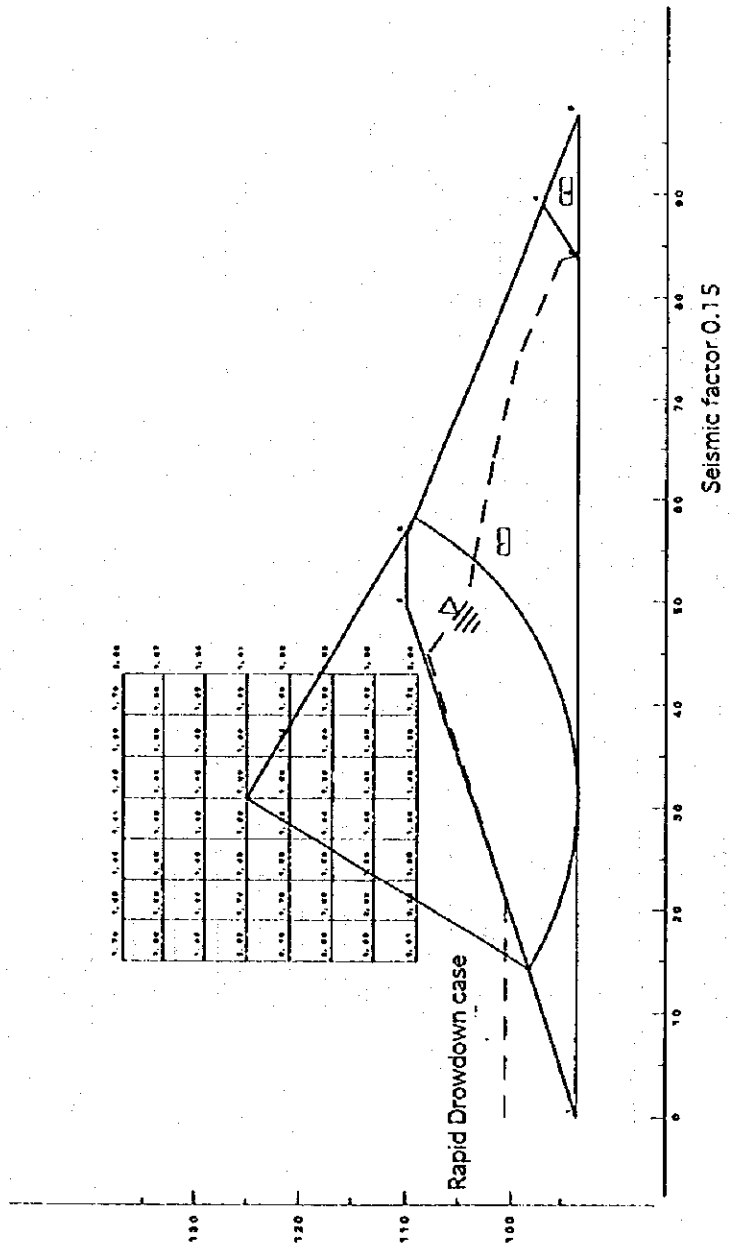
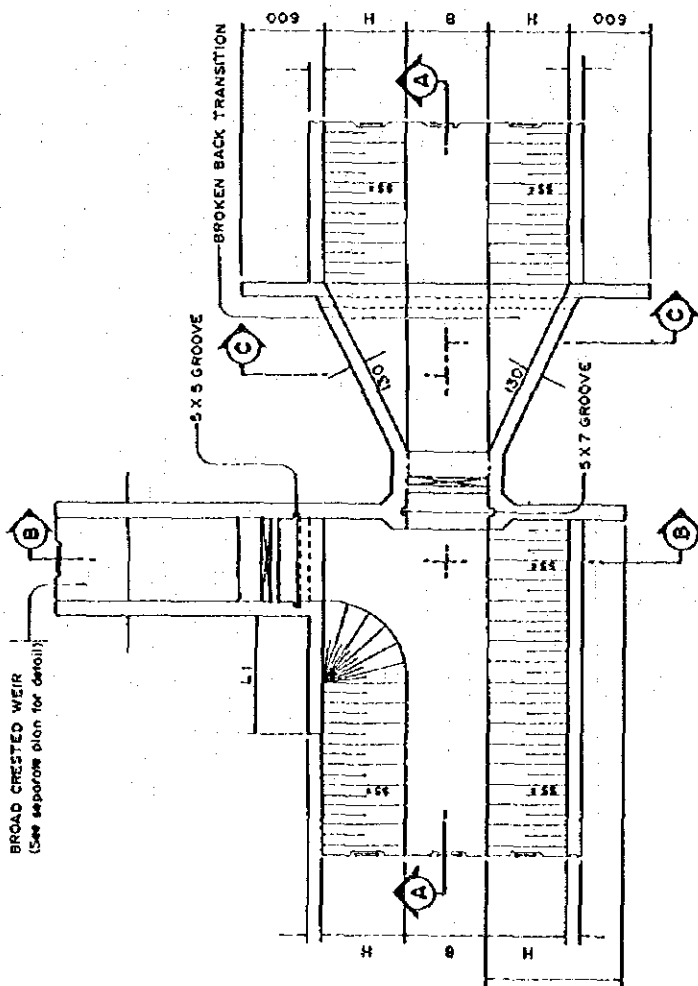
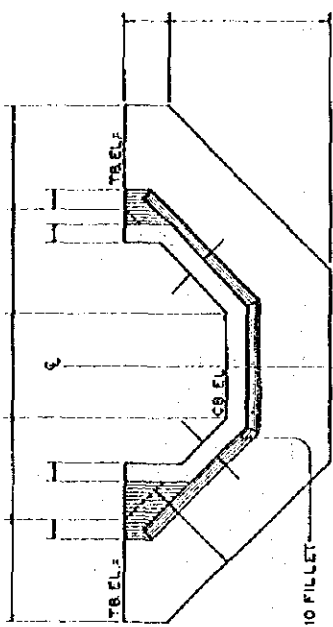
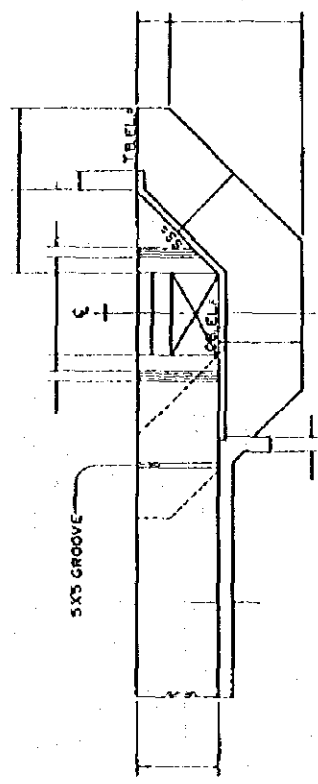


Figure D.9.4  
 Stability Analysis  
 (Rapid Drowdown)





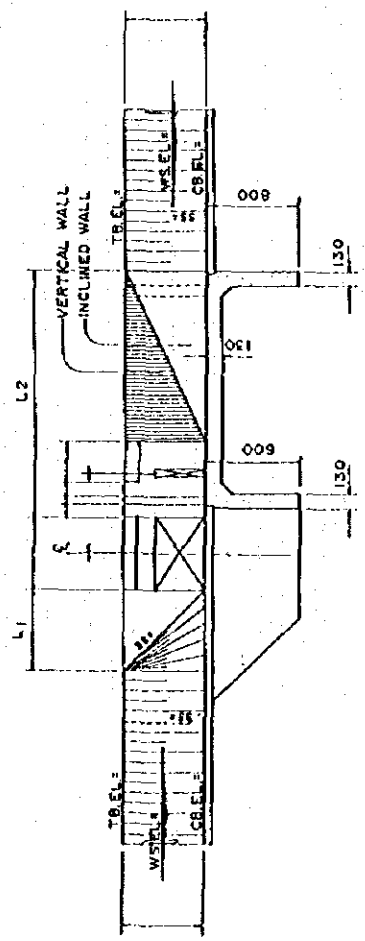
P L A N



DIMENSIONS (MG) (unit: mm)

TYPE	B	H	L1	L2
	400	600	600	1830

Figure D.9.5  
Section of Typical  
Head Gate

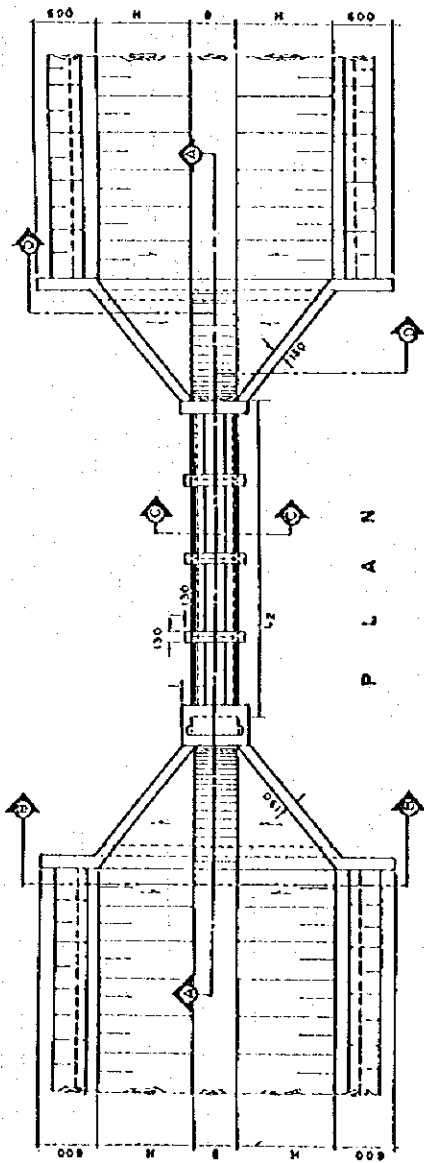




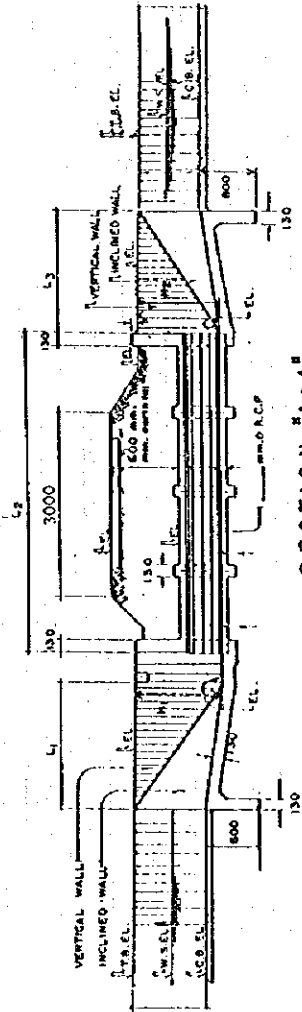


DIMENSIONS (RORPCV OR THR PCV)

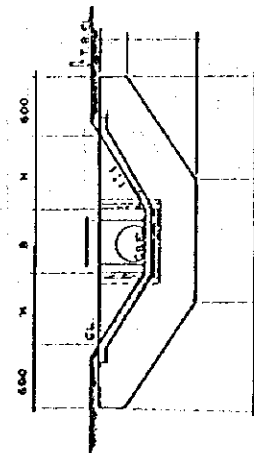
TYPE	Units: mm					
	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	H <sub>1</sub>	H <sub>2</sub>	M <sub>2</sub>
1	460	800	6000	1000	900	900
2	610	1000	6000	1200	1000	1000



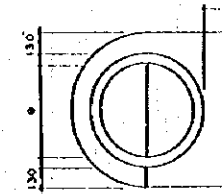
P L A N



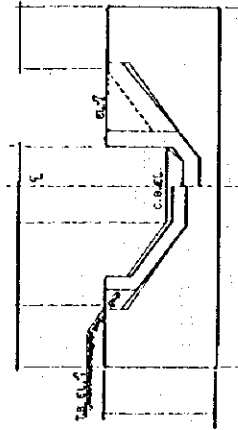
SECTION "A-A"



SECTION "B-B"



SECTION "C-C"



SECTION "D-D"

Figure D.9.8  
Section of Typical  
Road Crossing



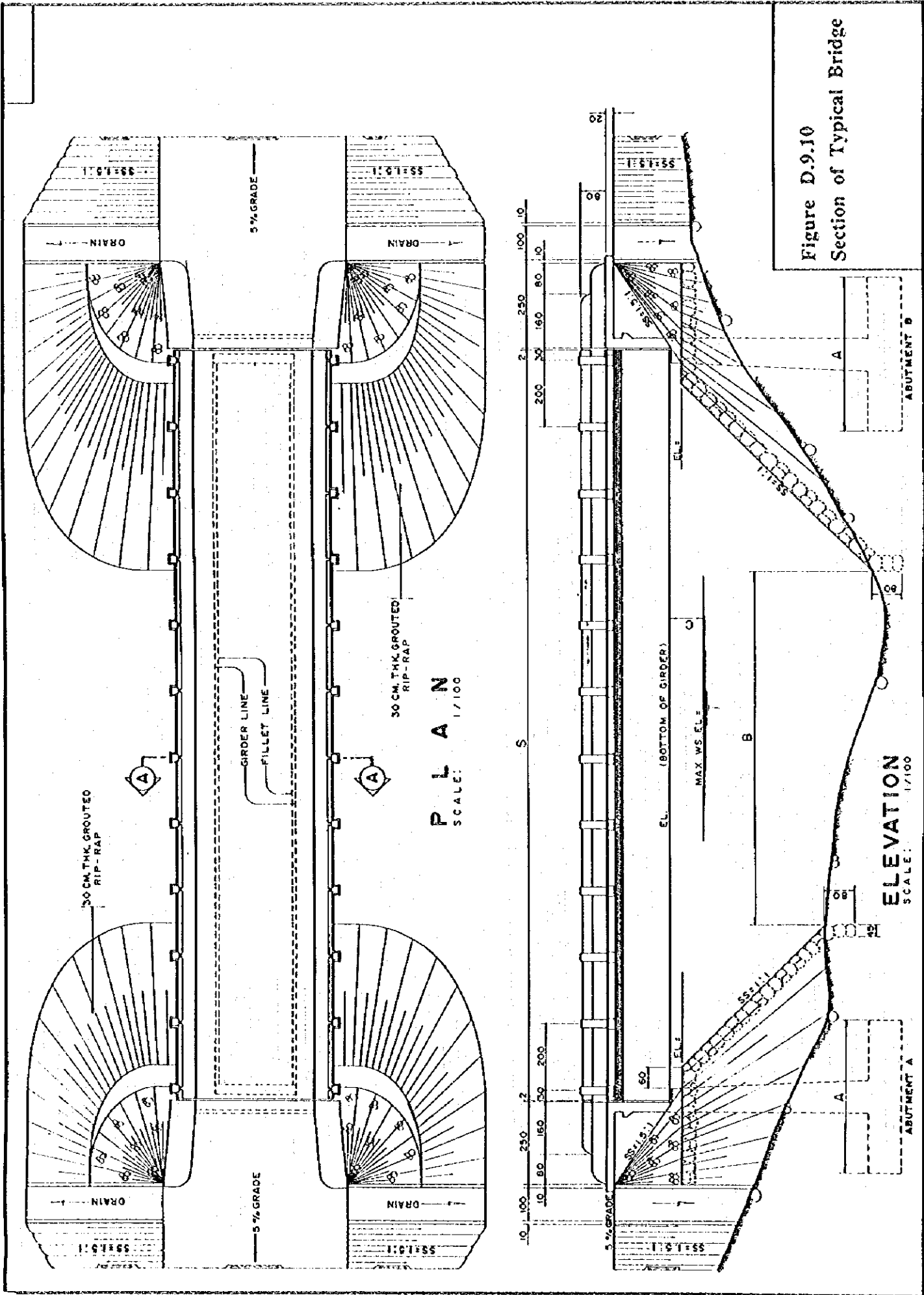


Figure D.9.10  
Section of Typical Bridge

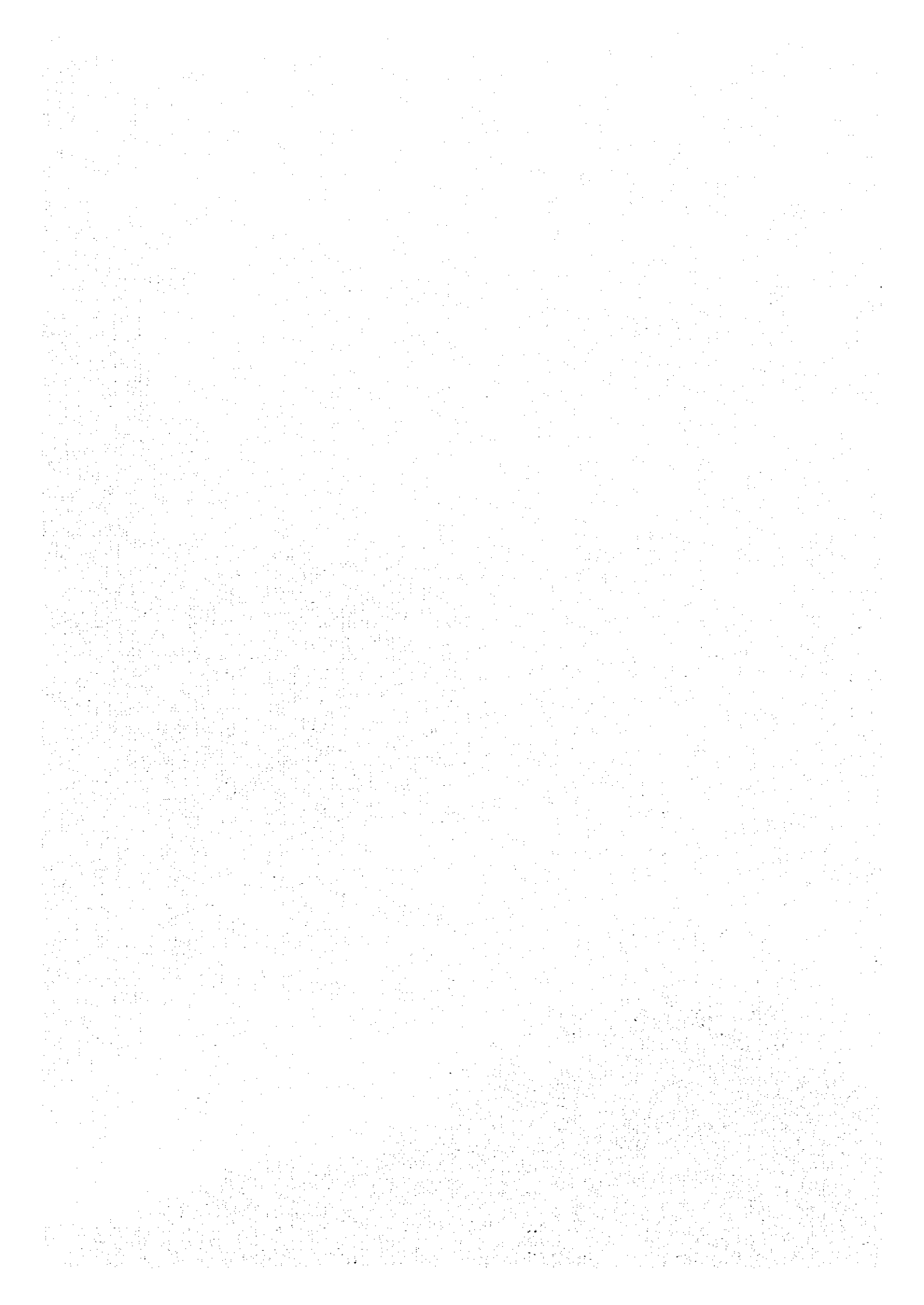






**THE FEASIBILITY STUDY ON  
THE WESTERN LEGAZPI IRRIGATION AND  
RURAL DEVELOPMENT PROJECT IN THE PHILIPPINES**

***ANNEX E***  
***RURAL INFRASTRUCTURE***



## ANNEX E

### RURAL INFRASTRUCTURE

#### Table of Contents

	<u>Page</u>
1. PRESENT CONDITIONS OF THE STUDY AREA .....	E-1
1.1 Road Network.....	E-1
1.1.1 National Road.....	E-1
1.1.2 Provincial Road.....	E-1
1.1.3 Municipal Road.....	E-2
1.1.4 Barangay Road.....	E-2
1.2 Water Supply.....	E-2
1.2.1 Background.....	E-2
1.2.2 Ongoing Project.....	E-3
1.2.3 Inventory of Water Supply Facilities.....	E-4
1.2.4 O&M Conditions.....	E-5
1.2.5 Water Supply Service Coverage.....	E-6
1.3 Electric Power Supply.....	E-7
1.4 Other Social Infrastructure.....	E-8
1.4.1 Public Transportation.....	E-8
1.4.2 Telecommunication.....	E-8
1.4.3 School.....	E-9
1.4.4 Health Care Center.....	E-9
1.4.5 Barangay Hall / Multi-purpose Hall.....	E-10
2. DEVELOPMENT CONSTRAINTS .....	E-11
2.1 Road Network.....	E-11
2.2 Water Supply.....	E-12
2.3 Electric Power Supply.....	E-12
2.4 Other Social Infrastructure.....	E-13
3. PRIORITY COMPONENTS FOR RURAL INFRASTRUCTURE DEVELOPMENT.....	E-14
3.1 Selected Components for Rural Infrastructure Development for the Project .....	E-14
3.2 Rural Road Network .....	E-14
3.2.1 Medium-Term Development Program in Albay Province.....	E-14
3.2.2 Proposed Rural Road Network Improvement Plan in the Municipalities of Camalig and Daraga.....	E-15
3.2.3 Priority Roads in the Study Area.....	E-15

	<u>Page</u>
3.3 Rural Water Supply.....	E-16
3.3.1 Target of the Master Plan in Albay Province .....	E-16
3.3.2 Projection of Water Supply Service Coverage in the Study Area.....	E-16
3.3.3 Proposed Rural Water Supply Development Plan .....	E-17
3.3.4 Improvement of the Existing Level-II Facilities.....	E-17
<b>4. RURAL INFRASTRUCTURE DEVELOPMENT PROJECT .....</b>	<b>E-18</b>
4.1 Rural Road.....	E-18
4.1.1 Location.....	E-18
4.1.2 Beneficiaries.....	E-18
4.1.3 Present Conditions of the Facilities.....	E-18
4.1.4 O&M Organization.....	E-19
4.1.5 Constraints and Development Strategies.....	E-19
4.2 Rural Water Supply.....	E-19
4.2.1 Location.....	E-19
4.2.2 Beneficiaries.....	E-19
4.2.3 Present Conditions of the Facilities.....	E-19
4.2.4 Operation and Maintenance .....	E-20
4.2.5 Constraints and Development Strategies.....	E-21
<b>5. RURAL ROAD UPGRADING PROJECT .....</b>	<b>E-22</b>
5.1 Design.....	E-22
5.1.1 Design Policy.....	E-22
5.1.2 Design Standard.....	E-22
5.2 Project Costs and Benefits.....	E-23
5.2.1 Direct Construction Cost.....	E-23
5.2.2 Maintenance Cost.....	E-23
5.2.3 Beneficiaries.....	E-23
<b>6. RURAL WATER SUPPLY REHABILITATION PROJECT .....</b>	<b>E-25</b>
6.1 Design.....	E-25
6.1.1 Water Requirement .....	E-25
6.1.2 Hydraulic Design .....	E-25
6.1.3 Possibility of Expansion .....	E-25
6.1.4 Proposed Rehabilitation Work .....	E-26
6.2 Project Costs and Benefits.....	E-26
6.2.1 Direct Construction Cost.....	E-26
6.2.2 Operation and Maintenance Cost.....	E-26
6.2.3 Beneficiaries.....	E-27
<b>7. STRATEGY FOR IMPLEMENTATION .....</b>	<b>E-28</b>

## List of Tables

	<u>Page</u>
Table E.1.1 Road Inventory in the Municipalities of Camalig and Daraga (1/2 - 2/2).	E-29
Table E.1.2 Road Inventory by Barangay in the Study Area .....	E-31
Table E.1.3 Responsible Authorities for Water Supply Facilities.....	E-32
Table E.1.4 Inventory of Water Supply Facilities Level-I .....	E-33
Table E.1.5 Level-II and III Water Supply Facilities .....	E-34
Table E.1.6 BWSA Organization and Facilities .....	E-35
Table E.1.7 Water Supply Service Coverage.....	E-36
Table E.1.8 Status of Electrification .....	E-37
Table E.1.9 Jeepney Routes .....	E-38
Table E.1.10 Inventory of Schools.....	E-39
Table E.1.11 Activities and Facilities for Rural Health Care .....	E-40
Table E.1.12 Inventory of Other Social Infrastructure Facilities.....	E-41
Table E.2.1 Responsible Authorities for Roads and Bridges.....	E-42
Table E.3.1 Medium-term Investment Plan for Rural Road Network 1995-1999 (1/2 - 2/2).....	E-43
Table E.3.2 Prioritization for Rural Road Improvement Plan .....	E-45
Table E.3.3 Proposed Rural Road Network Improvement Plan in the Municipalities of Camalig and Daraga, 1996-2010.....	E-46
Table E.3.4 Past Records of Public Well's Construction .....	E-47
Table E.3.5 Projection of Water Supply .....	E-48
Table E.3.6 Proposed Rural Water Supply Development Plan, 1996-2010 .....	E-49
Table E.4.1 Present Conditions of Water Supply Facilities Level-II .....	E-50
Table E.5.1 Rural Road Upgrading Project.....	E-51
Table E.5.2 BQ and Direct Construction Costs of Rural Road Upgrading Project ....	E-52
Table E.6.1 Rural Water Supply Rehabilitation Project .....	E-53
Table E.6.2 Pipe Line Hydraulics (1/4 - 4/4).....	E-54
Table E.6.3 BQ and Direct Construction Costs of Rural Water Supply Rehabilitation Project .....	E-58
Table E.7.1 Strategy for Implementation .....	E-59

## List of Figures

	<u>Page</u>
Figure E.1.1 Road Network in the Municipalities of Camalig and Daraga.....	E-60
Figure E.1.2 Electricity Transmission Line .....	E-61
Figure E.1.3 Jeepney Routes .....	E-62
Figure E.3.1 Priority Roads in the Study Area .....	E-63
Figure E.4.1 Location of Rural Infrastructure Development Project.....	E-64
Figure E.5.1 Proposed Roads - Typical Cross Section.....	E-65
Figure E.5.2 Proposed Bridge (1/3 - 3/3).....	E-66
Figure E.5.3 Rural Road Upgrading Project - Location Plan (1/5 - 5/5).....	E-69
Figure E.6.1 Rural Water Supply Rehabilitation Project - Schematic Plan (1/4 - 4/4)..	E-74
Figure E.6.2 Proposed Spring Intake Box, Ground Level Reservoir and Communal Faucet .....	E-78

## 1. PRESENT CONDITIONS OF THE STUDY AREA

### 1.1 Road Network

#### 1.1.1 National Road

The Study area is mainly traversed by a national primary road (Daan Maharlika). To the north it leads to Manila, and to the south it goes to the southern portion of Sorsogon which is the last province at the southern island of Luzon. This road is completely concreted in both directions enabling to reach Sorsogon in about one hour with a distance of 55 km from Daraga, or Manila in about 10 to 12 hours by a private car with a distance of 526 km from Daraga.

The national secondary road that leads to Legazpi City and follows the eastern shoreline of Albay province north to Tiwi originates in Daraga. This goes through the center of the poblacion and serves as the main street on its way to neighboring Legazpi City. The whole section of this road is also concreted up to Tiwi through Legazpi City.

In addition to the above two national roads, the "Camalig-Comun-Inarado-Gapo-Penafrancia road" (national secondary road) traverses the northern part of the Study area. The entire section of this road is almost asphalt-paved and partly concreted. Some 2 km-length is currently under rehabilitation. The road condition is almost good except for some sections which are under repair.

The responsible authority for the maintenance of the national roads mentioned above is the regional office of DPWH (Region V). The routine and periodic maintenance work of DPWH is effectively better compared with those work for the provincial and barangay roads in the Study area. The present conditions of the above national roads in the municipalities of Camalig and Daraga are summarized below. Details are in Table E.1.1.

National Road in the Municipalities of Camalig and Daraga

Road Name	Surface	Length (km)	Width (m),*/
1. Daan Maharlika (Guinobatan/Camalig Bdry. to Daraga/Sorsogon Bdry.)	Concrete	27.0	10.0
2. Camalig - Comun - Inarado - Peñafrancia	Asphalt	14.6	8.0
3. Daraga - Legazpi City Bdry.	Concrete	1.4	10.0

Note: \*/ width with both shoulders

#### 1.1.2 Provincial Road

The provincial roads in the Study area connect several barangays via the national road. Most barangays can be reached by these provincial roads, but these roads in many cases are made of gravel and in poor condition. Some sections are asphalt-paved. However, because of insufficient maintenance work most road surfaces are severely damaged. Therefore, public utility vehicles have difficulty traversing some areas of the provincial road, especially during the rainy season. The PEO of Albay is mainly responsible for the maintenance of these provincial roads and does such routine work as vegetation control, cleaning and patching. According to the engineer of PEO, the maintenance and rehabilitation work are not implemented sufficiently because of limited budget, focusing on only urgent programs.

There are 18 major routes of the provincial road in the municipalities of Camalig and Daraga with a total length of 65.7 km summarized below. Details are in Table E.1.1.

Municipality	No. of Route	Length (km)
Camalig	11	48.9
Daraga	7	16.8
Total	18	65.7

### 1.1.3 Municipal Road

The municipal roads are connected within the poblacions (the centers of both municipalities of Camalig and Daraga). Almost all of these roads are asphalt or concrete-paved and well maintained. The MEOs are responsible for the maintenance work of these roads. Routine and minor maintenance work such as cleaning and patching for small damages are directly made by the maintenance units of MEO. However, the major damages are repaired by private contractors in the form of forced account system because MEOs have no heavy equipment. The total length of the municipal roads are 4.2 km and 28.9 km in Camalig and Daraga, respectively.

### 1.1.4 Barangay Road

A barangay road is defined as a road outside of the poblacion. It connects two or more barangays or to an existing trunk line. It is usually declared as a barangay road by the concerned barangay council and approved as such by the municipal government. Presently, the maintenance and improvement of these roads are done by the barangay themselves and supported by MEO. Almost all barangay roads are earth fill (dirt) roads and in very poor condition. They are only traverseable by foot, especially during the rainy season. The minor maintenance work are done manually by barangay people and the major improvement work are done by private contractors with technical support from MEO for the bidding. Funds for materials and contracts are sourced from the 20% IRA share of barangay and these amounts are very limited and insufficient to keep the roads in good condition.

There are 46 major routes of the barangay road in the municipalities of Camalig and Daraga with a total length of 122.1 km summarized below. Details are in Table E.1.1.

Municipality	No. of Route	Length (km)
Camalig	21	50.5
Daraga	25	71.6
Total	46	122.1

In addition, there are farm roads which have not been declared as barangay roads nor approved by the municipal government. These roads are mainly traversing the farmland areas. They are usually used as routes for transporting agricultural products or linking scattered farm houses. Almost all the roads are earth-fill in foot path level.

Table E.1.2 shows that the average road density, including all road categories in the Study area is about 0.9 km/km<sup>2</sup>. Figure E.1.1 illustrates the present road network in the municipalities of Camalig and Daraga.

## 1.2 Water Supply

### 1.2.1 Background

The rural water supply services in the Study area are categorized into three (3) levels according to water system as below:

- Level-1 : Point source ( a protected well mostly with a hand pump or a developed spring with an outlet but without distribution system )



- Level-II : Communal faucet system or standposts ( a system composed of a source, a reservoir, a piped distribution network and communal faucets )
- Level-III : Waterworks system of individual house connections, generally for urban areas

In addition to the above developed three-level water supply facilities, there are undeveloped water supply sources such as open dug wells, streams and creek, from which the majority of the population are deriving their domestic water in the Study area.

At the provincial level, a number of national line agencies and institutions, in coordination with PPDO and PEO are involved in the development of water supply and sanitation sector. The mode of operation and institutional responsibilities of these sector agencies are determined, primarily by NEDA's Board Resolution No.5 (S.89) and Republic Act 6716 which have been broadened into AWSP as described below:

(1) NEDA Board Resolution No.5 (approved on March 8, 1989)

The delineation of responsibilities among DPWH, LWUA and DILG is described as follows. Level-I water supply projects will be implemented by DPWH with the participation of LGUs and Level-II and Level-III water supply projects will be implemented by LWUA. The DILG's participation will thus consist of general administration/institution building such as assistance to LGUs in the formation and training of RWSAs as well as in the identification, implementation and repair/maintenance of Level-I water supply systems. The DPWH shall set aside in the Program of work of Level-I water supply projects a certain sum for the use of DILG in building up the capabilities of LGUs.

(2) Republic Act 6716 (AWSP) (signed on March 17,1989)

An act providing for the construction of water wells and rainwater collectors, development of springs and rehabilitation of existing water wells in all barangays in the Philippines.

A total of 100,000 Level-I facilities is targeted for construction/rehabilitation under the act including the formation and registration of BWSA. The DPWH is the main implementing agency of R.A.6716 while the other agencies involved are LGUs, DOH, DECS and NGOs. The DILG, by virtue of NEDA Board Resolution, was later included as another lead implementing agency.

The responsible authorities for water supply facilities are summarized in Table E.1.3.

### 1.2.2 Ongoing Project

The First Water Supply, Sewerage and Sanitation Sector Project, also known as FW4SP was jointly sponsored by the World Bank and Government of the Philippines to provide Level-I or point source water supply systems to rural areas in Luzon and sanitation facilities nationwide. The project was launched on December 16, 1990 and will terminate by the end of 1996. Another year was extended from the initial program. The main objective of the project is to assist the Government meet the basic needs of the rural population through the provision of safe, adequate and accessible water supply and proper sanitation facilities. Institutionally, the project aims to:

- i) Promote effective community participation to achieve sustainable sector development ;
- ii) Develop organizations to improve the operation and maintenance of water supply facilities; and

- iii) Support government decentralization by providing LGUs with a greater role in the planning, implementing and monitoring activities, and training manpower in planning and implementing water supply and sanitation systems.

The project is composed of three components, namely: i) rural water supply; ii) sanitation; and iii) technical assistance as below:

- i) Rural water supply component

The project provides Level-I water facilities to some 18,000 rural barangays in 731 municipalities located in 37 provinces of Luzon. This includes groundwater supply through shallow and deep wells, spring development, rainwater collectors, water treatment units and rehabilitation of existing wells.

- ii) Sanitation component

This component provides such facilities as family latrines, well disinfection, school and communal/public toilets, sillage removal units and pilot waste water disposal units nationwide.

- iii) Technical assistance

This component provides training and community development for project implementors in the preparation and implementation of future projects.

The implementation of the project is a concerted and coordinated efforts among DPWH, DOH, DILG and LUWA. The DPWH implements the rural water supply component; DOH implements the sanitation component; DILG is responsible for institutional and community development activities, and LUWA undertakes technical studies for future sector projects. A Project Coordination Committee (PCC) has been established at the national level. This is chaired by the director of the Rural Water Supply Project Management Office (RWSPMO) of DPWH, with the Project Managers of RWSPMOs of DOH and DILG, a LUWA deputy director and a NEDA representative as members.

Under FW4SP, 61 wells were constructed and 36 BWSAs were established in the Study area between 1992 to 1995.

### 1.2.3 Inventory of Water Supply Facilities

#### (I) Level-I

The inventory survey of Level-I water supply facilities was carried out based on the data from PPDO and the District Engineer Office of DPWH. The number of Level-I facilities (mainly tube wells with hand pumps) in the Study area totals 563 of which 373 wells are privately owned by individual households. All of these wells are shallow wells (depth = less than 20 m) with pitcher pumps. As regards the public wells, the majority were installed by DPWH under FW4SP, AWSP and Rural Water Supply Projects. The others were constructed jointly by PPDO and PEO through the infrastructure program of the local government, funded out of the 20% IRA. Among these public wells, 124 are shallow wells and 58 are deep wells (depth = more than 20 m). There are also eight (8) spring development facilities, four (4) each of which are private and public facilities. The number of Level-I water supply facilities in the Study area is summarized below. Details are in Table E.1.4.

### Level-I Water Supply Facilities in the Study Area

Municipality	Private Facilities			Public Facilities		
	Shallow well	Deep well	Spring Dev.	Shallow well	Deep well	Spring Dev.
Camalig	211	0	2	63	27	1
Daraga	162	0	2	61	31	3
Total	373	0	4	124	58	4

#### (2) Level-II and Level-III

There are four (4) Level-II water supply facilities in the Study area. They are located in barangays Gotob, Taladong in Camalig municipality and barangays Inarado and Gabawan in Daraga municipality, respectively. These facilities were constructed in 1989 through the Rural Water Supply Project and serve about 1,000 people. However, because of limited budget for construction, improper design and poor maintenance activities, etc., the systems are not effectively used by the people. The features of the above Level-II systems are summarized below. Details are in Table E.1.5.

#### Existing Level-II Facilities

No.	Location of the System		Population		No. of Faucets	
	Barangay	Municipality	Total	Served	Communal	Individual
1	Gotob	Camalig	515	260	4	10
2	Taladong	Camalig	1,420	203	2	25
3	Inarado	Daraga	1,488	255	4	29
4	Gabawan	Daraga	1,303	374	5	2

In addition to the above Level-II systems, one (1) Level-III water supply facility serves the population in the poblacion and barangays Gapo and Ilawod in Camalig municipality. The system also serves barangays Sumlang and Cabangan which are outside of the Study area. The total population served by the system is about 3,600 in the Study area and about 1,000 outside of the Study area. The system was initially constructed in 1930 and has been managed by the Municipal Waterworks System. In 1980, the Camalig Water District was established as an independent organization for the operation and maintenance of the system. The source of water are three (3) springs. The system serves the population with 658 individual house connections and 10 communal faucets in the Study area. Around 171 individual house connections are served outside of the Study area. The total length of the main pipe line is about 5,000 m. The Camalig Water District has a program for rehabilitation and expansion of the system. The detailed design financed by LUWA, for improvement of the system was completed in 1983. However, the implementation was not started until now because of budgetary constraint. If the implementation will push through, the extension to additional three (3) barangays of Tagaytay, Tinago, Ligban and one (1) sitio of Sogon will be possible. The feature of the above Level-III is summarized in Table E.1.5.

#### 1.2.4 O&M Conditions

##### (1) Level-I

The BWSAs are responsible for the operation and maintenance of Level-I water supply facilities. Republic Act 6716 requires the formation of BWSA before a barangay can avail of a Level-I water system. The registration will give it a legal personality to accept the water system from the government. The BWSA is formed after the prospective members are fully informed about their duties and responsibilities in the association. In the formation process, community members will be assisted by the Municipal Water Task Force (MWTF). The responsibilities of BWSA are:

- Properly operate and maintain the water supply facilities;

- Attend all meetings and trainings conducted by MWTF, relevant to the viability of the association and upkeep of the system;
- Collect fees from members;
- Adopt policies and procedures approved by BDO (Board of Directors); and
- Observe sanitary practices.

Of the 41 barangays in the Study area, 36 BWSAs (or 80% of the barangays) were established through FW4SP during 1992 to 1994. However, according to the interview survey by the Study team, very few BWSAs are functioning properly for operation and maintenance of the Level-I water facilities and almost no BWSAs are collecting fees for maintenance. Table E.1.6 shows the barangays, where BWSAs were established under FW4SP in the Study area.

As regards the present conditions of existing Level-I facilities, some wells are mechanically out-of-order. The others are functional but with poor water quality and left unattended. Some are rusty and emitting foul odor. The people are only waiting for government assistance to come in. The reasons for the poor maintenance are:

- Insufficient technical transfer to BWSAs for the operation and maintenance;
- Non-functioning BWSAs and non-collection of fees for maintenance;
- Lack of spare parts for repair;
- Improper construction of some wells; and
- Insufficient monitoring and technical assistance by the government.

## (2) Level-II

The Rural Water Works and Sanitation Associations (RWSA) are responsible for the operation and maintenance of existing Level-II facilities in the Study area. Water charges collected regularly vary from 5 pesos to 25 pesos per month/connections in barangays Gotob, Taladong and Inarado. The barangay of Gabawan is an exception which does not collect any regular water charge and collects only in case of repair. According to the interview survey, the water supply is not properly distributed to the people. In other words, people located near the water source can enjoy getting water more than those located far downstream from the water source. Therefore, some complains about unfair distribution of water were found out among the members of RWSA. The RWSA of Gotob is planning to introduce volumetric system for each users' member to settle water charges based on the consumption of water.

## (3) Level-III

The Camalig Water District is responsible for the operation and maintenance of existing Level-III facilities in Camalig poblacion. The water rates are settled based on the consumption of water depending on the categories such as: i) residential/government; ii) commercial/industrial; and iii) semi-commercial/boarding house and bulk/wholesale. The water rates for residential/government are summarized below:

Water Rate for Residential (as of October, 1995)

Flat Rate (Less than 10 m <sup>3</sup> )	11 - 20 m <sup>3</sup>	21 - 30 m <sup>3</sup>	31 m <sup>3</sup> over
P 24.0	P2.4 /m <sup>3</sup>	P 2.9 /m <sup>3</sup>	P3.5 /m <sup>3</sup>

Source: Camalig Water District

### 1.2.5 Water Supply Service Coverage

The water supply service coverage is evaluated based on the following standards:

#### Level -I:

- Number of households to be served by one well = 10 households for rural area
- The outreach to the well must not be more than 250 m from the farthest user.

**Level -II:**

- Number of households to be served by one communal faucet = 4 - 5 households
- The outreach to the communal faucet , located at not more than 25 m from the farthest house.

According to the inventory survey of water supply facilities, the present population coverage served by developed water supply facilities such as Levels -I, -II and -III in the Study area is 31.1%, with a variation of 5% in barangay Peñafrancia to 95% in barangay Dinoronan. The majority (68.9%) of the people are categorized into the unserved population. Furthermore, a lot of the Level-I water supply facilities constructed by the government agencies are poorly maintained and some are left unattended because of mechanical or water quality problems. This condition shows that the actual water supply coverage is a little lower than the result of the above estimation of 31.1%. The water supply coverage in the Study area is summarized below. Details are in Table E.1.7.

**Water Supply Coverage in the Study Area**

Category	Level-I	Level-II	Level-III	Unserved
Coverage	Private (4.1%) Public (17.5%)			
	21.6%	2.7%	6.8%	68.9%

### 1.3 Electric Power Supply

The source of electric power supply in the Study area comes from NPC through the Luzon Grid network consisting of electricity coming from geothermal, hydro plants, and diesel powered generation stations. The 230-kV transmission line of the Luzon Grid is converted into 69-kV by NPC's owned sub-stations where it is further converted into 13.2-kV by sub-stations owned by electric cooperatives. Finally, the electricity is distributed to consumers.

In the case of Albay province, ALECO distributes and supplies the electric power requirements of the province, after receiving from NPC through the Luzon Grid and NPC sub-station, located in barangay Peñafrancia of Daraga municipality. The Legazpi sub-station (15.6 MVA) located in Legazpi City is covering the Study area with a total length of about 90 km of 13.2 kV distribution lines. Of the 41 barangays in the Study area, 30 barangays or 73% are already energized as of December, 1995. This figure shows almost the same level compared with the figures of the entire Albay province, and the entire Daraga and Camalig municipalities, which posted 67%, 76% and 68%, respectively. However, the total number of house connections is only 3,344 or 35% of the total households in the Study area. This is because the power supply is mostly available for the houses located along the main roads in energized barangays. Some people, even in available locations of power supply cannot afford their monthly electric charges. The monthly power rates by categories are summarized below:

**ALECO Power Rate (monthly)**

Category		(unit: pesos), */
1 Residential/Public Bidg	Minimum Bill (0 - 15 kwh) = P 52.30	Excess per kwh = P 3.49
2 Commercial	Minimum Bill (0 - 20 kwh) = P 70.42	Excess per kwh = P 3.52
3 Industrial	Demand Charge per kw = P 18.00	Energy Charge per kwh = P 3.48
4 Irrigation	Demand Charge per kw = P 12.00	Energy Charge per kwh = P 3.44

Source: ALECO (Albay Electric Cooperation Inc.), Note: \*/ as of October 1995

Figure E.1.2 illustrates the transmission network, and Table E.1.8 shows the status of electrification in the Study area.

## **1.4 Other Social Infrastructure**

### **1.4.1 Public Transportation**

#### **(1) Jeepney and Tricycle**

Jeepneys and tricycles provide the most common public transportation services in the Study area. There are 87 units of jeepneys registered and operating on 17 routes related to the Study area, illustrated in Figure E.1.3. The number of daily trips of those jeepneys varies depending on operating distance, road conditions and the volume of passengers of the routes. However, the jeepneys destined for remote areas far from the national road such as Panoypoy, Kinawitan, Magogon, Maopi, Canarom and San Ramon are operating two (2) to three (3) trips a day per jeepney on the average.

The official rates of jeepney are settled by LTFRB according to distance traveled. However, the actual fares for traversing in the rural areas are a little higher than the official rate, at about 30% higher in average because of poor road conditions. Table E.1.9 shows the jeepney routes, the number of authorized units and the official and actual fare rates.

Tricycles are mainly operated around the poblacions. There are 69 units of tricycles registered in Camalig and 458 units in Daraga as of December 1995. The official rates of tricycles are determined by the Municipal Legislative Council.

#### **(2) Rail Transport**

The municipalities of Camalig and Daraga were used to be served by PNR and the last station is before the southern terminal located in Legazpi City. The PNR provided both passenger and freight service to Manila and there were four trips daily both to and from Manila. However, the train service has not been available since the end of 1975, when floods washed out the major portions of the track on the southern end of the line. Presently, the train service is available originating in the municipality of Ligao and Naga City with one trip daily respectively both to and from Manila. The PNR just started the "Main Line South Revitalization Project Phase-II (Naga-Legazpi)" in July 1995 for the damaged railway system, including the relocation of existing railway alignment. The train service to and from Legazpi City is expected to be operated just after completion of the project in July 1997.

#### **(3) Air Transport**

Air transportation for the residents of Camalig and Daraga is provided through the airport located in Legazpi City. This is a trunk line airport equipped with all the necessary facilities. The PAL terminal building is located in three (3) km by road from the poblacion of Daraga. The PAL provides regular flights daily to and from Manila.

### **1.4.2 Telecommunication**

#### **(1) Telephone**

At present, a telephone service is not available in the Study area. It is only available in the Daraga poblacion served by MATELCO. MATELCO is a privately-owned public utility which operates in Legazpi City and Daraga. It provides commercial, residential and long distance services. According to the Camalig telecommunications officer, a private telephone company will start a telephone service in Camalig by 1996.

#### **(2) Telegraph**

There is only one government telegraph station available in the Study area, located in Camalig poblacion. The government service is provided by the Bureau of Telecommunication, DTC, as part of its nationwide service. In addition, a telegraph station in Daraga located in Daraga poblacion (outside of the Study area) also provides the service as well.

### (3) Postal Services

Postal services in the Study area are provided by the Bureau of Posts, DTC through the Camalig Post Office (in the Study area) and Daraga Post Office (located in Daraga poblacion, outside the Study area). These offices are providing municipal-wide postal services to the residents, mainly in the poblacion areas. Postal services in the rural areas are generally conversed through the respective barangay captains.

#### 1.4.3 School

In the Study area, there are fifteen (15) elementary schools and two (2) secondary schools covering twenty (20) barangays in Camalig, and twenty (20) elementary schools and one (1) secondary school involving twenty-one (21) barangays in Daraga. The total population of students for both levels is 11,081 and total numbers of teachers and class rooms are 345 and 360 respectively as of July 1995. The figures show that the teacher/student ratios are 1/32 in both levels and generally acceptable compared to the standard of 1/40 - 1/45.

The exact figures on performance indicators by barangay do not exist, but the following figures taken from the district of both Camalig and Daraga show the trend of performance for education in the Study area. The figures reveal that about 96.0% of school-age people attend elementary schools, and 77.6% of students will complete elementary school and 94.0% of students will continue the secondary school.

Trend of Performance for Education (SY 1994 - 95)

District	Participation Rate, 1/	Cohort Survival Rate, 2/	Transition Rate, 3/
Camalig North	97.0	81.4	93.1
Camalig South	98.4	77.5	91.6
Daraga North	94.7	79.8	95.5
Daraga South	93.9	71.5	95.6
Average	96.0	77.6	94.0

Source: DECS, Region V, Division of Albay

Note: 1/ Participation Rate = the proportion of school-age population (13-16 years) accommodated in school to the total population (13 -16 years)

2/ Cohort Survival Rate = the percentage of the enrollment of a certain cohort of students in the initial year at a certain level who reached the final year of the required number of years for that level

3/ Transition Rate (Elementary to Secondary) = the percentage of students who graduated from one level of education and moved on to the next higher level

As regards the quality of the school building, almost all the facilities are made of concrete-hollow-block walls and galvanized iron roofing and are within the acceptable level compared to a standard classroom of 50 m<sup>2</sup>. Most facilities are well maintained. The inventory of schools in the Study area is summarized in Table E.1.10.

#### 1.4.4 Health Care Center

The government health services within the municipalities are provided by the Rural Health Units (Municipal Health Center) located in both Camalig and Daraga poblacions. The services include: general consultation, pre-natal and baby clinic, examination and treatment, immunization, environmental sanitation, health education, nutrition education, dental services, family planning and inspection of water and supply units including pump wells, dug wells, springs and BWSA, etc.

There are no permanent health units established in the barangays. The personnel from the main center devote usually two (2) days a week to visit these areas. The rural health midwives concentrate their efforts in the rural areas. There are nine (9) Barangay Health Stations (BHS)

and one (1) Municipal Health Center distributed in 41 barangays in the Study area, utilized for rural health services. These are staffed by the municipal health offices, mainly rural health midwives. However, 31 or 76% of the barangays have no permanent BHS. Instead, these barangays use vacant school rooms, barangay halls or private houses for the conduct of basic health services to the people.

Most of the BHSs consist of one-room, made of concrete-hollow-block wall and galvanized iron roofing, far below the standard. The standard requirement of BHS buildings is a space of about 42 m<sup>2</sup> (6m x 7m), composed of consultation room, examination room, stock room, toilet and dining.

The acute lack of facilities and equipment including vehicles greatly limit the delivery of rural medical service both in quality and scope. The activities and facilities for rural health care are summarized in Table E.1.11.

#### **1.4.5 Barangay Hall/Multi-purpose Hall**

Most barangays have barangay and multi-purpose halls in the Study area. Barangay halls are mainly used for meetings of barangay council and other activities of barangay people. Most barangay halls are just one-room made of concrete-hollow-block wall and galvanized iron roofing. Multi-purpose halls are usually constructed adjoining the barangay halls. They are used for barangay's social and recreational activities and also used as drying facilities of agricultural products. The spaces of concrete pavement are almost all within the standard level of an average area of 450 m<sup>2</sup> (15 m x 30 m). The multi-purpose halls are well maintained.

The inventory of other social infrastructure facilities is summarized in Table E.1.12.



## 2. DEVELOPMENT CONSTRAINTS

### 2.1 Road Network

The main constraints regarding the road network in the municipalities of Camalig and Daraga are summarized as follows:

- (i) The rural road network, composing mainly of provincial/barangay road are inadequate and are in poor condition. This hampers mobility, comfortable and safe ride mainly because:
  - The barangay roads are not completely interlinked, hence some barangay centers are only accessible by foot.
  - Almost all provincial and barangay roads have poor drainage facilities (e.g. side ditches and cross drains), which easily damage the roads.
  - Almost all provincial asphalt roads are heavily damaged.
  - Almost all small size gravel on the surface of provincial gravel roads are washed out, and only big size of boulders are remaining.
  - In poor drainage portion of barangay earth (dart) roads, vehicles can not pass during the rainy season.
- (ii) There is generally poor maintenance work of provincial/barangay roads.
  - The maintenance of barangay roads is under the barangay LGU with funds coming from the 20% IRA (Rule V, Art.25 Local Government Code). Minor work is done manually by barangay people and major work is done by contract with support from MEO. However, almost all maintenance work is done manually by the barangay people because of limited budget. The funding depends on the availability of 20% IRA which are usually insufficient to cover good maintenance work.
- (iii) The farm roads are also inadequate and in almost footpath level.
  - Almost all farm roads are not developed in the Study area. The municipal offices give high priority to the improvement of the networks of main barangay roads connecting barangay centers to the trunk road or to related barangays.
  - The farmers are usually using carabao sleds for transporting agricultural products, which loading capacity is very limited.

The responsible authorities for the construction and maintenance of roads and bridges are based on the road categories. Each authority concentrates its respective roads, as shown in Table E.2.1 and summarized below:

Responsible Authorities for Roads and Bridges

Road Category	Responsible Authority
National Road	DPWH - Regional Office
Provincial Road	LGU - Provincial Engineer Office
Municipal Road	LGU - Municipal Engineer Office
Barangay Road	LGU - Barangay, supported by MEO

Note: LGU (Local Government Unit)

According to the reconnaissance survey, the provincial and barangay roads are poorly maintained compared to those of the national and municipal roads. The main reasons of such condition appear to be:

- (i) Insufficient budget are allocated to the relevant authorities, compared to the need.

- (ii) Technical assistance by the municipal office is not sufficient for the maintenance of barangay roads. The municipal offices do not own any heavy equipment for road maintenance such as motor graders, backhoes and dump trucks. Therefore, periodic maintenance and patching work after heavy rain or typhoon cannot be done timely. This is also aggravated by the lack of manpower and limited budget in MEO.

## 2.2 Water Supply

The main constraints regarding water supply in the Study are summarized as follows:

- (i) Water supply facilities such as tubewells with hand pumps are limited in relation to the actual needs.
  - Water supply coverage served by developed water supply facilities such as Level-I, -II and -III, described in the previous chapter, is very low estimated at 31.1%.
- (ii) Water which is used for drinking purposes at present is below quality in some places especially during the rainy season, when compared with the minimum requirement. Details about the water quality of ground water in the Study area are described in the section on "Water Resources".
  - Some deep wells are left unattended because of rusty water, bad taste or foul odor of water.
  - Some wells were not constructed properly because of limited budget for construction and limited equipment and manpower in DPWH.
- (iii) Some Level-I water supply facilities are not well maintained and the respective associations required to do the maintenance of the facilities such as BWSA appear incompetent.
  - Technical assistance by DPWH to BWSAs for operation and maintenance is not sufficient because of insufficient budget for training.
  - Monitoring and technical assistance by the municipal office are not sufficient, and only DPWH has the technical know-how.
  - Spare parts for repair are not available, especially for deep wells.
- (iv) Existing Level-II facilities are not effectively used by the people.
  - Improper design because of limited budget for construction.
  - Poor maintenance activity by BUA.
  - The water supply is not properly distributed to the people because of limited source of and technical problems of the pipeline facilities.

## 2.3 Electric Power Supply

As mentioned in the previous chapter, the total percentage of house connections is 35% and appears low compared with the percentage of 73% of energized barangays. This is because the power supply is mostly available for the houses located along the main roads in energized barangays. Some farmers even in available locations of power supply cannot afford the monthly electric charges.

According to ALECO, the first priority is the maintenance and rehabilitation of existing distribution lines. The expansion program will be done only when funds are available such as CDF and some grant funds. In the Study area, the barangay of Magogon will be energized in 1996. The expansion program of transmission line is not included in the Local Development

Investment Program, Province of Albay either, and all the management and investment activities by ALECO are basically done on a commercial base.

## 2.4 Other Social Infrastructure

In addition to road network and electrification, telecommunication facilities greatly affect directly and/or indirectly the profitability of agricultural development, especially marketing. However, effective telecommunication facilities are inadequate and are also in poor condition in the Study area. It is projected that a private telephone company will start a telephone service in Camalig by 1996, which will affect the activity of the people in the area.

As regards human needs, rural health care is one of the important services. The following constraints have been identified:

- (i) The lack of facilities and equipment including vehicles greatly hampers the delivery of health service both in quality and scope.
  - Of the 41 barangays in the Study area, 31 barangays have no BHS and are just using vacant school rooms, Barangay halls or private houses.
  - Most of existing BHS are just one-room made of concrete-hollow-block walls and galvanized iron roofings, far below the standard.
- (ii) The lack of manpower for public health activities.
  - The public health manpower ratio and deficient manpower in both municipalities are summarized below:

### Public Health Manpower

Medical Personnel	Camalig			Daraga			Standard Ratio
	Actual	Deficient		Actual	Deficient		
	Manpower	(Ratio)	Manpower	Manpower	(Ratio)	Manpower	
MHO, 1/	3	1/17,000	0	4	1/22,000	0	1/20,000
PHN, 2/	3	1/17,000	2	5	1/18,000	4	1/10,000
RHM, 3/	13	1/4,000	7	22	1/4,000	14	1/2500
RSI, 4/	2	1/26,000	3	5	1/18,000	4	1/10,000

Note: Total population of Camalig municipality: 51,600  
 Total population of Daraga municipality: 89,400  
 1/ : MHO (Municipal Health Officer)  
 2/ : PHN (Public Health Nurse)  
 3/ : RHM (Rural Health Midwife)  
 4/ : RSI (Rural Sanitary Inspector)

### **3. PRIORITY COMPONENTS FOR RURAL INFRASTRUCTURE DEVELOPMENT**

#### **3.1 Selected Components for Rural Infrastructure Development for the Project**

The following considerations were made to select the components for rural infrastructure development.

- (i) The first priority is given to the promotion of farmer's activities related directly and/or indirectly to profitability of agricultural production. Based on this viewpoint, the improvement of rural road network becomes a priority component.
- (ii) A high priority is also given to the improvement of basic human needs. Hence the provision of water supply facilities is also considered as one of the priority components.
- (iii) The results of the farm household survey were thoroughly taken into consideration. The priority facilities of the farmers' request were: (a) irrigation facilities; (b) road network and (c) agricultural extension and support services. Next to the above are water supply facilities which were strongly requested as one of the rural infrastructure.
- (iv) It is considered that some small items normally implemented by and funded under the 20% IRA fund are excluded in the Project.
- (v) The component, which would be generally developed on a commercial base are also excluded in the Project, e.g. electrification development.
- (vi) Farm roads are excluded from the improvement of the rural road network to give higher priority for provincial and barangay roads.

Based on the above consideration, two (2) priority components are finally proposed for the rural infrastructure development plan in the study. These include road network and potable water supply facilities.

The lack of good transport facilities prevents the introduction and expansion of improved farming technique by farmers, as well as marketing of farm inputs and outputs. Under the plan the first priority will be given to the rehabilitation and upgrading of existing rural road (provincial and barangay roads) network in the Study area.

The coverage of water supply in the Study area is still very low compared with the provincial master plan target. The maintenance of these facilities is also very poor. The provision of rural water supply will ease the burden on women and children, who now have to fetch water from distant water sources. Good water also means better health. Improving the quality of the drinking water can contribute to the prevention of water-borne diseases such as diarrhea. The priority will be given to Level-I and Level-II facilities in the rural areas.

#### **3.2 Rural Road Network**

##### **3.2.1 Medium-Term Development Investment Program in Albay Province**

In every five years, the provincial government of Albay prepares the "Local Development Investment Program" based on the "Medium-Term Investment Plan (MTIP)" of the municipalities in the province. The MTIP of the ADT (Area Development Team) IX-A covering the municipalities of Camalig, Daraga, Manito, and Rapu-rapu, and the City of

Legazpi, for the period 1994-1998, was prepared according to the felt needs of the area, which is along the same development thrust of the region. One of the development objectives is to pursue an aggressive infrastructure development, particularly roads as arteries for development.

Table E.3.1 shows the Medium-Term Investment Plan for the provincial and barangay roads in the municipalities of Camalig and Daraga for the periods 1992-96 and 1995-99. The figures suggest that the budgetary allocations for the rural roads improvement have not been realized or only partly realized during the period 1992-96. The same items and costs are listed for the next period of investment plan in 1995-99. In other words, the implementation of rural roads improvement is always below the target in spite of the high priority given to rural roads.

### 3.2.2 Proposed Rural Road Network Improvement Plan in the Municipalities of Camalig and Daraga

There are fifty (50) main routes of the provincial and barangay roads in the whole municipality areas of Camalig and Daraga with a total length of 172.2 km. Based on the inventory survey, these routes were prioritized considering such factors as population and jeepney route. These are shown in Table E.3.2 and the points for prioritizing the routes are summarized below:

- Population factor: points are allocated from 6 to 1 based on the related population to the respective routes.
- Jeepney factor: points are allocated from 5 to 1 based on the number of units of jeepneys and tricycles operated.
- Connecting factor with the existing jeepney routes and barangays: points 3 to 1.

As shown in the table, a high priority is given to the existing jeepney routes. Almost all of the jeepney routes cover several barangays and provide public transportation service to a large population (more than 3,000 of people) compared with other routes, which are unavailable jeepney services.

Considering the absorptive capacity of LGU, it is proposed that the stage-wise development strategy such as the short, medium, and long term development is applied as the development approach. The provincial government of Albay also prepares the "Local Development Investment Program" in every five (5) years. Hence, the horizon of the short, medium, and long will be assumed approximately as 0-5 years, 5-10 years and 10-15 years respectively. The above prioritized roads are divided into three (3) groups, which will be implemented in: (i) Short-Term (1996-2000), (ii) Medium-Term (2001-2005) and (iii) Long-Term (2006-2010), respectively. The proposed rural road network improvement plan is summarized below. Details are in Table E.3.3.

Proposed Rural Road Network Improvement Plan in the Municipalities of Camalig and Daraga

Municipality	Short-Term (1996-2000)		Medium-Term (2001-05)		Long-Term (2006-2010)	
	(km), 1/	(P '000), 2/	(km)	(P '000)	(km)	(P '000)
Camalig	40.7	101,750	28.3	70,750	19.4	48,500
Daraga	23.6	59,000	29.0	72,500	31.2	78,000
Total	64.3	160,750	57.3	143,250	50.6	126,500

Note: 1/ Total length of the proposed roads

2/ Tentative unit cost of a 2,500 Pesos/m was applied for the total cost estimation.

### 3.2.3 Priority Roads in the Study Area

The basic concept of rural road development is to make all barangays accessible by public transport vehicles. The roads should be passable in all seasons with safety. Five (5) priority roads are selected with a total length of 32.1 km, 11.4 km of which are provincial roads and the remaining 20.7 km are barangay roads. All roads, which are categorized in the proposed short-term development program (1996 -2000) and located within the Study area were selected as

proposed priority roads. The routes listed below are the priority roads and are illustrated in Figure E.3.1.

#### Priority Roads

Passing Barangay	Length (km)
(i) Comun - Cotmon - Del Rosario - Panoypoy	7.0
(ii) Ilawod - Ligban - Gotob - Taladong	5.4
(iii) Anislag - Maopi - Magogon - Panoypoy	6.4
(iv) Bascaran - Burgos - Mabini - Kinawitan - Panoypoy	5.7
(v) Mayon - San Ramon - Bigao - San Vicente Grande	7.6
(Total)	32.1

### 3.3 Rural Water Supply

#### 3.3.1 Target of the Master Plan in Albay Province

The Government's Water Supply, Sewerage and Sanitation Master Plan (1988-2000) has laid down the sector objectives, policies and strategies. The Master Plan is an inter-agency undertaking bearing the joint signatures of the Secretaries of Local Government, Public Works and Highways, Health and the Director General of NEDA.

The Government's Master Plan envisages a program of work carried out in two phases, 1988-92 and 1993-2000. The plan would achieve the following targets nationwide in terms of both the percentages of additional population served and total population coverage, as below:

#### Target of Mater Plan in National Level

	Phase I (1988 - 1992)		Phase II (1993 - 2000)	
	Additional Population Served (%)	Population Coverage (%)	Additional Population Served (%)	Population Coverage (%)
Water Supply (Urban)	22	77	18	95
Water Supply (Rural)	30	92	1	93
Sanitation	15	77	17	93

The provincial plan has been prepared using the objectives and policies contained in the Government Master Plan. The provincial plan for Albay will also be implemented in two phases: a medium-term plan from 1992-97; and a long-term plan from 1998-2010. The target set for the provincial plan will, for the medium term, be taken as those established for phase I of the Government's Mater Plan. For the long term plan the aim of the province will be to achieve complete coverage for both water supply and sanitation. The provincial targets for population coverage are shown below:

#### Target of Mater Plan in Albay Province

	Phase I (1992 - 1997)		Phase II (1998 - 2010)	
	Additional Population Served (%)	Population Coverage (%)	Additional Population Served (%)	Population Coverage (%)
Water Supply (Urban)	13	77	23	100
Water Supply (Rural)	42	92	8	100
Sanitation	27	77	23	100

#### 3.3.2 Projection of Water Supply Service Coverage in the Study Area

In order to achieve the target by the year 2010, a total of about 783 wells will be required in the Study area. And the possible available number, expected with probable budgetary allocation is estimated at about 21 wells annually in the Study area, based on the past records of public wells' construction. They are shown in Table E.3.4. Based on the above estimation, 318

wells will be probably constructed by the year 2010. This figure suggests that 465 wells will be short by the year 2010, if any additional water supply program is not implemented to complete the target.

The projection of water supply service coverage in the Study area is summarized below. Details are in Table E.3.5.

- i) Present water supply coverage: 31%
- ii) Projected population in year 2010: 57,600 people
- iii) Target water supply coverage in 2010: 100%
- iv) Requirement of newly constructed deep well : 783 wells
- v) Available number of newly constructed deep wells up to 2010 with probable budgetary allocations: 318 wells
- vi) Estimated shortfall = 465 wells

### 3.3.3 Proposed Rural Water Supply Development Plan

Based on the projection of water supply service coverage by the year 2010, the proposed rural water supply development plan is summarized below and detailed in Table E.3.6. It is also proposed that the stage-wise development strategy such as the short, medium, and long term development is applied as the development approach.

Proposed Water Supply Development Plan, 1996 - 2010

Municipality	No. of Brgys.	Required No. of Wells to be constructed			
		1996 - 2000	2001 - 2005	2006 - 2010	(Sub-total)
Camalig	20	152	150	127	429
Daraga	21	127	123	104	354
Total	41	279	273	231	783

As mentioned in the previous section, a certain specific rural water supply program will be required to achieve the target and overcome the estimated possible shortfall of 465 wells.

### 3.3.4 Improvement of the Existing Level-II Facilities

Despite the complete reliance on wells as the source of portable water supply, there is preference among the populace for Level-II facilities. This is because of convenience and uninterrupted supply of safe water. There are four (4) Level-II water supply systems in the Study area as mentioned in Chapter 1. These facilities were constructed in 1989 and serve about 1,000 people. However, because of limited budget for construction, improper design and poor maintenance activities, etc., the systems are not effectively used by the people. In order to maximize and expand the systems, the improvement of the systems are deemed imperative. The proposed improvement of the existing Level-II systems are given below:

Proposed Improvement of Existing Level-II

No.	Location of the System		Population		No. of Faucets	
	Barangay	Municipality	Total	Served	Communal	Individual
1	Gotob	Camalig	491	149	4	19
2	Taladong	Camalig	1,010	286	2	48
3	Inarado	Daraga	1,503	369	8	20
4	Gabawan	Daraga	1,233	94	2	1

## 4. RURAL INFRASTRUCTURE DEVELOPMENT PROJECT

### 4.1 Rural Road

#### 4.1.1 Location

Five (5) rural trunk roads with a total length of 32.1 km are proposed for rehabilitation and upgrading. Of these road network, 11.4 km are provincial roads and the remaining 20.7 km are barangay roads. The location of these roads is shown in Figure E.4.1 and the lengths are summarized below.

Proposed Roads

Road No.	Passing Barangay	Length (km)		
		Prov. Rd.	Brg. Rd.	Total
1	Comun - Cotmon - Del Rosario - Panoypoy	7.0	0.0	7.0
2	Ilawod - Ligban - Gotob - Taladong	0.0	5.4	5.4
3	Anislag - Maopi - Magogon - Panoypoy	2.2	4.2	6.4
4	Bascaran - Burgos - Mabini - Kinawitan - Panoypoy	0.0	5.7	5.7
5	Mayon - San Ramon - Bigao - San Vicente Grande	2.2	5.4	7.6
	<b>Total</b>	<b>11.4</b>	<b>20.7</b>	<b>32.1</b>

#### 4.1.2 Beneficiaries

The proposed road network for rehabilitation and upgrading will benefit 20 barangays with a total population estimated at 23,525 people and 4,397 households as shown below:

Beneficiaries of Proposed Roads

Road No.	Beneficiary Barangay	No. of Barangays	Population	Household
			*/	*/
1	Comun, Cotmon, Del Rosario, Panoypoy	4	5,215	1,019
2	Ilawod, Ligban, Gotob, Taladong	4	4,819	933
3	Anislag, Maopi, Magogon, Panoypoy	4	5,082	821
4	Bascaran, Burgos, Mabini, Kinawitan	4	4,383	872
5	Mayon, San Ramon, Bigao, San Vicente Grande	4	4,026	752
	<b>Total</b>	<b>20</b>	<b>23,525</b>	<b>4,397</b>

Note: \*/ Estimated 1995

#### 4.1.3 Present Conditions of the Facilities

Among the proposed roads, the provincial road with a total length of 11.4 km is mainly gravel paved, while the barangay roads with a total length of 20.7 km are earth fill (dirt) roads. The average width of the carriage way is 3 to 4 m for the barangay road and 4 to 5 m for the provincial road. Both types are below the standard of 4.5 m carriage way for barangay road and 6.1 m for the provincial road. These roads are severely damaged and in poor condition because of poor maintenance. Insufficient drainage facilities such as side ditches and crossing drains in the slope portions are the major causes of damage.

Under the proposed road sections, there are three river crossings often affected by heavy rainfall. This is due to insufficient discharge capacity of the cross sections. The cross sections are presently spillway-type culverts. The first one is Ligban spillway crossing the Iraya river, located at about 600 m from KM 516.7 of the national secondary road along the barangay road from Ilawod to Ligban. The second one is the Aguimit bridge crossing the Kapisungan river, located at about 800 m from the barangay center of Panoypoy along the provincial road from Comun to Panoypoy. The third one is Panoypoy spillway, heavily damaged by the typhoon last year. This crosses the Panoypoy river (as called by the barangay people), located at about



400 m from the barangay center of Panoypoy along the barangay road from Panoypoy to Magogon.

#### 4.1.4 O&M Organization

The PEO of Albay is mainly responsible for the maintenance of the provincial roads. The routine work includes vegetation control, cleaning and patching. According to the provincial engineer of Albay PEO, the maintenance and rehabilitation program is not implemented effectively because of limited budget. With reference to barangay roads, the minor maintenance work is done manually by barangay people. The major improvement work is done by private contractors with technical support from the MEO. Funding for materials and contracts are sourced from the 20% IRA share of the barangay. However, these amounts are reportedly limited and insufficient to keep the roads in good condition.

#### 4.1.5 Constraints and Development Strategies

The main constraint is limited funding support. This leads to poor maintenance. Indicative of this observation are non-functional drainage facilities and heavily damaged road sections. Accordingly, the actual activities of the government are concentrated on priority activities. It is observed, however, that the inputs for actual maintenance are always short of the total requirements. The proposed strategies for improving the rural road component include the implementation of proper design and structure consistent with maximum standards and strict enforcement of periodic maintenance system.

### 4.2 Rural Water Supply

#### 4.2.1 Location

The rural water supply component will focus on the rehabilitation of four (4) existing Level-II water supply systems. These are located in barangays Gotob and Taladong in Camalig municipality and barangays Inarado and Gabawan in Daraga municipality, as shown in Figure E.4.1.

#### 4.2.2 Beneficiaries

The existing Level-II water systems were originally constructed to serve 211 households covering about 1,161 persons. However, due to deteriorating facilities, these systems presently serve only 163 households involving about 898 persons. The actual water supply coverage is thus reduced by about 23%, as shown below:

Beneficiaries of Proposed Level-II Water System

Water System	Beneficiary Population (Household)	
	As Built	At Present
Gotob Level-II System	132 (24)	149 (27)
Taladong Level-II System	319 (58)	286 (52)
Inarado Level-II System	545 (99)	369 (67)
Gabawan Level-II System	165 (30)	94 (17)
<b>Total</b>	<b>1,161 (211)</b>	<b>898 (163)</b>

#### 4.2.3 Present Conditions of the Facilities

All of the Level-II water systems in the project areas need rehabilitation to function effectively. The water supply facilities were constructed by the DPWH through the OECF funded Rural Water Supply III Project in the 1980s. The systems have either remained as Level-II or converted to Level-III.

All systems derive the water source from springs by constructing "spring intake boxes" to protect the water source. These spring intake boxes are concrete made with an average capacity of 0.15 m<sup>3</sup> (0.5m x 0.5m x 0.6m). The number of spring intake boxes varies depending on the availability of water source. The water is transported from the spring intake boxes to a ground level reservoir through a GI pipe. The average distance between a spring intake box and a ground level reservoir is 10-20 m. A ground level reservoir has a normal capacity of 1/4 average day demand in order to satisfy the maximum hour demand. The capacity of the existing reservoirs varies from 1 to 7 m<sup>3</sup> depending on the availability of water source. The results of the discharge measurement by the Study team are shown below:

Discharge of Water Sources

Water System	Discharge (lit/s), */
Gotob Level-II System	0.32, + 0.16,**/
Taladong Level-II System	0.00 2.67 ***/
Inarado Level-II System	1.10
Gabawan Level-II System	0.24

Note: \*/ July 1996, by the Study team

\*\*/ additional potential source

\*\*\*/ adjacent source temporarily diverted to damaged spring intake box

A perimeter fence encloses the facilities. The concrete structures need minor repair notably replacement of some pipe valves and other fittings to be able to seal the cracks and leakage to prevent contamination. The distribution system includes service connections to communal and individual faucets with distribution pipes of size ranging from 75mm to 20mm. The GI pipes are used in the rugged terrain while the PVC pipes are used in the service area. The pipes are still in good condition but the joints have to be repaired. Thrust blocks should be provided to some portion of the GI pipes. The inventory of such facilities is given below while the details are in Table E.4.1.

Existing Facilities of Proposed Level-II Water System

Level-II System	Gotob	Taladong	Inarado	Gabawan
No. of Spring Intake Box	4	1	4	2
No. of Ground Level Reservoir	1	2	1	1
Total Length of GI Pipe (m)	394	969	1,141	106
Total Length of PVC Pipe (m)	781	1,735	1,380	600
No. of Communal Faucet	4	2	8	2
No. of Individual Connection	19	48	20	1

**4.2.4 Operation and Maintenance**

The establishment of a RWSA is a prerequisite for the construction of Level-II system. The RWSAs are non-stock, non-profit organizations envisaged to operate and manage the facilities. All of the Level-II water supply systems in the project area have existing RWSA with the exception of Gabawan. The Inarado RWSA is inactive while the Taladong RWSA became non-functional and non-existent after 5 years of operation. The latter's responsibility was turned over to the Barangay Council. On the other hand, the Gotob RWSA is performing well.

All water supply systems are practically not functional due to various maintenance defects. A number of water users are dissatisfied with the service due to inequitable distribution and poor quality of water especially in the Taladong system. The absence of periodic maintenance and proper water delivery schedule are common problems. Although water charges ranging from P 5.00 to P 25.00 per month per connection are collected regularly, significant water users refused to pay, thus seriously affecting the generation of revenues to finance the systems' operation and maintenance.

The MHO regularly monitor the quality of water delivered by the water systems. Water sample collection and examination is conducted monthly using the Primary Health Care (PHC) Method of testing. Further bacteriological test is done if necessary. Except in Gotob, the water samples collected in all systems indicated contamination. Apparently no disinfection is being done. Table E.4.1 shows the detailed O&M activities by water system in the project area.

#### 4.2.5 Constraints and Development Strategies

- i) Physical constraint
  - Water leakage from pipes, joints, valves and pilferage
  - Contaminated water
  - Insufficient capacity of the reservoir
  - Absence of water flow records
  
- ii) Institutional constraint
  - Absence of periodic maintenance
  - Absence of water delivery schedule
  - Absence of water rights
  - Lack of discipline among members (e.g. non-payment of fees, non-cooperation)
  - Inadequate skills and knowledge on O&M
  - Lack of government support to monitor and render technical assistance on O&M

The development strategies proposed to solve the above-mentioned constraints are:

- a. Minor rehabilitation of facilities
- b. Additional construction of ground level reservoir
- c. Expansion of distribution lines to maximize water users
- d. Introduction of water meters for accurate pricing system
- f. Introduction of measuring device to monitor water availability
- g. Periodic disinfection program by the MHO to prevent contamination of water and minimize risk against water borne diseases
- h. Organization and strengthening of RWSAs particularly on operation, maintenance, and management for long-term sustainability of the system
- i. Designation of MEO as government agency responsible to monitor and give technical assistance and advice to end-users on the operation and management of the system after construction and or rehabilitation.

## 5. RURAL ROAD UPGRADING PROJECT

### 5.1 Design

#### 5.1.1 Design Policy

Since provincial and barangay roads have a primary function of connecting a barangay center to the national road, as well as contributing to the farmers' day to day economic activities, its design should be an all weather type. In addition, cost effectiveness and environment-friendly should be considered in the design. To design so as to minimize volume of earth work, the existing road alignment should be retained as far as possible.

The drainage facilities such as river crossing, road crossing drain and side drains are indispensable in the prevention of rapid deterioration caused by water infiltration on the road surface. The drainage facility must have sufficient capacity of drain. In addition, the maintenance work should be considered in deciding the size of drainage facilities, especially pipe culverts. A proper drainage system is one of the most effective counter measures to prevent soil erosion.

#### 5.1.2 Design Standard

The road standards of the DPWH were applied for the design of the cross section of the proposed provincial and barangay roads. Considering the intensity of rainfall in the area and high cost of maintenance work, the use of concrete pavement is proposed for both provincial and barangay roads. The concrete paved roads are also expected to be used as drying facilities of paddy by the local people. These concrete paved roads are also expected to be used as drying facilities of paddy by the local people. The typical cross section is summarized below and shown in Figure E.5.1.

Proposed Typical Cross Section

Proposed road	(unit: m)	
	Provincial road	Barangay road
Pavement	Portland Cement Concrete Pavement	
Pavement width (carriage way)	6.1	4.5
Shoulder width, */	1.0 x 2	1.0 x 2
Side ditch width, **/	0.50	0.50

Note: \*/ in both sides, \*\*/ in some required portions

Consistent with the type or class of a road, the construction of bridges on the three (3) river crossing points is recommended, namely Agumit, Ligban and Panoytoy bridges. The bridge standards of the DPWH were applied in the design of safe and economical bridge. Based on the preliminary site investigations and considering design factors such as location, adequate waterway openings and bridge geometries, a permanent one span reinforced concrete deck girder (RCDG) standard bridge is proposed. The tentative plan of the proposed bridges are shown in Figure E.5.2 (1/3-3/3).

Side drains with sufficient capacity are indispensable to drain excess water from the road surface. Protection work of side drains such as lining by grouted rip rap will be proposed to prevent soil erosion.

In addition to side drains, cross drains are required according to the topography. The pipe culvert type having a minimum diameter of 0.6 m will be utilized for this purpose. This is necessary for desilting.

The location plans of the proposed rural road upgrading project are shown in Figure E.5.3 (1/5-5/5). Where details are summarized in Table E.5.1.

## 5.2 Project Costs and Benefits

### 5.2.1 Direct Construction Cost

Various construction work items are adopted from the DPWH Specifications for roads and bridges. The estimated direct construction costs are summarized below, while details are shown in Table E.5.2.

Direct Construction Cost of Proposed Roads

Road No.	(1)	(2)	(3)	(4)	(5)
Main Route	Cotmon-Panoyoy	Ligban-Gotob	Maopi-Magogon	Burgos-Mabini	SanRamon-Bigao
Length (km)	7.0	5.4	6.4	5.7	7.6
Direct Construction Cost (P'000)	41,378	25,261	33,099	21,306	33,799

### 5.2.2 Maintenance Cost

Work items and costs for each maintenance activity were estimated based on the PEO's annual maintenance work program and budget in 1995. The maintenance works are divided into two (2) categories, namely (i) routine maintenance (annual) and (ii) periodic maintenance. Major routine maintenance works are patching, resurfacing, reshaping, vegetation control, clean and repair culverts and minor repair of bridges. While major periodic maintenance work items are considered as regravelling for gravel roads in every ten (10) years and PCC overlay for concrete paved roads in every 25 years. The estimated maintenance costs for the proposed provincial and barangay roads are summarized below.

Maintenance Costs per km

Road Category	Provincial Rd.	Barangay Rd.
Width of Carriage Way (m)	6.1	4.5
Pavement	PCC, */	PCC, */
Annual Maintenance Cost ( P'000/km)	32	24
Periodic Maintenance Cost (every 25 years) ( P'000/km)	1,700	1,300

Note: \*/ PCC ( Portland Cement Concrete)

Maintenance Cost by the Proposed Road

Road No.	(1)	(2)	(3)	(4)	(5)
Main Route	Cotmon-Panoyoy	Ligban-Gotob	Maopi-Magogon	Burgos-Mabini	SanRamon-Bigao
Length (km)	7.0	5.4	6.4	5.7	7.6
Annual Maintenance Cost ( P'000)	224	130	171	137	200
Periodic Maintenance Cost (every 25 years) (P'000)	11,900	7,020	9,200	7,410	10,760

### 5.2.3 Beneficiaries

Beneficiaries related to the proposed roads are classified into two (2), namely direct and indirect beneficiaries. Direct beneficiaries are the people, living in the barangays where the proposed roads are directly traversing. While, indirect beneficiaries are the people, living the adjacent barangays, where the proposed road is traversing. Direct and indirect beneficial barangays and total population by each proposed road are summarized below.

Beneficiaries of Proposed Roads

Road No.	(1)	(2)	(3)	(4)	(5)
Main Route	Cotmon-Panoypoy	Ligban-Gotob	Maopi-Magogon	Burgos-Mabini	SanRamon-Bigao
Length (km)	7.0	5.4	6.4	5.7	7.6
Beneficiaries					
(I) Direct Beneficiaries	5,215	4,819	5,082	4,383	4,026
Barangays	Comun Cotmon Del Rosario Panoypoy	Ilawod Ligban Gotob Taladong	Anislag Maopi Magogon Panoypoy	Bascaran Burgos Mabini Kinawitan	Mayon San Ramon Bigao S.V.Grande
(II) Indirect Beneficiaries	4,158	18,690	640	1,524	1,071
Barangays	1/	2/	3/	4/	5/

Note: 1/ Magogon, Solong, Maninila, Taplacon, Taloto, Mabunga  
 2/ Mina, Tagoytoy, Tagaytay, Baligang, Binitayan, Comun, Del Rosario, Panoypoy, Magogon, Solong, Maninila, Taplacon, Taloto, Mabunga  
 3/ Anislag, San Vicente Pequeno  
 4/ Panoypoy, Alobo  
 5/ San Rafael, Nabasan, Ibaugan

## 6. RURAL WATER SUPPLY REHABILITATION PROJECT

### 6.1 Design

#### 6.1.1 Water Requirement

The following design assumption is applied for Level-II system based on the discussion with the district officers of the rural water supply section of DPWH.

- Planning year : Year 2010
- Design population : Present population x 1.12  
(with annual growth rate = 0.74%)
- Average size of household : 5.5 persons
- No. served per faucet :
  - Communal faucet : 5 households = 28 persons
  - Individual connection : 1 household = 5.5 persons
- Daily water consumption : 60 lit./capita/day
- Water demand :
  - Average day demand : Design population x per capita water consumption
  - Maximum day demand : 1.3 x average day demand
- Transmission loss : 30%

Based on the above assumptions, the design discharges per faucet are estimated below.

Design Discharge of Proposed Level-II Water System

Design Item	Communal faucet	Individual faucet
No. served (household)	5	1
No. served (person)	28	5.5
Average day demand (lit/sec)	0.019	0.0038
Design discharge for transmission line (lit/sec), 1/	0.028	0.006
Design discharge for distribution line (lit/sec), 2/	0.036	0.008

Note: 1/ with factors of transmission loss and population growth

2/ with factors of transmission loss, population growth and max. day demand

#### 6.1.2 Hydraulic Design

The following Hazen-Williams formula was used for the hydraulic design of the pipe line system:

$$h = 10.666 * L * C^{(-1.85)} * D^{(-4.87)} * Q^{(1.85)}$$

Where,

- h = Head loss (m)
- L = Pipe length (m)
- C = Coefficient (100 = GI pipe, 140 = PVC Pipe)
- D = Diameter (m)
- Q = Discharge (m<sup>3</sup>/s)

Other design assumption applied is as follows:

- Pressure rating of pipes : Max.=15 m, Min.=3.5 m
- Velocity limits in pipes : Max.= 3.0 m/sec., Min.= 0.3 m/sec.
- Head loss in fitting and other miscellaneous : 30% of pipe head loss

#### 6.1.3 Possibility of Expansion

The possibility of expanding the distribution system is evaluated based on site investigations, existing past records, and other information relative to design. In the absence of long term discharge measurement records and considering seasonal fluctuation of groundwater flow, an 80% dependable flow was adapted in evaluating water availability. The topography condition was also examined to clear the required pressure for water transportation by gravity system.

The maximum utilization of existing facilities was also considered. Considering these three (3) design limitations, the design discharge is summarized below.

Potential Discharge for Extension

Item	Gotob	Taladong	Inarado	Gabawan
Results of discharge measurement (lit/s)	0.48 *a	2.67 *b	1.10	0.24
Design discharge of water source (lit/s)	0.40	0.60 + (0.44) *c	0.90	0.20
No. of existing communal faucets (nos.)	3	2	8	2
No. of existing individual faucets (nos.)	19	48	17	1
Required discharge for existing facilities (lit/s)	0.20	0.32	0.33	0.06
Potential discharge for extension (lit/s)	0.20	0.28	0.57	0.14
No. of communal faucets for expansion (nos.)	7	10 + (3) *c	20 *d	5

Note: \*a including additional potential water source  
 \*b adjacent potential source temporarily diverted to damaged intake spring box  
 \*c (0.44)& (3) for barangay Mina (max. demand for the total population of 565)  
 \*d including one (1) communal faucet for replacement of pipeline

### 6.1.4 Proposed Rehabilitation Work

The proposed rehabilitation work in each system is summarized below.

Proposed Rehabilitation Work

Work Item	(unit)	Gotob	Taladong	Inarado	Gabawan
1. Construction of additional spring intake box	nos.	1	1	0	0
2. Construction of additional ground level reservoir	nos.	1	1	2	1
3. Replacement of pipe line	m	0	850	2,600	0
4. Expansion of pipe line	m	700	1,050	2,070	1,950
5. Construction of additional communal faucet	nos.	7	10	19	5
6. Rehabilitation of existing communal faucet	nos.	4	2	8	0
7. Minor repair of spring intake box	nos.	4	0	4	2
8. Minor repair of pipes and joints, replacement of valves and provision of pipe support	sum	1	1	1	1
9. Perimeter fence	nos.	1	1	1	1
10. Additional communal faucet at water source site	nos.	0	3	1	0

The details of the proposed rural water supply rehabilitation project components are in Table E.6.1 and each schematic plan is shown in Figure E.6.1 (1/4-4/4) and proposed spring intake box ground level reservoir and communal faucet are shown in Figure E.6.2. Pipe line hydraulics of each system are in Table E.6.2 (1/4)-(4/4).

## 6.2 Project Costs and Benefits

### 6.2.1 Direct Construction Cost

Various construction work items are adopted from the design manual for rural water supply by NWRC (National Water Resources Council). The estimated direct construction costs are summarized below, while details are shown in Table E.6.3.

Direct Construction Cost of Proposed Level-II Water System

Water System	Gotob	Taladong	Inarado	Gabawan
Direct construction Cost (P'000)	388	689	1,205	390

### 6.2.2 Operation and Maintenance Cost

Work items and costs for each O&M activity were estimated based on the interview with the barangay councils and the staffs of the rural water supply section of DPWH. The O&M costs



are divided into two (2) categories, namely (i) routine O&M (annual ) cost and (ii) replacement cost. Major routine O&M works are inspection of the facilities, conditions of water distribution, minor repair, collecting water charge and their management. Replacement cost should be considered as every 10 years to replace some parts of facilities. The estimated O&M and replacement costs are summarized below.

O&M Costs of Proposed Level-II Water System

Water System	Gotob	Taladong	Inarado	Gabawan
Annual O&M Cost (P'000)	8	11	14	6
Replacement Cost (P'000) (every 10 years)	78	138	241	78

**6.2.3 Beneficiaries**

Beneficiaries related to the communal faucets and individual connections are registered as members of the water users association. Total numbers of communal faucets and individual connections and beneficiaries are summarized below.

Beneficiaries of Proposed Level-II Water System

Water System	Gotob	Taladong	Inarado	Gabawan
No. of Communal Faucets	11	15	28	7
No. of Individual Connections	19	48	17	1
Beneficiaries (population)	345	650	901	234
Beneficiaries (HH)	62	117	162	42
Beneficial barangays	Gotob, Ligban	Taladong, Comun, Mina	Inarado	Gabawan

## **7. STRATEGY FOR IMPLEMENTATION**

The rural infrastructure component will be implemented in the model areas as well as outside of the model areas. The rationale for this is that the road sections and Level-II water supply which have been finally selected regardless of whether they are or outside of the model areas are considered of utmost priority in terms of felt need. The road network in the model areas is expected to facilitate mobility of people and goods in the same way as the road network outside of the model areas. In the same manner the rural water supply is basic to preventive health maintenance. Table E.7.1 shows the spatial distribution of the rural road and Level-II water supply.

**THE FEASIBILITY STUDY ON  
THE WESTERN LEGAZPI IRRIGATION AND  
RURAL DEVELOPMENT PROJECT IN THE PHILIPPINES**

***TABLES***



Table E.1.1 Road Inventory in the Municipalities of Camalig and Daraga (1/2)

Name of Road Section / Location	Surface Type	Length (km)	Carrriage way (m)	Width with shoulders(m)	Condition
<b>Municipality - Camalig</b>					
<b>I. National Road</b>					
1 Daan Mabarlaka (MSR) (KM512.0 - KM515.0 - KM518.4)	Concrete	6.4	6.1	10.0	Good
2 Gunobatan/Camalig Bdry. - Camalig - Camalig/Daraga Bdry.	Asphalt (Sub-retal)	9.6	5.0	8.0	Good / Fair / Poor
3 Camalig - Comun - Daraga Bdry. - (Inarado - Peña Francia)		16.0			
<b>II. Municipal Road</b>					
Poblacion (municipal center area)					
	Concrete / Asphalt / Gravel	4.2	4.0 - 6.0	7.0 - 9.0	Good
<b>III. Provincial Road</b>					
1 Salugan - Anoling	Asphalt / Gravel	3.1	4.0	7.0 - 8.0	Poor
2 Qurangay - Sua - Tumpa - (Guinobatan Bdry.)	Earth	4.3	4.0	7.0 - 8.0	Poor
3 Libod - Bariw	Gravel / Earth	2.2	3.0 - 4.0	8.0	Fair
4 Tagaytay - Bariw - Guinobatan Bdry. - (Mauraro)	Asphalt	5.1	3.0 - 4.0	8.0	Fair / Poor
5 Baligang - Bantonan	Gravel / Earth	0.9	3.0	5.0	Fair
6 Baligang - Caguiba - Pariaan	Asphalt / Gravel / Earth	6.9	4.0	8.0	Fair / Poor
7 Cotmon - Maninila - Taplacon - Taloto	Gravel	7.0	4.0	8.0	Fair / Poor
8 Cornuz - Cotmon - Del Rosario - Panoytoy	Gravel	7.2	4.0 - 5.0	8.0 - 10.0	Fair / Poor
9 Palasong - Iltuan	Asphalt / Gravel	3.2	3.5 - 4.0	7.0 - 8.0	Poor
10 Pariaan - Manawan - Quinuarilan	Earth	3.5	3.0 - 4.0	5.0 - 7.0	Poor / dry season only
11 (Guinobatan) - Iltuan - Pariaan - Cab Pequeño - (Jovellar)	Asphalt	5.5	4.0	8.0	Fair
	(Sub-total)	48.9			
<b>IV. Barangay Road</b>					
1 Camalig - Tinago - Gapo	Asphalt / Gravel	1.2	3.0	5.0	Good / Fair
2 Sumlang - Internal of the barangay Sumlang	Gravel / Earth	1.0	3.0	5.0	Fair / Poor
3 Ilawod - Ligbat - Cotob - Taladong	Concrete / Gravel / Earth	5.5	3.0	5.0	Fair / Poor / Bad
4 Bantonan - Palanong	Earth	2.9	-	-	Trail / Footpath
5 Taladong - Mina	Earth	1.5	3.0	5.0	Fair / Poor
6 Taladong - Tagoytoy	Gravel / Earth	2.8	3.0	5.0	Fair / Poor
7 Taladong - Bongabong	Gravel / Earth	0.9	3.0	5.0	Fair
8 Bongabon - Calabidongan - Solong - Taplacon	Earth	5.2	-	-	Trail / Footpath
9 Bunitayan - Darga Bdry. - (Inarado)	Earth	0.7	3.0	5.0	Poor / Partly trail
10 Cotmon - Solong	Earth	3.0	3.5 - 4.0	7.0 - 8.0	Poor
11 Caguiba - Calabidongan	Earth	2.3	3.0	5.0	Fair / Poor
12 Caguiba - Quiunday	Earth	4.0	-	-	Trail / Footpath
13 Iltuan - Manawan	Earth	2.8	3.0	5.0	Poor
14 Pariaan - Binandirahan	Earth	1.8	3.0	5.0	Poor
15 Panoytoy - Daraga Bdry. - (Kinawitan)	Earth	1.6	3.0	5.0	Bad
16 Panoytoy - Magogon	Earth	2.5	3.0	5.0	Bad (dry season only)
17 Magogon - Daraga Bdry. - (Maopi)	Earth	1.2	3.0	5.0	Poor / Bad
18 Magogon - Daraga Bdry. - (Canatom)	Earth	0.5	-	-	Trail / Footpath
19 Taloto - Mabunga	Earth	1.3	-	5.0	Bad / newly opened
20 Binandirahan - Quitunday - Taloto	Earth	5.0	-	-	Trail / Footpath
21 Talot - Panoytoy	Earth	2.8	-	-	Trail / Footpath
	(Sub-total)	50.5			

Source : DPWH-RV, PEO-Albay, Municipal Offices of Daraga and Camalig and Field investigation by the Study team

Table E.1.1 Road Inventory in the Municipalities of Camalig and Daraga (2/2)

Name of Road Section / Location		Surface Type	Length (km)	Carrage way (m)	Width with shoulders (m)	Condition
<b>Municipality: Daraga</b>						
<b>I. National Road</b>						
1	Daan Maharlika (MSR) (KM518.4 - KM524.5 - KM539.0) Camalig/Daraga Bdry. - Daraga - Daraga/Sorsogon Bdry.	Concrete	20.6	6.1	10.0	Good
2	(Camalig- Comum) - Daraga Bdry. - Inarado - Peña Francia	Asphalt / Concrete	5.0	5.0	8.0	Good / Fair / Poor
3	Daraga - Legaspi City Bdry. (KM524.5 - KM525.9)	Concrete	1.4	6.1	10.0	Good
	(Sub-total)		27.0			
<b>II. Municipal Road</b>						
	Poblacion (municipal center area)	Concrete/Asphalt/Gravel	28.9	4.0 - 6.0	7.0 - 9.0	Good
<b>III. Provincial Road</b>						
1	Salvacion - Budiao - Banadero	Gravel/Concrete	4.3	4.0	7.0	Fair / Poor
2	Maliabog - Lacag	Asphalt / Gravel	3.0	3.5 - 4.0	7.5 - 8.0	Fair / Poor
3	Cullat - Bongalon	Gravel/Asphalt	0.7	3.5	7.0	Fair
4	Lakandula Drive	Concrete	2.0	6.0	8.0 - 9.0	Good
5	Gapo - Lacag	Gravel	2.4	3.0 - 4.0	5.5 - 6.0	Bad / Abandoned
6	Anislag - Maopi	Gravel/Earth	2.2	3.5 - 4.0	7.0 - 8.0	Poor / Bad
7	Mayon - San Ramon	Asphalt / Gravel	2.2	4.0	8.0	Fair / Poor
	(Sub-total)		16.8			
<b>IV. Barangay Road</b>						
1	Salvacion - Miti	Gravel / Earth	4.5	3.5 - 4.0	7.0 - 8.0	Poor
2	Binitayan - Kilicao - Alcala - Mamong	Concrete	3.5	4.0	8.0	Good
3	Busay - Pandon - Lacag	Earth	2.4	2.5 - 3.0	5.5 - 6.0	Fair / Partly bad
4	Bongalon - Kidaco - Baniad - Peña Francia	Concrete / Gravel / Earth	4.9	2.5 - 3.0	5.5 - 6.0	Fair / Poor
5	Lacag - Inarado	Gravel / Earth	2.7	3.0	5.5 - 6.0	Fair / Poor
6	Peña Francia - Gabawan - Kiwalo - Bagumbayan	Gravel / Earth	4.4	3.5	7.0	Fair / Poor / Partly bad
7	Gapo - Internal of the barangay Gapo	Gravel	2.4	3.0	5.5	Bad
8	Inarado - Ajobo - Mabini	Earth	5.2	3.0	5.5	Bad
9	Alobo - Kinawitan	Earth	1.7	3.0	5.5	Bad
10	Bacaran - Burgos - Mabini - Kinawitan - Camalig Bdry.	Gravel / Earth	4.4	3.5 - 4.0	8.0	Fair / Poor / Bad
11	Bacaran - Talahib - Legaspi City Bdry.	Gravel	2.4	3.0	5.0	Poor / Bad
12	Maopi - Camalig Bdry. - (Magogon)	Gravel / Earth	1.6	3.0	5.0	Poor / Bad
13	Maopi - San Vicente Pequeno	Earth	1.0	3.0	5.0	Bad
14	Anislag - Internal of the barangay Anislag	Earth	1.6	3.0	5.0	Fair / Poor
15	Anislag - Canarom	Asphalt / Gravel / Earth	5.3	3.0	5.0	Fair / Poor
16	Canarom - Camalig Bdry. - (Magogon)	Earth	0.7			Trail / Footpath
17	San Ramon - Bigato - St. Vicente Grande	Gravel / Earth	4.7	3.5	7.0	Poor / Bad
18	San Ramon - Canarom	Earth	2.4			Trail / Footpath
19	Canarom - San Rafael	Earth	1.8			Trail / Footpath
20	San Rafael - San Vicente Grande	Earth	2.1			Trail / Footpath
21	Bigato - San Rafael	Earth	1.2			Trail / Footpath
22	San Vicente Grande - Nabasan	Earth	2.6			Trail / Footpath
23	San Vicente Grande - Ibaugan	Earth	2.4			Trail / Footpath
24	Nabasan - Ibaugan	Earth	4.0			Trail / Footpath
25	Villahermosa - Internal of the barangay Villahermosa	Earth	1.7	3.0	5.0	Fair / Poor
	(Sub-total)		71.6			

Source : DPWH-RV, PEO-Albay, Municipal Offices of Daraga and Camalig and Field investigation by the Study team

**Table E.1.2 Road Inventory by Barangay in the Study Area**

Code	Barangay	Area (km <sup>2</sup> )	Road Category				Total Road Length (km)	Road Density (km/km <sup>2</sup> )
			National Rd.(km)	Municipal Rd.(km)	Provincial Rd.(km)	Barangay Rd.(km)		
<b>Municipality : Camalig</b>								
C-1	Quirangay	6.5	0.4	-	1.2	-	1.6	0.2
C-2	Salugan	1.0	1.1	-	0.6	-	1.7	1.6
C-3	Gapo	0.9	-	-	-	1.0	1.0	1.1
C-4	Poblacion	0.4	1.0	4.2	-	-	5.2	14.6
C-5	Tinago	0.7	-	-	-	0.2	0.2	0.3
C-6	Ilawod	1.9	2.1	-	-	0.6	2.7	1.4
C-7	Libod	3.3	1.6	-	1.4	-	3.0	0.9
C-8	Ligban	0.9	-	-	-	1.3	1.3	1.4
C-9	Tagaytay	3.9	2.0	-	1.4	-	3.4	0.9
C-10	Gotob	0.9	-	-	-	1.0	1.0	1.1
C-11	Baligang	3.5	2.6	-	2.4	-	5.0	1.4
C-12	Tagoytoy	1.3	-	-	-	1.2	1.2	0.9
C-13	Taladong	2.0	1.8	-	-	2.4	4.2	2.1
C-14	Binitayan	0.7	-	-	-	0.7	0.7	1.0
C-15	Comun	1.6	1.4	-	0.6	-	2.0	1.3
C-16	Bongabong	3.2	-	-	-	3.0	3.0	0.9
C-17	Cotmon	6.0	0.8	-	3.7	1.5	6.0	1.0
C-18	Del Rosario	2.4	-	-	3.0	1.6	4.6	1.9
C-19	Panoytoy	4.6	-	-	1.5	1.9	3.4	0.7
C-20	Magogon	2.4	-	-	-	2.6	2.6	1.1
(Sub-total/ Average)		47.8	14.8	4.2	15.8	19.0	53.8	1.1
<b>Municipality : Daraga</b>								
D-1	Inarado	6.8	1.5	-	-	1.0	2.5	0.4
D-2	Gapo	3.9	1.2	-	1.1	0.2	2.5	0.6
D-3	De La Paz	0.7	0.8	-	-	-	0.8	1.1
D-4	Dinoronan	0.6	1.1	-	-	-	1.1	1.8
D-5	Peña Francia	1.9	1.2	-	-	-	1.2	0.6
D-6	Alobo	1.6	-	-	-	2.8	2.8	1.7
D-7	Tabon-Tabon	2.1	1.6	-	-	1.2	2.8	1.3
D-8	Gabawan	0.9	-	-	-	1.1	1.1	1.2
D-9	Mabini	1.2	-	-	-	4.0	4.0	3.2
D-10	Kinawitan	0.8	-	-	-	0.7	0.7	0.9
D-11	Burgos	1.5	-	-	-	2.0	2.0	1.3
D-12	Bascaran	4.2	2.3	-	-	1.4	3.7	0.9
D-13	Talahib	4.3	-	-	-	1.0	1.0	0.2
D-14	Namantao	3.6	1.0	-	-	-	1.0	0.3
D-15	San Vicente Pequeño	0.6	-	-	-	1.5	1.5	2.4
D-16	Maopi	2.5	-	-	1.2	-	1.2	0.5
D-17	Anislag	6.6	2.4	-	1.0	2.7	6.1	0.9
D-18	Canarom	2.5	-	-	-	5.1	5.1	2.1
D-19	San Ramon	7.9	-	-	0.5	2.3	2.8	0.4
D-20	Mayon	3.6	-	-	1.7	-	1.7	0.5
D-21	San Rafael	0.3	-	-	-	0.8	0.8	2.5
(Sub-total/Average)		58.3	13.1	0.0	5.5	27.8	46.4	0.8
(Total/Average)		106.1	27.9	4.2	21.3	46.8	100.2	0.9

Source : DPWH-RV, PEO-Albay, Municipal Offices of Daraga and Camalig and Field investigation by the Study team

**Table E.1.3 Responsible Authorities for Water Supplies Facilities**

Category	Authority	Implementing Agency	Related Authority	Program/Activity	Source of Funds	Period of Implementation	Remarks
<b>I. Annual Water Supply Development Program</b>							
(1) Level III	LWUA, 1/	WD, 6/	LGU 4/	(i) Construction, Improvement & Rehabilitation (ii) Operation & Maintenance	Foreign Local-National Local-WD	-	
(2) Level II Level I	DPWH, 2/	DPWH-DEO, 7/	LGU 4/	Infrastructure Program (Construction of Rural Water Supply Project)	Local - National Local - National Water Supply Project	1989 - 1990 1991	General Appropriations Act (GAA) Countrywide Development Fund (CDF)
<b>II. Special Water Supply Development Program</b>							
(1) Level-II Level-I	DPWH, 2/	DPWH, 2/	NEDA, 11/	Accelerated Water Supply Program (AWSP)	-	Starting - 1989	Umbrella Program for Rural Water Supply & Sanitation Program (Republic Act No.6716)
	PCC, 3/	DPWH, 2/ DOH, 8/ DILG, 9/ LGU, 4/ LWUA, 1/	NEDA, 11/	(i) First Water Supply, Sewerage and Sanitation Sector Project (FWASP) (a) Water Supply Component (b) Sanitation Component (c) Technical Assistance Component (Training & Community Development) (ii) Operation & Maintenance	Foreign (World Bank)	1990 - 1995	Phase I - Implementation of National Water Supply, Sewerage & Sanitation Master Plan FWASP Implementation (responsible authorities): - DPWH-DEO construction/rehabilitation of water supply facilities - DILG-PAO general administration and institutional building - DOH-PHO sanitation component - LGU-PPDO/MPDO coordination - LWUA technical studies - BWSA operation & maintenance
(2) Level-I	LGU, 4/	LGU-PEO, 10/ LGU-Barangay	LGU-PPDO, 12/	Infrastructure Program (Construction of Rural Water Supply Project)	Local - Provincial Local - Provincial Water Supply Project	1995	20% IRA Share of Province/Barangay, 13/ (i) Provincial - Material Cost (ii) Barangay - Installation Cost (Memo-Ag. between DPWH & DILG allows LGUs to implement 25% of total Level-I facilities programmed for the province)
(3) Level-II Level-I	DPWH, 2/	DPWH-DEO, 7/	-	Rural Water Supply Project	Foreign - OECF (13th Yen)	1988 - 1990	
(4) Level-I	RWDC, 5/ LGU, 4/	LGU-PEO, 10/	LGU-PPDO, 12/	Barangay Waterworks Program	Foreign- USAID	1980 - 1985	
(5) Level-II Level-I	DPWH, 2/	DPWH-DEO, 7/ LGU, 4/	LGU-PPDO, 12/	Rural Water Supply Program	Foreign	-	Probable Rural Development Component
<b>Note:</b>							
	1/ Local Water Utilities Administration			6/ Water District (Camarig and Daraga Water District)			10/ Provincial Engineer Office
	2/ Department of Public Works and Highways			7/ District Engineer Office			11/ National Economic and Development Authority
	3/ Project Coordination Committee			8/ Department of Health			12/ Provincial Planning and Development Office
	4/ Local Government Unit			9/ Department of Interior and Local Government			13/ Internal Revenue Allotment
	5/ Rural Water Development Corporation (Absorbed by LWUA)						



**Table E.1.4 Inventory of Water Supply Facilities Level-I**

Code	Barangay	Total Population 1/	Total Household 1/	Level-I Water Supply Facilities by Category					
				Private 2/			Public 3/		
				No. of Wells		Spring Dev.	No. of Wells		Spring Dev.
		SW	DW		SW	DW			
Municipality : Camalig									
C-1	Quirangay	2,047	379	0	0	1	0	0	0
C-2	Salugan	1,584	278	3	0	0	0	4	0
C-3	Gapo	1,280	261	0	0	1	1	0	0
C-4	Poblacion	3,730	666	64	0	0	0	0	0
C-5	Tinago	1,325	237	21	0	0	2	1	0
C-6	Ilawod	2,682	506	6	0	0	4	2	0
C-7	Libod	2,600	433	10	0	0	6	4	0
C-8	Ligban	636	125	11	0	0	5	1	0
C-9	Tagaytay	2,108	398	10	0	0	5	2	0
C-10	Gotob	491	96	13	0	0	2	0	0
C-11	Baligang	2,913	511	17	0	0	4	2	0
C-12	Tagoytoy	566	109	1	0	0	2	2	0
C-13	Taladong	1,010	206	7	0	0	5	2	1
C-14	Binitayan	418	75	5	0	0	5	0	0
C-15	Comun	1,185	224	15	0	0	8	0	0
C-16	Bongabong	685	109	9	0	0	4	0	0
C-17	Cotmon	2,285	439	9	0	0	2	3	0
C-18	Del Rosario	780	159	3	0	0	1	2	0
C-19	Panoypoy	965	197	5	0	0	3	1	0
C-20	Magogon	496	89	2	0	0	4	1	0
	(Sub-Total)	29,786	5,497	211	0	2	63	27	1
Municipality : Daraga									
D-1	Inarado	1,503	301	60	0	0	8	1	0
D-2	Gapo	1,608	322	5	0	0	4	1	1
D-3	De La Paz	522	107	0	0	0	2	1	1
D-4	Dinoronan	295	66	6	0	0	3	1	1
D-5	Peña Francia	1,628	258	0	0	0	0	2	0
D-6	Alobo	559	100	28	0	0	3	2	0
D-7	Tabon-Tabon	1,322	259	1	0	0	1	2	0
D-8	Gabawan	1,233	224	10	0	0	4	1	0
D-9	Mabini	452	94	8	0	0	3	0	0
D-10	Kinawitan	435	95	0	0	0	2	2	0
D-11	Burgos	841	162	3	0	0	2	2	0
D-12	Bascaran	2,655	521	18	0	0	1	3	0
D-13	Talahib	526	103	0	0	0	0	1	0
D-14	Namantao	1,169	216	10	0	2	3	2	0
D-15	San Vicente Pequeño	192	39	0	0	0	4	0	0
D-16	Maopi	817	163	5	0	0	2	1	0
D-17	Anislag	2,804	519	0	0	0	4	2	0
D-18	Canaron	448	80	0	0	0	1	2	0
D-19	San Ramon	1,337	257	2	0	0	10	1	0
D-20	Mayon	1,171	209	6	0	0	3	2	0
D-21	San Rafael	260	46	0	0	0	1	2	0
	(Sub-Total)	21,777	4,141	162	0	2	61	31	3
	(Total)	51,563	9,638	373	0	4	124	58	4

Note : 1/ Estimated in 1995  
 2/ Sourced by PPDO, Albay & Interviews  
 3/ Sourced by DPWII, Albay

Table E.1.5 Level-II and III Water Supply Facilities

Level of Facility	Level - II				Level - III	
	4 systems				1 system	
	Camalig		Daraga		Camalig	
Total No. of Systems						
Municipality						
Barangay	Gotob	Taladong	Inarado	Gabawan	Gapo	Ilawod
Population in Service Area	491	1,010	1,503	1,233	1,280	2,682
Total Population Served	149	286	369	94	354	770
Service Connections						
- No. of households in service area	91	200	298	239	733	487
- No. of individual connections	19	48	20	1	472	133
- No. of communal faucets	4	2	8	2	4	3
- No. of households served	27	52	67	17	492	148
Water Supply Aspects						
- Construction year	1989	1989	1989	1989	: 1930	
- Source of water	Spring	Spring	Spring	Spring	: 3 springs, 6/	
- Capacity of source (lit/sec), 1/	1.0	2.0	1.0	1.0	: 1,827 m <sup>3</sup> /day	
- Total length of main (m), 1/	1,000	2,700	2,500	700	: 5,000 m	
- Intake tank	4	1	4	2	3	
- Reservoir tank	1	2	1	1	0	
Operation and Maintenance						
- In charge	RWSA.4/	Bgy. Council	RWSA.4/	Bgy. Council	: Camalig Water District	
- Water charge / Tariff					: Water Rate for Residential	
(Individual connection) (P/M/C), 2/	15	15	25	0, 5/	- Flat Rate : 24.0 Pesos/month	
(Communal faucet) (P/M/H), 3/	10	15	5	0, 5/	- 11-20 m <sup>3</sup> : 2.4 Pesos/m <sup>3</sup>	
					- 21-30 m <sup>3</sup> : 2.9 Pesos/m <sup>3</sup>	
					- 31 m <sup>3</sup> over : 3.5 Pesos/m <sup>3</sup>	

Source : DPWH, Interview with the barangay people by the Study team

Note : 1/ Figures by estimation, interviewing

2/ P/M/C (Pesos/month/connection)

3/ P/M/H (Pesos/month/household)

4/ RWSA (Rural Water Works and Sanitation Association)

5/ No regular collection of water charge

6/ located in the barangays of Quirangay, Salugan, Sumlang

**Table E.1.6 BWSA Organization & Facilities**

Code	Barangay	Organized BWSA, 1/	Date Organized	BWSA Facilities			Total
				SW, 3/	DW, 4/	Rehab., 5/	
<b>Municipality : Camalig</b>							
C-1	Quirangay	-	2/	0	0	0	0
C-2	Salugan	○	Oct. '92	0	1	0	1
C-3	Gapo	-	2/	0	0	0	0
C-4	Poblacion	-	2/	0	0	0	0
C-5	Tinago	○	Oct. '92	2	0	0	2
C-6	Ilawod	○	Oct. '92	2	1	1	4
C-7	Libod	○	Oct. '92	2	1	0	3
C-8	Ligban	○	Oct. '94	2	0	0	2
C-9	Tagaytay	○	Oct. '94	2	1	0	3
C-10	Gotob	○	2/	0	0	0	0
C-11	Baligang	○	Oct. '92	1	1	1	3
C-12	Tagoytoy	○	Oct. '94	2	0	1	3
C-13	Taladong	-	2/	0	0	0	0
C-14	Binitayan	○	Oct. '94	2	0	0	2
C-15	Comun	○	Oct. '92	1	0	0	1
C-16	Bongabong	○	Oct. '94	2	0	0	2
C-17	Cotmon	○	Oct. '92	0	1	0	1
C-18	Del Rosario	○	Oct. '92	1	2	0	3
C-19	Panoypoy	○	Oct. '94	1	0	0	1
C-20	Magogon	○	Oct. '94	1	0	0	1
(Sub-total No. of BWSA)		15		21	8	3	32
(% of Organized BWSA)		75	%				
<b>Municipality : Daraga</b>							
D-1	Inarado	○	Oct. '92	1	1	0	2
D-2	Gapo	○	Oct. '94	1	0	0	1
D-3	De La Paz	○	Oct. '94	0	0	1	1
D-4	Dinoronan	○	Oct. '94	1	0	1	2
D-5	Peña Francia	○	Oct. '92	0	1	1	2
D-6	Alobo	○	Oct. '92	1	1	0	2
D-7	Tabon-Tabon	○	Oct. '92	0	1	0	1
D-8	Gabawan	○	Oct. '92	1	0	0	1
D-9	Mabini	○	Oct. '92	1	0	1	2
D-10	Kinawitan	○	Oct. '92	1	1	0	2
D-11	Burgos	○	Oct. '92	1	0	0	1
D-12	Bascaran	○	Oct. '94	0	1	2	3
D-13	Talahib	○	Oct. '94	0	1	0	1
D-14	Namantao	○	Oct. '92	0	1	0	1
D-15	San Vicente Pequeño	○	Oct. '94	1	0	1	2
D-16	Maopi	○	Oct. '92	1	0	0	1
D-17	Anislag	○	Oct. '92	2	1	0	3
D-18	Canaron	○	Oct. '94	1	1	0	2
D-19	San Ramon	○	Oct. '92	2	0	1	3
D-20	Mayon	○	Oct. '92	1	1	0	2
D-21	San Rafael	○	Oct. '94	1	1	0	2
(Sub-total No. of BWSA)		21		17	12	8	37
(% of Organized BWSA)		100	%				
(Total No. of BWSA)		36		38	20	11	69
(% of Organized BWSA)		88	%				

Source : DILG - Albay

Note : 1/ BWSA (Barangay Waterworks and Sanitation Association) under the FW4SP

(First Water Supply, Sewerage and Sanitation Sector Project) funded by World Bank.

2/ Not yet organized

3/ SW (Shallow well), 4/ DW ( Deep well), 5/ Rehab. (Rehabilitation of existing well)

Table E.1.7 Water Supply Service Coverage

Code	Harangay	Total Population	Total Household	Private 1/				Public 2/				Level - II 3/			Level - II 4/		Total Coverage (%)	
				No. of Wells		Spring		No. of Wells		Spring		No. of Indivi. Conn.	No. of Pop. Served	No. of Indivi. Conn.	No. of Pop. Served	Total Pop. Served		
				SW	DW	Dev.	Spring	SW	DW	Dev.	Spring							Pop. Served
<b>Municipality - Camalig</b>																		
C-1	Quirangay	2,047	375	0	0	0	1	424	0	0	0	0	0	0	0	0	424	21
C-2	Salugan	1,584	278	3	0	0	13	13	0	4	0	0	212	0	0	0	225	14
C-3	Capo	2,340	261	0	0	0	1	85	1	0	0	0	53	0	0	53	281	39
C-4	Poblacion	3,720	666	64	0	0	0	271	0	0	0	0	0	4	106	472	2,502	77
C-5	Tinago	1,825	237	21	0	0	0	89	2	1	0	0	159	0	0	0	248	19
C-6	Ilawod	2,682	506	6	0	0	25	4	2	0	0	0	318	3	80	133	705	42
C-7	Libod	2,600	433	10	0	0	42	0	6	4	0	0	510	0	0	0	572	22
C-8	Liguan	636	125	11	0	0	0	47	5	1	0	0	318	0	0	0	365	57
C-9	Tagaytay	2,108	398	10	0	0	42	0	5	2	0	0	371	0	0	0	413	20
C-10	Coimb	491	96	13	0	0	55	2	0	0	0	106	10	4	265	0	426	87
C-11	Balgang	2,913	511	17	0	0	72	4	2	0	0	318	0	0	0	0	390	13
C-12	Tagovicy	566	109	1	0	0	4	4	2	2	0	0	212	0	0	0	216	38
C-13	Taladong	1,010	206	7	0	0	30	0	5	2	1	477	25	2	207	0	713	71
C-14	Buntayan	418	75	5	0	0	21	5	0	0	0	265	0	0	0	0	286	68
C-15	Comun	1,185	224	15	0	0	64	8	0	0	0	424	0	0	0	0	488	41
C-16	Bongabong	685	109	9	0	0	38	4	0	0	0	212	0	0	0	0	250	37
C-17	Comon	2,285	439	9	0	0	38	2	3	0	0	265	0	0	0	0	303	13
C-18	Del Kosano	740	159	3	0	0	13	1	2	0	0	159	0	0	0	0	172	22
C-19	Panopyoy	965	197	5	0	0	21	3	1	0	0	212	0	0	0	0	233	24
C-20	Magogon	496	89	2	0	0	8	4	1	0	0	265	0	0	0	0	273	55
(Sub-total / Average)		29,786	5,497	211	0	2	1,403	63	27	1	4,876	35	16	737	658	3,487	10,504	35
<b>Municipality - Daraga</b>																		
D-1	Tinardo	1,503	301	60	0	0	254	8	1	0	382	29	4	255	0	0	891	59
D-2	Capo	1,608	322	5	0	0	21	4	1	1	297	0	0	0	0	0	318	20
D-3	De-La-Paz	522	107	0	0	0	0	0	2	1	212	0	0	0	0	0	212	41
D-4	Duronan	295	66	6	0	0	25	3	1	1	254	0	0	0	0	0	280	95
D-5	Pera Francia	1,628	258	0	0	0	0	0	2	0	85	0	0	0	0	0	85	5
D-6	Alobo	559	100	28	0	0	119	3	2	0	212	0	0	0	0	0	331	59
D-7	Talbon-Talbon	1,322	259	1	0	0	4	1	2	0	127	0	0	0	0	0	131	10
D-8	Gabawan	1,233	224	10	0	0	42	4	1	0	212	2	5	382	0	0	636	52
D-9	Mabini	452	94	8	0	0	34	3	0	0	127	0	0	0	0	0	161	36
D-10	Kunawitan	435	95	0	0	0	0	2	2	0	170	0	0	0	0	0	170	39
D-11	Burgos	841	162	3	0	0	13	2	2	0	170	0	0	0	0	0	182	22
D-12	Basaran	2,655	521	18	0	0	76	1	3	0	170	0	0	0	0	0	246	9
D-13	Talabih	526	103	0	0	0	0	0	1	0	42	0	0	0	0	0	42	8
D-14	Namanlao	1,169	216	10	0	0	2	44	3	2	0	212	0	0	0	0	256	22
D-15	Sao Vicente Pequeho	192	39	0	0	0	0	0	4	0	0	0	0	0	0	0	170	88
D-16	Maopi	817	163	5	0	0	21	2	1	0	127	0	0	0	0	0	148	18
D-17	Anislag	2,804	519	0	0	0	0	0	4	2	0	254	0	0	0	0	254	9
D-18	Canaron	448	80	0	0	0	0	0	1	2	0	127	0	0	0	0	127	28
D-19	Sao Ramon	1,337	257	2	0	0	8	10	1	0	466	0	0	0	0	0	475	36
D-20	Mayon	1,171	209	6	0	0	25	3	2	0	212	0	0	0	0	0	237	20
D-21	San Rafael	260	46	0	0	0	0	1	2	0	127	0	0	0	0	0	127	49
(Sub-total / Average)		21,777	4,141	162	0	2	688	61	31	3	4,155	31	9	636	0	0	5,480	25
(Total / Average)		51,563	9,638	373	0	4	2,092	124	58	4	9,031	66	25	1,373	658	3,487	15,984	31

Source: 1/ PPDO, Albay, 2/ DPWH, Albay, 3/ DPWH, Albay and interview, 4/ Camalig Water District

Note: Following assumptions are used based on the field survey by the Study team.  
 (i) Average household size = 5.3 persons  
 (ii) A private well serves one household each.  
 (iii) A public well serves 10 households each.  
 (iv) A individual connection serves one household each.  
 (v) A communal faucet serves 5 to 14 households each. (interviewed data)  
 (vi) Population Served = No. of wells x average household size x average household per well  
 (vii) No. of wells = actual no. of well x connection factor  
 (viii) Correction factor = 0.80 (to correct for number of non-operational & operational but not potable well)

**Table E.1.8 Status of Electrification**

Code	Barangay	Total Households	Energized Barangay	Date Energized	No. of House Connections	(%)
<b>Municipality : Camalig</b>						
C-1	Quirangay	379	-		0	
C-2	Safugan	278	○	Feb.'77	8	3
C-3	Gapo	261	○	Feb.'77	40	15
C-4	Poblacion	666	○	Feb.'77	517	78
C-5	Tinago	237	○	Feb.'77	73	31
C-6	Ilawod	506	○	Feb.'77	280	55
C-7	Libod	433	○	Feb.'87	140	32
C-8	Ligban	125	○	Feb.'87	88	70
C-9	Tagaytay	398	○	Feb.'77	230	58
C-10	Gotob	96	○	Feb.'77	3	3
C-11	Baligang	511	○	Dec.'79	210	41
C-12	Tagoytoy	109	-		0	
C-13	Taladong	206	○	Feb.'77	140	68
C-14	Binitayan	75	-		0	
C-15	Comun	224	○	Dec.'79	111	50
C-16	Bongabong	109	-		0	
C-17	Cotmon	439	○	Dec.'79	135	31
C-18	Del Rosario	159	○	May '80	49	31
C-19	Panoytoy	197	○	Apr. '82	31	16
C-20	Magogon	89	-		0	0
(Sub-total No. of Energized Barangays) =			15	(Sub-total HCs) =	2,055	
(% of Energized Barangays) =			75	(Average % of HCs) =	37	
<b>Municipality : Daraga</b>						
D-1	Inarado	301	○	Apr. '83	123	41
D-2	Gapo	322	○	Feb. '93	64	20
D-3	De La Paz	107	○	Mar. '92	43	40
D-4	Dinoronan	66	○	Feb. '92	43	65
D-5	Peña Francia	258	○	Dec. '81	96	37
D-6	Alobo	100	-		0	
D-7	Tabon-Tabon	259	○	Dec. '81	91	35
D-8	Gabawan	224	○	Oct. '87	72	32
D-9	Mabini	94	-		0	
D-10	Kinawitan	95	○	Apr. '82	20	21
D-11	Burgos	162	○	Oct. '94	127	78
D-12	Bascaran	521	○	Dec. '81	193	37
D-13	Tatahib	103	-		0	
D-14	Namantao	216	○	Jul. '80	91	42
D-15	San Vicente Pequeño	39	-		0	
D-16	Maopi	163	○	Dec. '94	30	18
D-17	Anislag	519	○	Jul. '80	225	43
D-18	Canarom	80	-		0	
D-19	San Ramon	257	○	Aug. '94	12	5
D-20	Mayon	209	○	Jul. '80	59	28
D-21	San Rafael	46	-		0	
(Sub-total No. of Energized Barangays) =			15	(Sub-total HCs) =	1,289	
(% of Energized Barangays) =			71 %	(Average % of HCs) =	31	
(Study Area Total No. of Energized Barangays) =			30	(Total HCs) =	3,344	
(% of Energized Barangays) =			73 %	(Average % of HCs) =	35	
Province / Municipality	Covered Barangay	Energized Barangay	(%) of Energized Barangays	Total Households	House Connections	(%) of House Connections
Albay	719	483	67	153,847	95,171	62
Daraga	54	41	76	15,551	11,659	75
Camalig	50	34	68	9,216	4,883	53

Source : Albay Electric Cooperation Inc. (ALECO), Monthly Report August, 1995

Table E.1.9 Jeepney Routes

No.	Route		Distance (km)	No. of Authorized Units	Fare Rate, 3/ (Pesos/ Passenger)	Actual, 4/ Fare Rate (Pesos/Passenger)
	Origin (Project Area)	Destination (Out of the Project Area) (Via)				
1	Inarado (Daraga)	- Legazpi City Malabog, 1/	15	1	5.10	7.00 5/
2	Inarado (Daraga)	- Legazpi City Peña Francia	13	5	4.40	5.50
3	Maopi (Daraga)	- Legazpi City Daraga	18	2	6.20	8.00
4	San Ramon (Daraga)	- Legazpi City Daraga	20	3	6.90	8.00
5	San Ramon (Daraga)	- Daraga	15	1	5.10	6.00
6	Anislag (Daraga)	- Legazpi City Daraga	16	23	5.50	5.50
7	Anislag (Daraga)	- Daraga	11	3	3.70	3.50
8	Kiwalo, 1/ (Daraga)	- Daraga Gabawan	8	1	2.60	1.50 6/
9	Burgos (Daraga)	- Daraga	8	1	2.60	4.00
10	Kinawitan (Daraga)	- Daraga	12	1	4.00	4.50
11	Canarom (Daraga)	- Daraga Anislag	15	1	5.10	10.00
12	San Vicente Grande, 1/ (Daraga)	- Daraga San Ramon, Mayon	25	1	8.70	10.00
13	Alobo, 2/ (Daraga)	- Daraga	10	1	3.30	5.00
14	Comon (Camalig)	- Legazpi City Camalig, Daraga	23	14	8.00	9.00
15	Magogon (Camalig)	- Daraga Maopi, Anislag	15	1	5.10	12.00
16	Panoyoy (Camalig)	- Daraga Camalig	14	4	4.70	7.50
17	Camalig (Camalig)	- Legazpi City Daraga	14	24	4.70	5.00
				(Total No. of Units Operating in the Project Area)	87	
18	Daraga, 1/ (Daraga)	- Legazpi City	5	230	1.50	2.00

Source : LTRFB (Land Transportation Franchising & Regulatory Board) Regional Office No.V.

Department Transportation and Communications

Note : 1/ Out of the Study Area

2/ Under the applying procedure for the authorization of operation by LTRFB

3/ Approved Fare Rate - 1.50 Pesos for minimum of first five (5) km and 0.36 Pesos/km for succeeding KMS

4/ Actual Fare Rate : Because of the poor road conditions in the remote area, they charge a little higher fare compared to the official rate. (Dry Season only)

5/ Actual Destination up to Lacag

6/ Actual Destination up to junction of national road & Gabawan

**Table E.1.10 Inventory of Schools**

Code	Barangay	Name of School, 1/	Elementary			Name of School, 2/	Secondary		
			No. of Students	No. of Teachers	No. of Classrooms		No. of Students	No. of Teachers	No. of Classrooms
<b>Municipality : Camalig</b>									
C-1	Quirangay	Quirangay ES	386	10	10				
C-2	Salugan	Camalig North ES	1,262	37	33				
C-3	Gapo	-	-	-	-	St. John's Acad., 3/	582	13	13
C-4	Poblacion	-	-	-	-				
C-5	Tinago	-	-	-	-				
C-6	Ilawod	Camalig South CS	646	21	22				
C-7	Libod	Libod ES	369	9	10				
C-8	Ligban	-	-	-	-				
C-9	Tagaytay	Tagaytay ES	180	6	7				
C-10	Gotob	Gotob ES	130	3	3				
C-11	Baligang	Baligang ES	559	19	20				
C-12	Tagoytoy	Tagoytoy ES	189	6	6				
C-13	Taladong	Taladong ES (Proper)	295	10	14				
		Taladong ES (Interior)	52	2	4				
C-14	Binitayan	-	-	-	-				
C-15	Comun	Comun	299	7	9				
C-16	Bongabong	-	-	-	-				
C-17	Cotmon	Cotmon	403	13	15	Cotmon HS	866	23	21
C-18	Del Rosario	Del Rosario	137	4	10				
C-19	Panoytoy	Panoytoy	191	7	6				
C-20	Magogon	Magogon	105	3	4				
	(Sub-total)	15	5,203	157	173	2	1,448	36	34
	(Teacher/Student Ratio)			1 : 33				1 : 40	
<b>Municipality : Daraga</b>									
D-1	Inarado	Inarado ES	340	10	16				
D-2	Gapo	Gapo ES	239	6	12				
D-3	De La Paz	De La Paz ES	108	3	3				
D-4	Dinoronan	-	-	-	-				
D-5	Peña Francia	Peña Francia ES	222	6	6				
D-6	Alobo	Alobo ES	74	3	3				
D-7	Tabon-Tabon	Tabon-Tabon ES	360	12	11				
D-8	Gabawan	Gabawan ES	311	7	12				
D-9	Mabini	Mabini ES	83	3	3				
D-10	Kinawitan	Kinawitan ES	63	3	6				
D-11	Burgos	Burgos ES	151	5	9				
D-12	Bascaran	Bascaran ES	389	13	14				
D-13	Tatahib	Tatahib PS	28	1	10				
D-14	Namantao	Namantao ES	238	7	9				
D-15	San Vicente Pequeño	San Vicente Pequeño P	30	1	2				
D-16	Maopi	Maopi ES	154	6	8				
D-17	Anislag	Daraga North CS	599	22	23	Anislag National HS	1,171	45	20
D-18	Canarom	Canarom ES	78	3	3				
D-19	San Ramon	San Ramon ES	178	6	6				
D-20	Mayon	Mayon ES	281	8	7				
D-21	San Rafael	San Rafael PS	20	1	1				
	(Sub-total)	20	3,259	107	133	1	1,171	45	20
	(Teacher/Student Ratio)			1 : 30				1 : 26	
	(Total)	35	8,462	264	306	3	2,619	81	54
	(Average Teacher/Student Ratio)			1 : 32				1 : 32	

Source : DECS, Albay (as of July 1995) and Basic Education data SY 1992-1993

Note : 1/ ES : Elementary School, PS : Primary school, CS : Central School 2/ HS : High School

3/ Private school

**Table E.I.11 Activities & Facilities for Rural Health Care**

Key Station, 1/ Barangay	Catchment, 2/ Barangay	Staff assigned		Frequency of visits by RHM	Remark	
			BHS, 3/		Population	Household
<b>Municipality : Camalig</b>						
1	Poblacion		RHM, 4/	MHO	Daily	3,730 666
	1-1 Tinago				1 / month	1,325 237
	1-2 Libod				2 / month	2,600 433
2	Quirangay		RHM	○	2 / week	2,047 379
	2-1 Salugan			-	2 / week	1,584 278
3	Gapo		RHM	-	2 / week	1,280 261
	3-1 (Sunlang), 5/			-	2 / week	- -
4	Ilawod		RHM	-	3 / week	2,682 506
	4-1 Ligban			-	1 / week	636 125
	4-2 Tagaytay			-	1 / week	2,108 398
	4-3 Gotob			-	1 / week	491 96
5	Baligang		RHM	○	3 / week	2,913 511
	5-1 Tagoytoy			-	2 / week	566 109
	5-2 Taladong			○	3 / week	1,010 206
	5-3 (Mina), 5/			-	2 / month	- -
6	Comun		RHM	○	3 / week	1,185 224
	6-1 Binitayan			-	2 / week	418 75
	6-2 Cotmon			○	2 / week	2,285 439
	6-3 Bongabong			-	2 / month	685 109
7	Del Rosario		RHM	○	3 / week	780 159
	7-1 Panoytoy			-	1 / week	965 197
	7-2 Magogon			-	2 / week	496 89
	7-3 (Manirifa), 5/			-	1 / week	- -
<b>Municipality : Daraga</b>						
1	Inarado		RHM	○	6/	1,503 301
	1-1 Gapo			-	6/	1,608 322
	1-2 Alobo			-	6/	559 100
2	Peña Francia		RHM	○	6/	1,628 258
	2-1 De La Paz			-	6/	522 107
	2-2 Dinoronan			-	6/	295 66
	2-3 Gabawan			-	6/	1,233 224
3	Bascaran		RHM	○	3 / week	2,655 521
	3-1 Tabon-Tabon			-	1 / week	1,322 259
	3-2 Mabini			-	2 / month	452 94
	3-3 Kinawitan			-	1 / month	435 95
	3-4 Burgos			-	3 / month	841 162
	3-5 Talahib			-	2 / month	526 103
4	Maopi		RHM	○	6/	817 163
	4-1 San Vicente Pequeño			-	6/	192 39
5	Anislag		RHM	○	6/	2,804 519
	5-1 Namantao			-	6/	1,169 216
	5-2 (Villahermosa), 5/			-	6/	- -
6	San Ramon		RHM	○	2 / week	1,337 257
	6-1 Canaron			-	1 / month	448 80
	6-2 Mayon			-	2 / month	1,171 209
	6-3 (Bigao), 5/			-	1 / week	- -
7	(Sn. Vicente Grande), 5/		RHM	○	2 / week	- -
	7-1 San Rafael			-	1 / week	260 46

Source : MHO (Municipal Health Offices of Camalig and Daraga)

Note : 1/ Total numbers of Key Stations are 13 in Camalig and 22 in Daraga municipalities.

2/ Covered by related Key Stations

3/ BHS : Barangay Health Station

4/ RHM : Rural Health Midwife

5/ Outside of the Study area

6/ Not available data, but seems to be the same figures as the other stations.



**Table E.1.12 Inventory of Other Social Infrastructure Facilities**

Code	Barangay	School		BHIS, 1/	Barangay Hall	Multi-Purp. Hall	Telephone Office	Post Office	Telegraph / PLECS, 2/
		Elementary	Secondary						
<b>Municipality : Camalig</b>									
C-1	Quirangay	1	0	1	1	1	0	0	0
C-2	Salugan	1	0	0	1	1	0	0	0
C-3	Gapo	0	0	0	1	1	0	0	0
C-4	Poblacion	0	1	1, 4/	7, 5/	2	0, 6/	1, 7/	1, 8/
C-5	Tinago	0	0	0	1	1	0	0	0
C-6	Hawod	1	0	0	1	1	0	0	0
C-7	Libod	1	0	0	1	1	0	0	0
C-8	Ligban	0	0	0	1	1	0	0	0
C-9	Tagaytay	1	0	0	1	1	0	0	0
C-10	Gotob	1	0	0	0	1	0	0	0
C-11	Baligang	1	0	1	1	1	0	0	0
C-12	Tagoytoy	1	0	0	0	1	0	0	0
C-13	Taladong	2, 9/	0	1	1	1	0	0	0
C-14	Binitayan	0	0	0	1	1	0	0	0
C-15	Comun	1	0	1, 4/	1	1	0	0	0
C-16	Bongabong	0	0	0	0	1	0	0	0
C-17	Cotmon	1	1	1, 4/	1	1	0	0	0
C-18	Del Rosario	1	0	1, 4/	1	1	0	0	0
C-19	Panoyoyoy	1	0	0	0	1	0	0	0
C-20	Magogon	1	0	0	1	1	0	0	0
	(No. of Sub-total)	15	2	7	22	21	0	1	1
	(% of Sub-total)	71			85				
<b>Municipality : Daraga</b>									
D-1	Inarado	1	0	1	1	1	0	0	0
D-2	Gapo	1	0	0	1	1	0	0	0
D-3	De La Paz	1	0	0	1	1	0	0	0
D-4	Dirononan	0	0	0	1	1	0	0	0
D-5	Peña Francia	1	0	1	1	1	0	0	0
D-6	Alobo	1	0	0	1	1	0	0	0
D-7	Tabon-Tabon	1	0	0	1	1	0	0	0
D-8	Gabawan	1	0	0	1	1	0	0	0
D-9	Mabini	1	0	0	1	1	0	0	0
D-10	Kinawitan	1	0	0	1	1	0	0	0
D-11	Burgos	1	0	0	1	1	0	0	0
D-12	Bascaran	1	0	1	1	1	0	0	0
D-13	Talahib	1	0	0	0	1	0	0	0
D-14	Namantao	1	0	0	1	1	0	0	0
D-15	San Vicente Poqueño	1	0	0	1	1	0	0	0
D-16	Maopi	1	0	1	1	1	0	0	0
D-17	Anislag	1	1	1, 3/	1	1	0	0	0
D-18	Canarom	1	0	0	1	1	0	0	0
D-19	San Ramon	1	0	1	1	1	0	0	0
D-20	Mayon	1	0	0	1	1	0	0	0
D-21	San Rafael	1	0	0	1	1	0	0	0
	(No. of Sub-total)	20	1	6	20	21	0	0	0
	(% of Sub-total)	95			95				
	(No. of Total)	35	3	13	42	42	0	1	1
	(% of Total)	85			89				

Source : Municipal Offices of Daraga and Camalig

Note : 1/ BHIS, Barangay Health Station

2/ PLECS : Provincial Law Enforcement Communication System

3/ Multipurpose building, such as combined with BHIS, Bgy. Hall, Day Care etc.

4/ MHO - Municipal Health Office,

5/ Poblacion consists of seven (7) barangays (Barangay -1 to 7), and each barangay has one (1) barangay hall

6/ A private telephone company will start its operation in 1996

7/ Bureau of Post, Provincial Communication Office (PCO), Department of Transportation and Communications (D

8/ Telecommunication Office, PCO, DTC

9/ Proper Elementary School and Interior Elementary School

**Table E.2.1 Responsible Authorities for Roads and Bridges**

Category	Authority	Implementing Agency	Related Authority	Program/Activity	Source of Funds	Remarks
<b>I. Annual Road Development Program</b>						
(1) National Road	DPWH 1/	DPWH-RO 3/	-	Infrastructure Program (i) Construction, Improvement & Rehabilitation (ii) Maintenance	Foreign Local-National Foreign Local-National	General Appropriations Act General Appropriations Act
(2) Provincial Road	LCU 2/	LGU-PEO 4/	LCU-PPDO 6/	Infrastructure Program (i) Construction, Improvement & Rehabilitation (ii) Maintenance	Local-Provincial Local-Provincial	20% IRA Share of Province 9/ (Rule V, Art. 25 Local Gov't Code)
(3) Municipal Road	LGU	LGU-MEO 5/	LGU-MPDO 7/	Infrastructure Program (i) Construction, Improvement & Rehabilitation (ii) Maintenance	Local-Municipal Local-Municipal	20% IRA Share of Municipality 9/ (Rule V, Art. 25 Local Gov't Code)
(4) Barangay Road	LCU	LGU-Barangay	LCU-MEO LGU-MPDO	Infrastructure Program (i) Maintenance	Local-Barangay	20% IRA Share of Barangay 9/ (Rule V, Art. 25 Local Gov't Code)
<b>II. Special Road Development Program</b>						
8/	DPWH	DPWH-RO	LGU	Infrastructure Program (i) Construction, Improvement & Rehabilitation	Foreign	Probable Rural Development Component

Note:  
 1/ Department of Public Works & Transportation  
 2/ Local Government Unit  
 3/ Regional Office  
 4/ Provincial Engineer Office  
 5/ Municipal Engineer Office  
 6/ Provincial Planning & Development Office  
 7/ Municipal Planning & Development Office  
 8/ All Roads & Bridges Category  
 9/ Internal Revenue Allotment

**Table E.3.1 Medium-Term Investment Plan for Rural Road Network 1995 - 1999 (1/2)**

Priority Activity	Total, 1/ 1992-96	Fiscal Year					Total, 2/ 1995-99
		1995	1996	1997	1998	1999	
(Unit: 1,000 Pesos)							
<b>Municipality Camalig</b>							
<b>I. Municipal/City Roads</b>							
(1) Concreting of Mun./City Road/Street							
- Mun. Processional Sts.		100	100	100	100		400
(2) Asphaltting of Mun./City Road (Pavement)							
- Mun. Sts.	2,800	1,000	1,000	800			2,800
(3) Rehab./Improve. of Mu./City Road							
- Mun. Processional Sts.	500	50	75	100	125	150	500
- Mun. Sts.	500	50	75	100	125	150	500
(4) Reopening/Const. of Mun. Streets							
- Mun. streets	2,500	500	500	500	500	500	2,500
(Sub-total)	6,300	1,700	1,750	1,600	850	800	6,700
<b>II. Provincial/Barangay Roads</b>							
(1) Rehab./Repair/Improve./Maint. of Provin./Brgy. Road							0
- Brgy. 1 (Libod - Travesia)	4,000	800	800	800	800	800	4,000
- Brgy. 7 (Gapo - Sumlang)	4,000	800	800	800	800	800	4,000
- Caguiba - Calabidongan	4,000	800	800	800	800	800	4,000
- Caguiba - Pariaan	2,500	500	500	500	500	500	2,500
- Comon - Binitayan	2,000	400	400	400	400	400	2,000
- Comon - Solong	4,500	900	900	900	900	900	4,500
- Ilufuan - Manawan - Quinartelan	6,000	1,200	1,200	1,200	1,200	1,200	6,000
- Maninila - Del Rosario	2,000	400	400	400	400	400	2,000
- Panoytoy - Magogon	3,000	600	600	600	600	600	3,000
- Pariaan - Binanderahan - Quitinday	6,000	1,200	1,200	1,200	1,200	1,200	6,000
- Pob. - Qurangay - Sua - Tumpa	4,000	800	800	800	800	800	4,000
- Quitinday - Caguiba	2,000	400	400	400	400	400	2,000
- Taladong - Bongabong - Solong	4,000	800	800	800	800	800	4,000
- Taladong - Tagoytoy - Kituinan - Tinago	8,000	1,600	1,600	1,600	1,600	1,600	8,000
- Taloto - Mabunga	2,000	400	400	400	400	400	2,000
- Taplacon - Solong - Calabidongan	4,000	800	800	800	800	800	4,000
(2) Concreting/Asphaltting of Provincial/Barangay Road							0
- Caguiba - Pariaan	100	60	40				100
- Calzada - Gapo	100	60	40				100
- Comon - Binitayan - Tagaytay - Taladong	550	275	275				550
- Comon - Solong - Calabidongan	500	250	250				500
- Comon - Binitayan	100	60	40				100
- Comon - Solong	100	60	40				100
- Ilawod - Ligban - Gotob	3,000	600	600	600	600	600	3,000
- Ilufuan - Manawan - Quinartelan	500	250	250				500
- Libod - Bariw	3,000	600	600	600	600	600	3,000
- Magogon - Panoytoy - Taloto - Mabunga	500	250	250				500
- Maninila - Del Rosario	100	60	40				100
- Pariaan - Binanderahan - Quitinday - Caguiba	550	275	275				550
- Qurangay - Sua	100	60	40				100
- Sua - Sitio Tinubran	100	60	40				100
- Sua - Tumpa	100	60	40				100
- Tagaytay - Sitio Tondo	100	60	40				100
- Taladong - Bongagong - Solong	650	325	325				650
- Taladong - Tagoytoy	100	60	40				100
- Tinago - Gapo	500	250	250				500
(Sub-total)	72,750	16,075	15,875	13,600	13,600	13,600	72,750
(Total of Municipality)	79,050	17,775	17,625	15,200	14,450	14,400	79,450

Source : PPDO (Provincial Planning Development Office) Albay  
 1/ Local Development Investment Program, Province of Albay 1992 - 1996  
 2/ Priority Sub-Sector Activities, 1995 - 1999

**Table E.3.1 Medium-Term Investment Plan for Rural Road Network 1995 - 1999 (2/2)**

Priority Activity	Total, 1/ 1992-96	Fiscal Year					Total, 2/ 1995-99
		1995	1996	1997	1998	1999	
(Unit: 1,000 Pesos)							
<b>Municipality Daraga</b>							
<b>I. Municipal/City Roads</b>							
(1) Concreting of Mun./City Road/Street							
- Poblacion Mun. Rds. and Sts.		12,000	12,000	8,334	8,334	8,334	49,002
(2) Rehab./Improve. of Mu./City Road							
- Mun. Rds. and Sts.	1,000	100	150	200	250	300	1,000
(Sub-total)	1,000	12,100	12,150	8,534	8,584	8,634	50,002
<b>II. Provincial/Barangay Roads</b>							
<b>(1) Const. of Provin./Brgy. Roads</b>							
- Bafabog - Binitayan	3,000	600	600	600	600	600	3,000
- Balaquer - Binitayan	3,000	600	600	600	600	600	3,000
- Bascaran - Talahib	900	180	180	180	180	180	900
- Binitayan - Kilicao	300	100	100	100			300
- Cabangan - Ibangan - San Vicente Grande	3,000	600	600	600	600	600	3,000
- Gapo - Balinad	300	100	100	100			300
- Gapo - Bascaran - Palanong	1,000	200	200	200	200	200	1,000
- Kiwalo - Bagunbayan	700	140	140	140	140	140	700
- Lacago - Inarado	950	190	190	190	190	190	950
- Lacag - Kidaco	950	190	190	190	190	190	950
- Malabog - Lacag	3,000	600	600	600	600	600	3,000
- Matnog - Bañadero - Budiao - Salvacion	3,000	600	600	600	600	600	3,000
- Motnog - Mabinit	350	100	100	100	50		350
- Nabasan - Ibaugan - San Vicente Grande	3,000	600	600	600	600	600	3,000
- Pandan - Lacag	350	100	100	100	50		350
- Peña Francia - Kiwalo - Gabawan	900	180	180	180	180	180	900
- Peña Francia - Tabon-Tabon - Bascaran	800	160	150	160	160	160	800
- Salvacion - Matnog	3,000	600	600	600	600	600	3,000
- San Jose - Kidaco	500	100	100	100	100	100	500
- Villahermosa - Banquerohan	900	180	180	180	180	180	900
(2) Rehab./Repair/Improve./Maint. of Provin./Brgy. Road							0
- Balaguer St.	500	100	100	100	100	100	500
- Balinad - Kimantong	500	100	100	100	100	100	500
- Bongalong - Kidaco - Balinad	950	190	190	190	190	190	950
- Maopi - San Vicente Pequeno - Magogon	950	190	190	190	190	190	950
- Peña Francia St.	250	100	100	50			250
(3) Concreting/Asphalting of Provincial/Barangay Road							0
- Anislag - Canarom	4,000	800	800	800	800	800	4,000
- Malabog old road	750	150	150	150	150	150	750
(Sub-total)	37,800	7,750	7,750	7,700	7,350	7,250	37,800
(Total of Municipality)	38,800	19,850	19,900	16,234	15,934	15,884	87,802

Source : PPDO (Provincial Planning Development Office) Albay

1/ Local Development Investment Program, Province of Albay 1992 - 1996

2/ Priority Sub-Sector Activities, 1995 - 1999

**Table E.3.2 Prioritization for Rural Road Improvement Plan**

Name of Road Section / Location	Length (km)			No of Brgy. /	Population		Evaluation Factor, <i>M</i>				Evaluation (Total Points)
	Total	Provincial Road	Brgy. Road		<i>N</i>	Pop. / <i>A</i>	Jeepcy Route, <i>S</i>	Conn. <i>6</i> Jeep. Rt.	Conn. <i>7</i> 2 Brgy.	Incr. of Brgy. <i>8</i>	
<b>Municipality : Camalig</b>											
1 Cotmon - Cotmon - Del Rosario - Panoytoy - Magogon	9.7	7.2	2.5	5	6,083	6	5	0	0	0	11
2 Cotmon - Manila - Taplacon - Taloto	7.0	7.0	0.0	4	3,206	4	5	0	0	0	9
3 Tagaytay - Bariw - Palanog - Ibuluan	7.3	7.3	0.0	4	5,203	6	2	0	0	0	8
4 Baligang - Caguiba - Pariaan	6.9	6.9	0.0	3	3,205	4	3	0	0	0	7
5 Hawed - Lighan - Gotob - Taladong	5.5	0.0	5.5	3	1,648	2	2	3	0	0	7
6 Quirangay - Sus - Tumpa - (Guinobatan Bldy.)	4.3	4.3	0.0	3	4,091	5	2	0	0	0	7
7 Baligang - Bantonan	0.9	0.9	0.0	1	550	1	2	3	0	0	6
8 Libod - Bariw	2.2	2.2	0.0	1	2,410	3	0	0	2	0	5
9 Pariaan - Manawan - Quinartulan	3.5	3.5	0.0	2	1,650	2	0	3	0	0	5
10 Salugan - Anoling	3.1	3.1	0.0	1	1,522	2	0	3	0	0	5
11 Binitayan - Inarado (Daraga)	0.7	0.0	0.7	1	452	1	0	3	0	0	4
12 Caguiba - Calabidongan	2.3	0.0	2.3	1	758	1	0	3	0	0	4
13 Cotmon - Solong	3.0	0.0	3.0	1	456	1	0	3	0	0	4
14 Ibuluan - Manawan	2.8	0.0	2.8	1	813	1	0	3	0	0	4
15 Pariaan - Binandirahan	3.3	0.0	3.3	2	769	1	0	3	0	0	4
16 Taladong - Bongabong	0.9	0.0	0.9	1	755	1	0	3	0	0	4
17 Taladong - Mina	1.5	0.0	1.5	1	602	1	0	3	0	0	4
18 Taladong - Tagoytoy	2.8	0.0	2.8	1	692	1	0	3	0	0	4
19 Taloto - Mabunga	1.3	0.0	1.3	1	118	1	0	3	0	0	4
20 Semdang - Internal of the barangay Semdang	1.0	0.0	1.0	0	-	0	2	0	0	1	3
21 Bantonan - Palunog	2.9	0.0	2.9	0	-	0	0	0	2	0	2
22 Bongabon - Calabidongan - Solong - Taplacon	5.2	0.0	5.2	0	-	0	0	0	2	0	2
23 Caguiba - Quinday	4.0	0.0	4.0	0	-	0	0	0	2	0	2
24 Quinday - Taloto	3.5	0.0	3.5	0	-	0	0	0	2	0	2
25 Talot - Panoytoy	2.8	0.0	2.8	0	-	0	0	0	2	0	2
(Sub-total)	68.4	42.4	46.0								
<b>Municipality : Daraga</b>											
1 Mayon - San Ramon - Bigao - San Vicente Grande	6.9	2.2	4.7	6	4,250	5	5	0	0	0	10
2 Baccaran - Burgos - Mabini - Kinawitan - Panoytoy (Camalig)	6.0	0.0	6.0	4	3,000	4	5	0	0	0	9
3 Malabog - Lacag - Inarado	5.7	3.0	2.7	2	3,470	4	5	0	0	0	9
4 Anislag - Maopi - Magogon (Camalig)	5.0	2.2	2.8	3	1,669	2	5	0	0	0	7
5 Inarado - Alogo - Mabini	5.2	0.0	5.2	2	1,143	2	1	3	0	0	6
6 Peña Francia - Gabawan - Kivato - Bagumbayan	4.4	0.0	4.4	2	1,937	2	3	0	0	0	5
7 Anislag - Canarom	5.3	0.0	5.3	1	518	1	3	0	0	0	4
8 Baccaran - Talabub - Legaspi City Bldy.	2.4	0.0	2.4	1	625	1	0	3	0	0	4
9 Bigao - San Rafael	1.2	0.0	1.2	1	295	1	0	3	0	0	4
10 Maopi - San Vicente Pequeno	1.0	0.0	1.0	1	205	1	0	3	0	0	4
11 Salvacion - Miisi	4.5	0.0	4.5	1	765	1	0	3	0	0	4
12 San Vicente Grande - Ibaogan	2.4	0.0	2.4	1	437	1	0	3	0	0	4
13 San Vicente Grande - Nabasan	2.6	0.0	2.6	1	509	1	0	3	0	0	4
14 Alogo - Kinawitan	1.7	0.0	1.7	1	607	1	0	0	2	0	3
15 Busay - Pandon - Lacag	2.4	0.0	2.4	2	2,848	3	0	0	0	0	3
16 Canarom - Magogon (Camalig)	1.2	0.0	1.2	1	560	1	0	0	2	0	3
17 Canarom - San Rafael	1.8	0.0	1.8	1	295	1	0	0	2	0	3
18 Cullat - Bongalon - Kidaco - Banilad - Peña Francia	5.6	0.7	4.9	3	2,928	3	0	0	0	0	3
19 Nabasan - Ibaogan	4.0	0.0	4.0	1	437	1	0	0	2	0	3
20 Salvacion - Budiao - Bañadero	4.3	4.3	0.0	2	2,765	3	0	0	0	0	3
21 San Rafael - San Vicente Grande	2.1	0.0	2.1	1	795	1	0	0	2	0	3
22 San Ramon - Canarom	2.4	0.0	2.4	1	518	1	0	0	2	0	3
23 Anislag - Internal of the barangay Anislag	1.6	0.0	1.6	0	-	0	0	0	0	1	1
24 Gapo - Internal of the barangay Gapo	2.4	0.0	2.4	0	-	0	0	0	0	1	1
25 Villahermosa - Internal of the barangay Villahermosa	1.7	0.0	1.7	0	-	0	0	0	0	1	1
(Sub-total)	83.8	12.4	71.4								
(Total)	172.2	54.8	117.4								

Note:

- 1/ Number of barangays related the route
- 2/ Number of population related the route
- 3/ Points for evaluation are applied as follows (from 4/ to 8/):
- 4/ Population factor: Points are allocated as the following table.
- 5/ Jeepcy route factor: Points are allocated as the following table.
- 6/ Connecting with the existing jeepcy route, point = 3
- 7/ Connecting with the two (2) barangays, point = 2
- 8/ Barangay roads run internal of the barangay, point = 1

Population Factor						
Population range	< 1,000	1,000 - 1,999	2,000 - 2,999	3,000 - 3,999	4,000 - 4,999	> 5,000
Points	1	2	3	4	5	6

Jeepcy Route Factor		Points
Existing jeepcy route, with more than two (2) units operating		5
Existing jeepcy route, with one (1) unit operating		3
Existing main tricycle route		2
Under the applying procedure for the authorization		1

**Table E.3.3 Proposed Rural Road Network Improvement Plan in the Municipalities of Camalig and Daraga, 1996-2010**

Name of Road Section / Location	Length (km)			Implementation Plan 1996 - 2010						
	Total	Provi. Road	Brgy. Road	1996 - 2000		2001 - 2005		2006 - 2010		
				(km)	(P'000)	(km)	(P'000)	(km)	(P'000)	
<b>Municipality Camalig</b>										
<b>I. Priority Roads (Short Term : 1996 - 2000)</b>										
I-1	Comun - Cotmon - Del Rosario - Panoytoy - Magogon	9.7	7.2	2.5	9.7	24,250	-	-	-	-
I-2	Cotmon - Maninila - Taplacon - Taloto	7.0	7.0	0.0	7.0	17,500	-	-	-	-
I-3	Tagaytay - Bariw - Palanog - Buluan	7.3	7.3	0.0	7.3	18,250	-	-	-	-
I-4	Bahgang - Caguiba - Pariaan	6.9	6.9	0.0	6.9	17,250	-	-	-	-
I-5	Ilawed - Ligban - Gotob - Taladong	5.5	0.0	5.5	5.5	13,750	-	-	-	-
I-6	Quirangay - Sus - Tumpa - (Guinobatan Bdry.)	4.3	4.3	0.0	4.3	10,750	-	-	-	-
	(Sub-total)	40.7	32.7	8.0	40.7	101,750	-	-	-	-
<b>II. Medium Term : 2001 - 2005</b>										
II-1	Bahgang - Bantonan	0.9	0.9	0.0	-	-	0.9	2,250	-	-
II-2	Libod - Bariw	2.2	2.2	0.0	-	-	2.2	5,500	-	-
II-3	Pariaan - Manawan - Quinartilan	3.5	3.5	0.0	-	-	3.5	8,750	-	-
II-4	Salegan - Anoling	3.1	3.1	0.0	-	-	3.1	7,750	-	-
II-5	Binitayan - Inarado (Daraga)	0.7	0.0	0.7	-	-	0.7	1,750	-	-
II-6	Caguiba - Calabidongan	2.3	0.0	2.3	-	-	2.3	5,750	-	-
II-7	Cotmon - Solong	3.0	0.0	3.0	-	-	3.0	7,500	-	-
II-8	Ibuluan - Manawan	2.8	0.0	2.8	-	-	2.8	7,000	-	-
II-9	Pariaan - Binandirahan	3.3	0.0	3.3	-	-	3.3	8,250	-	-
II-10	Taladong - Bongabong	0.9	0.0	0.9	-	-	0.9	2,250	-	-
II-11	Taladong - Mina	1.5	0.0	1.5	-	-	1.5	3,750	-	-
II-12	Taladong - Tagoytoy	2.8	0.0	2.8	-	-	2.8	7,000	-	-
II-13	Taloto - Mabunga	1.3	0.0	1.3	-	-	1.3	3,250	-	-
	(Sub-total)	28.3	9.7	18.6	-	-	28.3	70,750	-	-
<b>III. Long Term : 2006 - 2010</b>										
III-1	Sumlang - Internal of the barangay Sumlang	1.0	0.0	1.0	-	-	-	-	1.0	2,500
III-2	Bantonan - Palanog	2.9	0.0	2.9	-	-	-	-	2.9	7,250
III-3	Bongabon - Calabidongan - Solong - Taplacon	5.2	0.0	5.2	-	-	-	-	5.2	13,000
III-4	Caguiba - Quitinday	4.0	0.0	4.0	-	-	-	-	4.0	10,000
III-5	Quitinday - Taloto	3.5	0.0	3.5	-	-	-	-	3.5	8,750
III-6	Talot - Panoytoy	2.8	0.0	2.8	-	-	-	-	2.8	7,000
	(Sub-total)	19.4	0.0	19.4	-	-	-	-	19.4	48,500
	(Total of Camalig)	88.4	42.4	46.0	-	-	101,750	70,750	19.4	48,500
<b>Municipality Daraga</b>										
<b>I. Priority Roads (Short Term : 1996 - 2000)</b>										
I-1	Mayon - San Ramon - Bigao - San Vicente Grande	6.9	2.2	4.7	6.9	17,250	-	-	-	-
I-2	Bascaran - Burgos - Mabini - Kinawitan - Panoytoy (Camalig)	6.0	0.0	6.0	6.0	15,000	-	-	-	-
I-3	Malabog - Lacag - Inarado	5.7	3.0	2.7	5.7	14,250	-	-	-	-
I-4	Anislag - Maopi - Magogon (Camalig)	5.0	2.2	2.8	5.0	12,500	-	-	-	-
	(Sub-total)	23.6	7.4	16.2	23.6	59,000	-	-	-	-
<b>II. Medium Term : 2001 - 2005</b>										
II-1	Inarado - Aloba - Mabini	5.2	0.0	5.2	-	-	5.2	13,000	-	-
II-2	Peña Francia - Gabawan - Kivalo - Bagumbayan	4.4	0.0	4.4	-	-	4.4	11,000	-	-
II-3	Anislag - Canarom	5.3	0.0	5.3	-	-	5.3	13,250	-	-
II-4	Bascaran - Talahib - Legaspi City Bdry.	2.4	0.0	2.4	-	-	2.4	6,000	-	-
II-5	Bigao - San Rafael	1.2	0.0	1.2	-	-	1.2	3,000	-	-
II-6	Maopi - San Vicente Pequeño	1.0	0.0	1.0	-	-	1.0	2,500	-	-
II-7	Salvacion - Misi	4.5	0.0	4.5	-	-	4.5	11,250	-	-
II-8	San Vicente Grande - Ibaugan	2.4	0.0	2.4	-	-	2.4	6,000	-	-
II-9	San Vicente Grande - Nabasan	2.6	0.0	2.6	-	-	2.6	6,500	-	-
	(Sub-total)	29.0	0.0	29.0	-	-	29.0	72,500	-	-
<b>III. Long Term : 2006 - 2010</b>										
III-1	Aloba - Kinawitan	1.7	0.0	1.7	-	-	-	-	1.7	4,250
III-2	Busay - Pandon - Lacag	2.4	0.0	2.4	-	-	-	-	2.4	6,000
III-3	Canarom - Magogon (Camalig)	1.2	0.0	1.2	-	-	-	-	1.2	3,000
III-4	Canarom - San Rafael	1.8	0.0	1.8	-	-	-	-	1.8	4,500
III-5	Cullat - Bongalon - Kidaco - Bantad - Peña Francia	5.6	0.7	4.9	-	-	-	-	5.6	14,000
III-6	Nabasan - Ibaugan	4.0	0.0	4.0	-	-	-	-	4.0	10,000
III-7	Salvacion - Bofiao - Bahadero	4.3	4.3	0.0	-	-	-	-	4.3	10,750
III-8	San Rafael - San Vicente Grande	2.1	0.0	2.1	-	-	-	-	2.1	5,250
III-9	San Ramon - Canarom	2.4	0.0	2.4	-	-	-	-	2.4	6,000
III-10	Anislag - Internal of the barangay Anislag	1.6	0.0	1.6	-	-	-	-	1.6	4,000
III-11	Gapo - Internal of the barangay Gapo	2.4	0.0	2.4	-	-	-	-	2.4	6,000
III-12	Villahermosa - Internal of the barangay Villahermosa	1.7	0.0	1.7	-	-	-	-	1.7	4,250
	(Sub-total)	31.2	5.0	26.2	-	-	-	-	31.2	78,000
	(Total of Daraga)	83.8	12.4	71.4	-	-	59,000	72,500	31.2	78,000
	(Total of Daraga and Camalig)	172.2	54.8	117.4	-	-	160,750	143,250	126,500	-
	(Total Cost for 1996 - 2010)						430,500			

Note: Tentative unit cost of a 2,500 Pesos / m is applied for the cost estimation, based on PFDO Investment Program and DPWH unit cost.



**Table E.3.5 Projection of Water Supply**

Code	Barangay	Present (1995)			Projection up to 2010				
		Total Population	Total Population Covered	Population Coverage (%)	Projected Population in 2010	Additional Population Covered	Additional Required No. of Deep Wells	Possible Availability , /	Shortfall No. of Deep Wells
<b>Municipality : Camalig</b>									
C-1	Quirangay	2,017	424	21	2,286	1,862	35	15	20
C-2	Sahugan	1,584	225	14	1,769	1,545	29	9	20
C-3	Gapo	1,280	498	39	1,430	931	18	5	13
C-4	Poblacion	3,730	2,879	77	4,166	1,287	24	6	18
C-5	Tinago	1,325	248	19	1,480	1,232	23	7	16
C-6	Ilawod	2,682	1,128	42	2,996	1,868	35	16	19
C-7	Libod	2,600	572	22	2,904	2,332	44	24	20
C-8	Ligban	636	365	57	710	346	7	1	6
C-9	Tagaytay	2,108	413	20	2,355	1,941	37	17	20
C-10	Gotob	491	426	87	548	122	2	1	1
C-11	Baligang	2,913	390	13	3,254	2,864	54	34	20
C-12	Tagoytoy	566	216	38	632	416	8	2	6
C-13	Taladong	1,010	713	71	1,128	415	8	2	6
C-14	Binitayan	418	286	68	467	181	3	1	2
C-15	Comun	1,185	488	41	1,324	836	16	6	10
C-16	Bongabong	685	250	33	765	515	10	2	8
C-17	Cocnon	2,285	303	13	2,552	2,249	42	23	19
C-18	Del Rosario	780	172	22	871	699	13	3	10
C-19	Panoypoy	965	233	24	1,078	845	16	6	10
C-20	Magogon	496	273	55	554	281	5	1	4
<b>Municipality : Daraga</b>									
D-1	Inarado	1,503	891	59	1,679	788	15	3	12
D-2	Gapo	1,608	318	20	1,796	1,478	28	9	19
D-3	De La Paz	522	212	41	583	371	7	1	6
D-4	Dinoronan	295	280	95	329	50	1	1	0
D-5	Peña Francia	1,628	85	5	1,818	1,734	33	13	20
D-6	Alobo	559	331	59	624	294	6	1	5
D-7	Tabon-Tabon	1,322	131	10	1,477	1,345	25	7	18
D-8	Gabawan	1,233	636	52	1,377	741	14	3	11
D-9	Mabini	452	161	36	505	344	6	1	5
D-10	Kinawitan	435	170	37	486	316	6	1	5
D-11	Burgos	841	182	22	939	757	14	3	11
D-12	Bascaran	2,655	246	9	2,965	2,720	51	31	20
D-13	Talahib	526	42	8	588	545	10	2	8
D-14	Namantao	1,169	256	22	1,306	1,050	20	6	14
D-15	San Vicente Pequeño	192	170	88	214	45	1	1	0
D-16	Maopi	817	148	16	913	764	14	3	11
D-17	Anislag	2,804	254	9	3,132	2,877	54	34	20
D-18	Canaron	448	127	28	500	373	7	2	5
D-19	San Ramon	1,337	475	36	1,493	1,018	19	7	12
D-20	Mayen	1,171	237	20	1,308	1,070	20	7	13
D-21	San Rafael	260	127	49	290	163	3	1	2
	(Total)	51,563	15,984	31	57,593	41,609	783	318	465

Note: / Possible Availability : Possible available no. of deep wells to be implemented by both the national/local funds and any other special water supply program funds such as FW4SP

- Possible available no. of deep wells to be implemented in a year in the Project area = 21.22 (wells)
- Total of possible available no. of deep wells to be implemented up to Year 2010 = 318 (wells)
- Possible available no. of wells by barangay up to year 2010 is tentatively allocated based on the additional requirement and coverage

Following assumptions are used based on the data collected by the Study team and " Water Supply, Sewerage and Sanitation Development, 1992 - 2010 in Province of Albay"

- Annual population growth rate in the Project area = 0.74 %
- Target population coverage in 2010 = 100 %
- Deep well construction is applied for future development.



Table E.3.6 Proposed Rural Water Supply Development Plan 1996 - 2010

Code	Barangay	Present (1995)		Projection up to 2010		Implementation Plan 1996 - 2010		Implementation Plan 1996 - 2010	
		Total Population	Population Covered (%)	Projected Population in 2010	Additional Population Covered	Required No. of Deep Wells	Short-term (1996-2000) (Required No. of Wells)	Medium-term (2001-2010) (Required No. of Wells)	Long-term (2006-2010) (Required No. of Wells)
<b>Municipality - Comala</b>									
C-1	Cuatrecasas	2,047	21	2,206	1,662	35	12	12	11
C-2	Salugan	1,564	225	1,769	1,545	29	10	10	9
C-3	Capo	1,240	498	1,430	931	18	6	6	6
C-4	Poblacion	3,790	2,979	4,166	1,287	24	8	8	8
C-5	Tingco	1,323	248	1,480	1,232	23	8	8	7
C-6	Itawod	2,662	1,128	2,904	1,868	35	12	12	11
C-7	Litod	2,600	372	2,904	2,392	44	15	15	14
C-8	Lugban	636	365	710	346	7	3	2	2
C-9	Tagaytay	2,108	413	2,355	1,941	37	13	13	11
C-10	Corob	491	426	548	122	1	1	1	0
C-11	Baligang	2,913	390	3,254	2,864	54	18	18	18
C-12	Tanoytoy	566	216	632	416	8	3	3	2
C-13	Talaong	1,010	713	1,128	415	3	3	3	2
C-14	Buntayan	418	286	467	181	2	2	1	0
C-15	Comun	1,185	488	1,324	836	16	6	6	4
C-16	Bongabong	685	250	785	515	10	4	4	2
C-17	Comon	2,285	303	2,552	2,249	15	5	5	5
C-18	Del Rosario	780	172	871	699	13	5	5	3
C-19	Panoytoy	965	233	1,078	845	16	6	6	4
C-20	Magsaysay	466	275	554	281	5	2	2	1
(Sub-total)		29,786	10,504	33,269	27,166	429	152	150	127
<b>Municipality - Davao</b>									
D-1	Inezuelo	1,500	301	1,679	768	15	5	5	5
D-2	Capo	1,608	318	1,796	1,478	28	10	10	8
D-3	De La Paz	522	212	583	371	7	3	3	1
D-4	Dinorwain	2,595	280	3,299	50	1	1	0	0
D-5	Pela Francia	1,628	85	1,818	1,734	33	11	11	11
D-6	Albino	559	331	624	294	6	3	3	2
D-7	Talibon-Talibon	1,232	131	1,477	1,345	25	9	9	7
D-8	Gobawan	1,233	636	1,377	741	14	5	5	4
D-9	Mabina	452	161	505	344	6	2	2	2
D-10	Kinsarutan	435	170	486	316	6	2	2	2
D-11	Burgon	841	182	939	757	14	5	5	4
D-12	Bucayan	2,655	246	2,965	2,720	51	17	17	17
D-13	Talibiti	526	42	588	345	10	4	4	2
D-14	Namantao	1,169	256	1,306	1,050	20	7	7	6
D-15	San Vicente Pequeño	192	170	214	45	1	1	0	0
D-16	Maopi	817	148	913	764	14	5	5	4
D-17	Anilag	2,804	254	3,132	2,877	54	18	18	18
D-18	Canaran	448	127	500	373	7	3	3	1
D-19	San Ramon	1,337	425	1,493	1,018	19	7	7	5
D-20	Mayon	1,171	257	1,308	1,070	20	7	7	6
D-21	San Rafael	260	127	290	163	3	2	1	0
(Sub-total)		21,777	5,480	24,734	18,843	354	127	123	104
(Total)		51,563	15,984	57,993	41,699	783	279	273	231
(Average No. of Wells per Barangay)						19	7	7	6
(Average of Population Coverage)			31 %				58 %		81 %
(Total Cost : '000 Pesos)					93,522			32,700	27,646

Note: 1/ N/L Fund, National or Local Government Fund  
 2/ Tentative cost for one deep well is applied = 218,000 Pesos / well  
 Following assumptions are used based on the data collected by the Study team and "Water Supply, Sewerage and Sanitation Development Plan 1992-2010 in Province of Albay"  
 - Annual population growth rate in the Project area = 0.74 %  
 - Target population coverage in 2010 = 100 %  
 - Deep well construction is applied for future development.

Table E.4.1 Present Conditions of Water Supply Facilities Level-II

Level-II Water System	Gotob	Taladong	Inarado	Gabawan
1.00 Municipality	Camalig	Camalig	Daraga	Daraga
2.00 Barangay	Gotob	Taladong	Inarado	Gabawan
3.00 Total Population ( Estimated, 1995)	491	1,010	1,503	1,233
4.00 Total Population Served (Estimated, 1996) ( Estimated After Construction )	149 132	286 319	369 545	91 165
<b>5.00 Water Supply System</b>				
5.10 Construction Year	1988	1989	1984, 1989 Improvement	1988
5.20 Funding Source	RWSP, OECE, 1/	RWSP, OECE, 1/	RWSP, OECE, 1/	RWSP, OECE, 1/
5.30 Total Project Cost	P 189,606	No Data	No Data	No Data
5.40 Source of Water				
Type	Spring	Spring	Spring	Spring
Location	Bgy. Gotob	Bgy. Mina	Bgy. Lacag	Bgy. Gabawan
Capacity	No record	No Record	No Record	No Record
Water Rights	None	None	None	None
Discharge, 2/	0.32 l/s (Potential Q=0.16 l/s), 3/	None ( Potential Q=2.67 l/s), 3/	1.10 l/s	0.24 l/s
5.50 Water Supplies Facilities	At Present, July 1996	At Present, July 1996	At Present, July 1996	At Present, July 1996
5.51 Intake Spring Box				
Number	4 units	1 unit	4 units	2 units
Capacity	0.29 cu m	None	0.29 cu m/unit	0.13 cu m/unit
Perimeter Fence	1.89 sq m	52 sq m	none	None
5.52 Reservoir				
Type	Ground Level	Ground Level	Ground Level	Ground Level
Number	1 unit	No. 1	1 unit	1 unit
Capacity	7.20 cu m	5.20 cu m	7.20 cu m	1.0 cu m
Type		Ground Level		
Number		No. 2		
Capacity		12.50 cu m		
5.53 Main Transmission Line				
Pipe Type, Diameter, Length	G.I. D=75mm L=23 m	G.I. D=38mm L=674 m	G.I. D=50, 25 mm L=11 m	G.I. D=50 mm L=6 m
5.54 Distribution Line				
Pipe Type, Diameter, Length	G.I. D=75, 38, 32, 20 mm L=371m PVC D=32, 25, 20 mm L=781m	G.I. D=50, 38, 32, 25 mm L=295m PVC D=102, 50, 38 mm & D=32, 25, 20, 13 mm L=1,735 m	G.I. D=75 mm L=1,130 m PVC D=50 mm L=1,380 m	G.I. D=50 mm L=100 m PVC D=32 mm L=600 m
5.55 Service Connection				
Communal Faucet, Number	4 Units	2 units	8 units	2 units
Number of HH served	8 HH	4 HH	47 HH	15 HH
Individual Faucet, Number	19 units	48 units	20 units	1 unit
Number of HH served	19 HH	48 HH	20 HH	2 HH
5.56 Water Flow Meter	19 units	None	None	None
<b>6.00 Operation &amp; Maintenance</b>				
6.10 Responsible Authority	Gotob RWSA, 4/	Brgy. Council	Inarado RWSA, 4/	Bgy. Council
6.20 Water Charge				
Communal Faucet	P 10/Mo/HH	None	P 5 /HH	None
Individual Faucet	P 15 /Mo/HH	P 15 /mo/HH	P 25 /HH	None
6.30 Periodic Maintenance Schedule	Monthly	None	None	None
6.40 Water Delivery Schedule				
Wet Season	6 am to 8-10 pm	None	None	None
Dry Season	6 am to 11 am 3 pm to 10 pm	None	None	None
6.50 Annual Average O & M Cost	P 500 (materials only)	P 3,500	P 2,000 (materials only)	None
<b>7.00 Water Quality</b>				
7.10 Responsible Authority	Camalig MHO, 5/	Camalig MHO, 5/	Daraga MHO, 5/	Daraga MHO, 5/
7.20 Quality Test Frequency	Monthly	Monthly	Monthly	Monthly
7.30 Results of Test	FHC negative	FHC positive	FHC positive	FHC positive

Note 1/ Rural Water Supply Project

2/ Actual discharge measurement, July 1996 by the Study team

3/ Potential as an additional water source adjoining the existing water source site

4/ Rural Waterworks & Sanitation Association, Inc.

5/ Municipal Health Office

Table E-5.1 Rural Road Upgrading Project

Proposed Road No. Model area	(1)-1		(1)-2		(2)-1		(2)-2		(5)-1		(3)-2		(4)		(5)-1		(5)-2			
	Dam No.2				Camalig				Magogon				San Ramon							
Passing Barangay	Comun	Comun	Comun	Ilawod	Gotob	Anislag	Maopi	Maopi	Maopi	Basaran	Mayon	San Ramon	Basaran	Mayon	San Ramon	Basaran	Mayon	San Ramon		
	-Comun	-Del Rosario	-Panoytoy	-Ligban	-Taladong	-Maopi	-Panoytoy	-Panoytoy	-Panoytoy	-Burgos	-San Ramon	-San Ramon	-Mabini	-Kinawian	-Panoytoy	-Burgos	-San Ramon	-Bigao	-San Vicente	Grande
<b>Present Condition</b> (unit)	1.6	5.4	2.9	2.5	2.2	4.2	4.0	3.6	4.0											
(1) Total length km	1.6	5.4	2.9	2.5	2.2	4.2	4.0	3.6	4.0											
(2) Length by road category km																				
- Provincial road km	1.6	5.4	0.0	0.0	2.2	0.0	0.0	2.2	0.0											
- Barangay road km	0.0	0.0	2.9	2.5	0.0	4.2	4.0	1.4	4.0											
(3) Existing facilities nos.																				
- Bridge nos.	1	1	0	0	0	0	0	0	0											
- Spillway type culvert nos.	0	1	1	1	0	0	1	0	0											
- Box culvert nos.	0	0	0	0	0	0	0	0	0											
- Pipe culvert nos.	0	8	10	4	1	1	1	5	2											
(4) Beneficiaries brgy.																				
- No. of barangay person	4, **/	5,215, */	4,819, **/	933, **/	4, **/	5,082, ***/	821, ***/	4, ***/	4, ***/											
- Beneficial population HH	1,019, */	1,019, */	933, **/	933, **/	821, ***/	821, ***/	821, ***/	821, ***/	821, ***/											
- Beneficial household	4, **/	5,215, */	4,819, **/	933, **/	4, **/	5,082, ***/	821, ***/	4, ***/	4, ***/											
<b>Proposed Upgrading</b> (unit)																				
(1) Width of pavement m	6.1	6.1	4.5	4.5	6.1	4.5	4.5	6.1	4.5											
- Provincial Rd. m	-	-	4.5	4.5	-	4.5	4.5	-	4.5											
- Barangay Rd. nos.	0	1	1	0	0	1	0	0	1											
(2) Bridge nos.																				
(3) Pipe culvert nos.																				
- Replacement (D=0.61) nos.	0	4	2	0	0	2	2	0	2											
- Replacement (D=0.91) nos.	0	0	0	0	0	0	4	0	4											
- Replacement (D=0.91x2) nos.	0	0	0	0	0	0	1	0	1											
- New installation (D=0.61) nos.	3	4	0	1	2	3	3	2	4											
- New installation (D=0.91) nos.	0	1	0	1	0	1	1	0	1											
(4) Side ditch km	3.1	6.0	3.4	2.5	1.2	3.7	3.7	1.2	3.7											

Note: \*/ The road from: Comun to Panoytoy is considered to be one route.  
 \*\*/ The road from Ilawod to Taladong is considered to be one route.  
 \*\*\*/ The road from Anislag to Panoytoy is considered to be one route.  
 \*\*\*\*/ The road from Mayon to San Vicente Grande is considered to be one route.

Table E-5.2 BQ and Direct Construction Costs of Rural Road Upgrading Project

Proposed Road No. Pasaging barangay	(1)		(2)		(3)		(4)		(5)	
	Unit	Unit Price (Pesos)	Qty	Amount (P'000)	Qty	Amount (P'000)	Qty	Amount (P'000)	Qty	Amount (P'000)
(I) Total Length	m		11	7,000	3	5,400	7	6,400	5	7,600
(II) Pipe culvert: RC Pipe (D=0.61)	nos.		1		1		1		1	
: RC Pipe (D=0.91)	nos.		0		0		0		0	
: RC Pipe (D=0.91 x 2)	nos.		1		1		1		0	
(III) Bridge			9,090		5,900		4,890		3,650	
(IV) Side ditch	m									6,850
(A) Road and Culvert										
(1) Earth Works										
- Stripping	m <sup>3</sup>	70	3,150	221	2,430	170	2,880	202	2,565	3,470
- Excavation-B (equipment)	m <sup>3</sup>	50	11,635	582	7,532	378	6,259	313	4,672	8,768
- Excavation-C (equipment/mainpower)	m <sup>3</sup>	98	349	34	111	11	441	43	156	446
- Embankment-B (from adjacent site)	m <sup>3</sup>	76	0	0	0	0	3,780	287	0	0
- Backfill	m <sup>3</sup>	111	4,845	538	3,077	342	2,773	308	1,957	3,768
- Sub-grade preparation	m <sup>2</sup>	4	77,000	308	48,600	194	62,000	248	51,300	72,800
- Aggregate sub-base course	m <sup>3</sup>	447	13,860	6,195	6,750	3,017	9,606	4,294	7,125	3,185
- Aggregate base course	m <sup>3</sup>	526	9,170	4,823	5,778	3,039	7,376	3,880	6,099	3,208
- Clearing and grubbing	ha	94,671	2.1	199	1.6	151	1.9	180	1.7	161
(2) Concrete Works										
- Concrete-A (RC)	m <sup>3</sup>	2,856	21	60	8	23	31	89	11	31
- Concrete-B (Plain, Pavement)	m <sup>3</sup>	2,820	6,475	18,260	3,684	10,389	5,940	16,751	3,892	10,975
- Reinforcement Bar	ton	23,499	0.4	9	0.2	4	0.6	13	0.2	5
- Form (Lean concrete)	m <sup>2</sup>	77	2,910	224	2,192	169	2,678	206	2,327	179
- Form (RC structure)	m <sup>2</sup>	223	195	43	73	16	280	62	103	23
(3) Stone Works										
- Grouted Riprap	m <sup>3</sup>	1,630	4,000	6,520	2,596	4,231	2,152	3,508	1,606	2,618
(4) Other Works										
- RC Pipe (D=0.61)	m	1,157	121	140	27	31	67	78	45	52
- RC Pipe (D=0.91)	m	1,866	11	21	9	17	63	119	9	17
(Sub-total of A) (P'000)				38,177		22,182		30,560		21,306
(B) Bridge and Approach road										
Span	m		15		18.29		12			
Roadway + Sidewalk	m		7.32 + 0.76 x 2		7.32 + 0.76 x 2		7.32 + 0.76 x 2			
(1) Earth Works										
- Excavation-B (equipment)	m <sup>3</sup>	50	1,260	63	1,260	63	1,000	50	0	0
- Embankment-B (adjacent site)	m <sup>3</sup>	76	2,147	163	1,309	99	1,017	77	0	0
- Backfill	m <sup>3</sup>	111	819	91	819	91	616	68	0	0
(2) Concrete Works										
- Concrete-A (RC)	m <sup>3</sup>	2,856	486	1,388	484	1,382	400	1,142	0	0
- Concrete-B (Plain, Pavement)	m <sup>3</sup>	2,820	24	68	29	82	19	54	0	0
- Reinforcement Bar	ton	23,499	37.1	871	36.4	854	29.9	703	0	0
- Form (RC structure)	m <sup>2</sup>	223	958	214	1,027	229	783	175	0	0
(3) Stone Works										
- Grouted Riprap	m <sup>3</sup>	1,630	135	220	90	147	81	132	0	0
(4) Other Works										
- Demolition of Concrete	m <sup>3</sup>	1,618	60	97	60	97	60	97	0	0
- R.C. Railing	m	900	30	27	37	33	24	22	0	0
(Sub-total of B) (P'000)				3,201		3,078		2,520		0
Total of (A+B) (P'000)				41,378		25,260		33,099		21,306
										33,799

**Table E.6.1 Rural Water Supply Rehabilitation Project**

Level-II Water system		Gotob	Taladong	Inarado	Gabawan
<b>Present Condition</b>	<b>unit</b>				
(1) Discharge of water source	l/s	0.32	0.00	1.10	0.24
(2) Existing facilities					
- No.of spring intake box	nos.	4	1	4	2
- No.of ground level reservoir	nos.	1	2	1	1
- Total length of GI pipe	m	394	969	1,141	106
- Total length of PVC pipe	m	781	1,735	1,380	600
- No.of communal faucet	nos.	4	2	8	2
- No.of individual connection	nos.	19	48	20	1
(3) Beneficiaries					
- No.of beneficial household	nos.	27	52	67	17
- No.of beneficial population	person	149	286	369	94
<b>Proposed Rehabilitation</b>	<b>unit</b>				
(1) Design discharge	l/s	0.40	1.04	0.90	0.20
(2) Rehabilitation Works					
(2.1) Construction of additional facilities					
- spring intake box	nos.	1	1	0	0
- ground level reservoir	nos.	1	1	2	1
- perimeter fence	nos.	1	1	1	1
- pipelines expansion	m	700	1,050	2,070	1,950
- communal faucets at source site	nos.	0	3	1	0
- communal faucets at distribution line	nos.	7	10	19	5
(2.2) Rehabilitation & minor repair of facilities					
- spring intake box minor repair	nos.	4	0	4	2
- pipe line replacement	m	0	850	2,600	0
- communal faucet rehabilitation	nos.	4	2	8	0
- minor repair of pipes & joints, replacement of valves and provision of pipe supports	sum	1	1	1	1
(3) Beneficiaries					
(3.1) Additional Beneficiaries					
- No.of beneficial household	nos.	0	0	95	25
- No.of beneficial population	person	0	0	532	140
(3.2) Additional Beneficiaries (adjoining brgy.)		Ligban	Mina & Comun */	None	None
- No.of beneficial household	nos.	35	65	0	0
- No.of beneficial population	person	196	364	0	0
(3.3) Total Beneficiaries					
- No.of beneficial household	nos.	62	117	162	42
- No.of beneficial population	person	345	650	901	234

\*/ Brgy. Mina = 3 Communal Faucets & Brgy. Comun =10 Communal Faucets

Table E.6.2 Pipe Line Hydraulics (1/4) (Gorob)

Tank / Junction	Pipe line	Elevation (EL=m)	Required flow (lit./sec)	Pipe length (L=m)	Proposed pipe size (D=mm)	Head loss of pipe (h <sub>fm</sub> )	Miscellaneous loss (Mis. loss=m)	Residual head (H <sub>res</sub> )	Type of pipe	Remark
P0		131.1								Water source. 5/
↓	Transmission line. 1/		0.40	40	75	0.01	0.00	-3.9	GI	
P1		135.0								Ground level reservoir. 6/
↓	Distribution line (1). 1/	102.0	0.50	258	38	3.54	1.06	28.4	GI	
P2		103.5								
↓	Distribution line (2). 1/		0.20	248	32	0.77	0.23	25.9	PVC	
P4		104.5								
↓	Distribution line (3). 1/		0.18	26	32	0.12	0.04	22.2	GI	
P5		104.5								
↓	Distribution line (4). 1/		0.18	200	25	1.71	0.51	21.0	PVC	
P6		106.0								
↓	Distribution line (5). 1/		0.12	47	20	1.05	0.31	20.8	GI	
P7		104.8								
↓	Distribution line (6). 1/		0.12	300	25	1.21	0.36	21.1	PVC	
P8		103.0								
↓	Distribution line (7). 1/	102.5	0.02	33	20	0.01	0.00	27.9	PVC	
P3										
↓	Distribution line (8). 2/	103.6	0.25	700	32	3.30	0.99	22.5	PVC	
P9										

Note: 1/ Existing pipe line

2/ Proposed expansion line

3/ Average day demand

4/ Maximum day demand

5/ Existing four (4) spring intake boxes, one (1) reservoir (7.2 m<sup>3</sup>), and proposed an additional spring intake box

6/ Proposed reservoir with a capacity of 18 m<sup>3</sup> (3m x 3m x 2m)

Table E.6.2 Pipe Line Hydraulics (2/4) (Taladong)

Tank / Junction	Pipe line	Elevation (E <sub>1</sub> =m)	Required flow (lit/Sec)	Pipe length (L=m)	Proposed pipe size (D=mm)	Head loss of pipe (h <sub>fm</sub> )	Miscellaneous loss (Mis. loss=m)	Residual head (H <sub>res</sub> )	Type of pipe	Remark
P0	↓	151.5	0.60 3/	674	38	12.96	3.89	17.7	GI	Water source, S/
P1	↓	116.9	0.78 4/	262	50	2.15	0.65	11.2	GI	Ground level reservoirs, 6/
P2	↓	102.9	0.75 4/	873	50	3.58	1.07	16.5	PVC	
P4	↓	93.0	0.55 4/	350	38	3.08	0.92	13.8	PVC	
P5	↓	91.7	0.08 4/	350	32	0.20	0.06	12.0	PVC	
P6	↓	93.2								
P7	↓	86.4	0.40 4/	150	38	0.73	0.22	18.1	PVC	
P8	↓	90.2	0.36 4/	600	38	2.41	0.72	11.2	PVC	
P9	↓	86.7	0.14 4/	450	25	2.42	0.73	11.5	PVC	
P2	↓		0.01 4/	42	13	0.02	0.01	9.9	PVC	
P3	↓	104.2								

Note : 1/ Existing pipe line

2/ Proposed expansion or replace line

3/ Average day demand

4/ Maximum day demand

5/ Proposed intake spring box and a communal faucet for Barangay Mina

6/ Existing ground level reservoir (12.5 m<sup>3</sup>) and the proposed reservoir with a capacity of 10 m<sup>3</sup> (2.3m x 2.3m x 2.0m)

**Table E.6.2 Pipe Line Hydraulics (3/4) (Inarado)**

Task / Junction	Pipe line	Elevation (El.=m)	Required flow (lit./sec)	Pipe length (L=m)	Proposed pipe size (D=mm)	Head loss of pipe (h=m)	Miscellaneous loss (Mis. loss=m)	Residual head (H=m)	Type of Pipe	Remark
P0	↓	167.0								
	Transmission line (1), 1/		0.90 3/	570	25	0.85	0.25	47.9	GI	Water source, 5/
P1	↓	118.0								
	Transmission line (2), 2/		0.88 3/	520	50	5.34	1.60	33.0	GI	Proposed ground level reservoir, 6/
P3	↓	126.0								
	Distribution line (1), 2/		0.97 4/	850	50	10.45	3.13	15.8	GI	
P6	↓	96.5								
	Distribution line (2), 2/		0.93 4/	630	50	7.16	2.15	9.7	GI	
P7	↓	93.4								
	Distribution line (3), 2/		0.40 4/	500	38	2.44	0.73	7.0	PVC	
P12	↓	92.9								
	Distribution line (4), 2/		0.22 4/	550	32	2.05	0.61	6.2	PVC	
P13	↓	91.1								
	Distribution line (5), 2/		0.32 4/	70	32	0.52	0.16	8.4	PVC	
P8	↓	94.0								
	Distribution line (6), 2/		0.18 4/	300	32	0.77	0.23	6.3	PVC	
P10	↓	95.1								
	Distribution line (7), 2/		0.14 4/	450	25	2.42	0.73	7.2	PVC	
P9	↓	92.1								
P2	↓	126.0								
	Distribution line (8), 2/		0.14 4/	150	20	4.45	1.34	17.2	GI	
P3	↓	103.0								
	Distribution line (9), 2/		0.14 4/	280	20	4.46	1.34	11.5	PVC	
P4	↓	102.9								
P5	↓	96.6								
	Distribution line (10), 2/		0.04 4/	170	20	0.27	0.08	14.6	PVC	
P6	↓	97.5								
P11	↓	92.9								
	Distribution line (11), 2/		0.04 4/	200	25	0.11	0.03	7.8	PVC	
P12	↓	92.0								

Note : 1/ Existing pipe line  
 2/ Proposed expansion or replace line  
 3/ Average day demand  
 4/ Maximum day demand  
 5/ Four (4) spring intake boxes and one (1) ground level reservoir (2m x 2m x 1.8m) = 7.2 m<sup>3</sup>  
 6/ Proposed capacity (2.8m x 2.8m x 2.6 m) x 2 units = 40 m<sup>3</sup>



Table E.6.2 Pipe Line Hydraulics (4/4) (Gabawan)

Tank / Junction	Pipe line	Elevation (m)	Required flow (lit./sec)	Pipe length (m)	Required pipe size (mm)	Head loss of pipe (m)	Miscellaneous loss (m)	Residual head (m)	Type of pipe	Remark
P0		126.9								Water source, 5/
↓	Transmission line (1), 1/		0.20, 3/	100	50	0.07	0.02	26.8	GI	
P1		100.0								
↓	Transmission line (2), 1/		0.20, 3/	350	32	1.09	0.33	30.8	GI	
P2		94.5								
↓	Transmission line (3), 2/		0.20, 3/	450	32	1.41	0.42	27.9	PVC	
P3		94.2								
↓	Transmission line (4), 2/		0.20, 3/	700	32	2.19	0.66	15.7	PVC	Ground level reservoir, 6/
P4		101.7								
↓	Distribution line (1), 2/		0.07, 4/	200	20	0.88	0.26	6.2	PVC	
P5		94.4								
↓	Distribution line (2), 2/		0.11, 4/	600	25	2.06	0.62	4.8	PVC	
P6		94.2								

Note : 1/ Existing pipe line

2/ Proposed expansion line

3/ Average day demand

4/ Maximum day demand

5/ Existing two (2) spring intake boxes (0.12 m<sup>3</sup> x 2) and two (2) ground level reservoir (1 m<sup>3</sup> x 2)

6/ Proposed reservoir with a capacity of 6 m<sup>3</sup> (2 m x 2 m x 1.5 m)

Table E.6.3 BQ and Direct Construction Costs of Rural Water Supply Rehabilitation Project

Water System	Cotab Level-II			Talaong Level-II			Inarado Level-II			Gabawan Level-II		
	Unit	Unit Price (Pesos)	Qty	Amount (P'000)	Qty	Amount (P'000)	Qty	Amount (P'000)	Qty	Amount (P'000)	Qty	Amount (P'000)
(1) Construction of additional facilities												
- Spring intake box	nos.		1	(0.6 x 0.6 x 0.8)	700	1,900	1	(3.0 x 3.0 x 1.3)	0	2,520	0	0
- Ground level reservoir	nos.		1	(3.0 x 3.0 x 2.0)	0	0	1	(2.3 x 2.3 x 2.0)	0	2,150	0	0
- Perimeter fence	nos.		1	(6.0 x 4.0, H=2.0)	7	13	1	(6.0 x 4.0, H=2.0)	20	5	5	1, (2.0 x 2.2 x 1.5)
- Pipelines expansion / replacement												1, (6.0 x 4.0, H=2.0)
- PVC Pipe (total length)	m											
- GI Pipe (total length)	m											
- Communal faucets	nos.											
(2) Minor repair of existing facilities												
- Spring intake boxes	nos.		4		4	0	4		4	2	2	
- Communal faucets	nos.		3		3	2	8		8	2	2	
- Pipes, valves, fittings	sum		1		1	1	1		1	1	1	
(1) Earth Works												
- Excavation-B (equipment)	m3	50	166	8	446	22	594	30	452	23	23	
- Backfill	m3	111	140	16	380	42	504	56	390	43	43	
(2) Concrete Works												
- Concrete-A (RC)	m3	2,856	11	32	15	42	26	74	6	17	6	17
- Concrete-B (Plain, Pavement)	m3	2,820	4	12	6	17	11	32	3	8	3	8
- Reinforcement Bar	ton	23,499	0.6	14	0.8	19	1.4	33	0.3	7	0.3	7
- Form (RC structure)	m2	223	32	7	110	25	197	44	44	10	44	10
(3) Stone Works												
- Grouted Riprap	m3	1,630	0.1	0.2	0.4	0.7	0.9	0	0.0	0	0.0	0
- Gravel filling	m3	622	25	16	63	39	87	54	62	38	62	38
(4) Other Works												
- PVC Pipe (D=13 mm)	m	22	35	1	65	1	100	2	25	1	25	1
- PVC Pipe (D=20 mm)	m	33	0	0	0	0	450	15	200	7	200	7
- PVC Pipe (D=25 mm)	m	44	0	0	450	20	650	29	600	26	600	26
- PVC Pipe (D=32 mm)	m	50	700	35	350	18	920	46	1,150	58	1,150	58
- PVC Pipe (D=38 mm)	m	77	0	0	1,100	85	500	39	0	0	0	0
- GI Pipe (D=20 mm)	m	56	0	0	0	0	150	8	0	0	0	0
- GI Pipe (D=50 mm)	m	192	0	0	0	0	2,000	384	0	0	0	0
- Valves, Fittings for Spring Intake Box	L.S.		1	10	1	46	0	0	0	0	0	0
- Valves, Fittings for Ground Level Reservoir	L.S.		1	39	1	34	1	106	1	23	1	23
- Valves, Fittings for Pipeline	m	20	700	14	2,000	40	4,800	96	2,000	40	2,000	40
- Valves, Fittings for Communal Faucet	no.	2,210	7	15	13	29	20	44	5	11	5	11
- Perimeter Fence (H=2.0m)	m	747	24	18	24	18	24	18	24	18	24	18
- Repair for Spring Intake Box	no.	4,550	4	18	0	0	4	16	2	9	2	9
- Repair for Communal Faucet	no.	1,950	4	8	2	4	8	16	0	0	0	0
- Repair for Pipeline	m	104	1,200	125	1,800	187	600	62	500	52	500	52
Total (000 Pesos)				388		689		1,205		390		390

**Table E.7.1 Strategy for Implementation**

Project Category	Model Projects			Other Priority Projects outside the Model Area		
	Length (km)	Passing Barangays	Model Area	Length (km)	Passing Barangays	Model Area
Rural Road	(1)	Ilawod-Ligban-Gotob	Camalig	(1)	Cotmon-Del Rosario-Panoypoy	
	(2)	Comun-Cotmon	Dam No.2	(2)	Gotob-Taladong	
	(3)	Maopi-Magogon-Panoypoy	Magogon	(3)	Anislag-Maopi	
	(4)	Mayon-San Ramon	San Ramon	(4)	Bscaran-Burgos-Mabini-Kinawitan	
(total)	12.3			4.0	San Ramon-Bigao-San Vicente Grande	
				19.8		
Rural Water Supply	Level-II System (Barangay)			Level-II System (Barangay)		
	(1)	Gotob Level-II System	Camalig	(1)	Taladong Level-II System	
	(2)	Inarado Level-II System	Dam No.2	(2)	Gabawan Lebel-II System	

