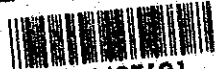


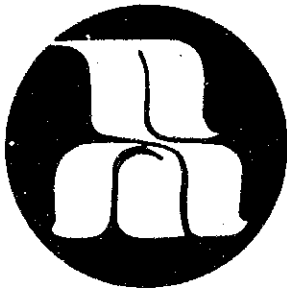
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REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION

MASTER PLAN STUDY
ON

**IMPROVEMENT OF COMMUNAL IRRIGATION SYSTEMS
THROUGH PHYSICAL AND INSTITUTIONAL DEVELOPMENT
AND RURAL DEVELOPMENT
IN SOUTHERN TARLAC PROVINCE**

APPENDIX II

OCTOBER 1990

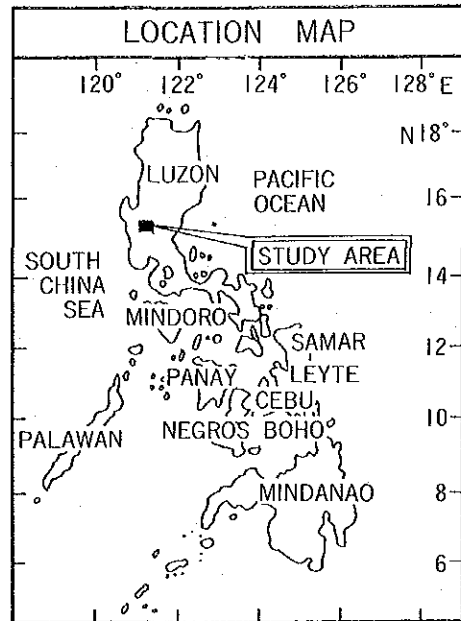
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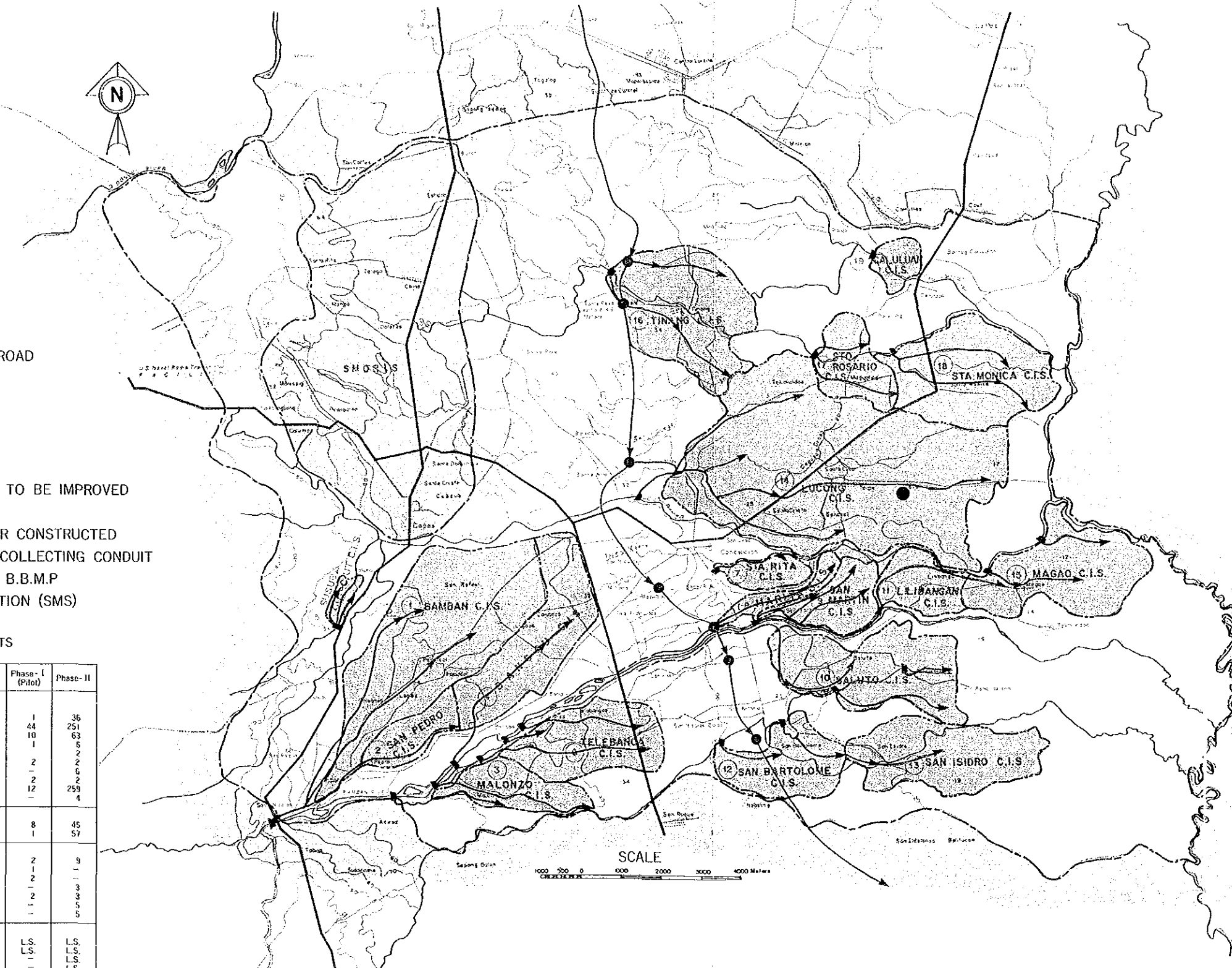


GENERAL MAP

IMPROVEMENT OF COMMUNAL IRRIGATION SYSTEMS THROUGH PHYSICAL AND INSTITUTIONAL DEVELOPMENT AND RURAL DEVELOPMENT IN SOUTHERN TARLAC PROVINCE

COMMUNAL IRRIGATION SYSTEMS UNDER THE PROJECT

Name of CIS	Area(Ha)	Name of CIS	Area(Ha)	Name of CIS	Area(Ha)
1. Bamban	1,051	8. Marita	100	15. Magao	620
2. San Pedro	120	9. San Martin	280	16. Tinsag	850
3. Malonzo	240	10. Baluto	740	17. Sta. Rosario	200
4. Bangou	700	11. Libibangan	240	18. Sta. Monica	740
5. Susuba Cutcut	40	12. San Bartolome	375	19. Caluyan	80
6. Telebanca	389	13. San Isidro	635	Total Area	9,785
7. Sta Rita	135	14. Lucong	2,250		



LEGEND :

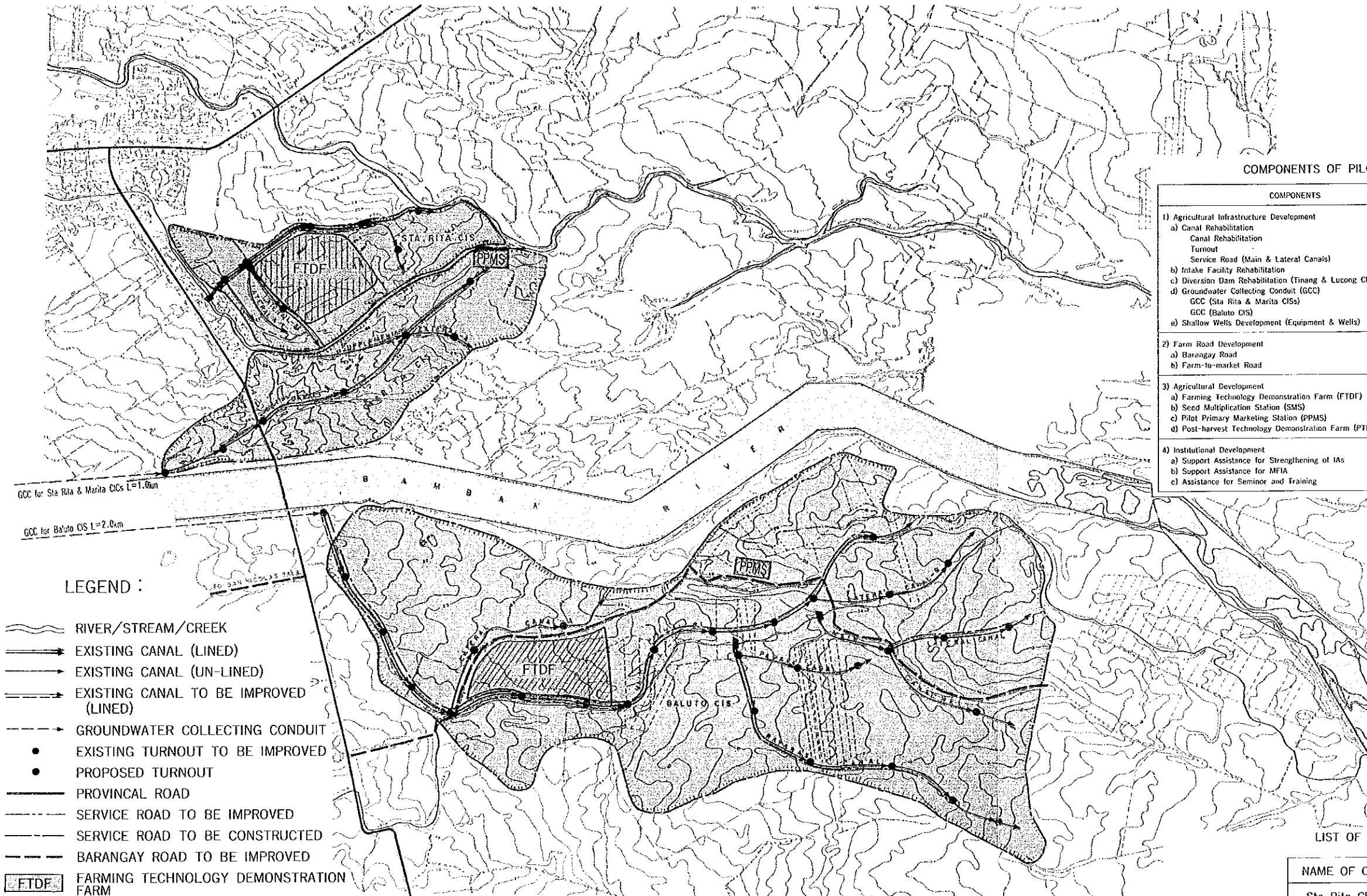
- NATIONAL OR PROVINCIAL ROAD
- BOUNDARY OF CIS
- BOUNDARY OF NIS
- BARANGAY ROAD
- RIVER OR CREEK
- EXISTING DIVERSION DAM
- BRUSH OR DIVERSION DAM TO BE IMPROVED
- EXISTING CANAL
- CANAL TO BE IMPROVED OR CONSTRUCTED
- PROPOSED GROUNDWATER COLLECTING CONDUIT
- PROPOSED LINK CANAL OF B.B.M.P
- SEED MULTIPLICATION STATION (SMS)

MAJOR DEVELOPMENT COMPONENTS

Development Components	Unit	Total	Phase - I (Pilot)	Phase - II
1) Agricultural Infrastructure Development				
a) Irrigation Facilities Development				
Canals	Km	37	1	36
Canal Structures	Unit	95	44	251
Service Road	Km	73	10	63
Intake Facilities	Unit	7	1	6
b) Diversion Dams Improvement				
Replacement by Rubber Dams	Unit	4	2	2
Rehabilitation	Unit	6	-	6
c) Groundwater Collecting Conduit	Unit	4	2	2
b) Shallow Wells	Unit	271	12	259
e) Drainage Development	Km	4	-	4
2) Farm Road Development				
Barangay Road	Km	53	8	45
Farm-to-market Road	Km	58	1	57
3) Agricultural Development				
Farming Technology Demonstration Farm	Farm	11	2	9
Seed Multiplication Station	Sta.	1	1	-
Pilot Primary Marketing Station	Sta.	2	2	-
Primary Marketing Station	Sta.	3	-	3
Post-harvest Technology Demonstration Farm	Farm	5	2	3
Duck Raising	Pia.	5	-	5
Fishery Pond	Pia.	5	-	5
4) Institutional Development				
Support Assistance for Strengthening IAs	L.S.		L.S.	L.S.
Support Assistance MFIA	L.S.		L.S.	L.S.
Support Assistance for Strengthening FIAs	L.S.		-	L.S.
Support Assistance for Strengthening CIAs	L.S.		-	L.S.
Support Assistance for Strengthening ASS	L.S.		-	L.S.
Support Assistance for Seminar & Training	L.S.		L.S.	L.S.

LAYOUT

PILOT COMMUNAL IRRIGATION SYSTEMS DEVELOPMENT (Pilot CISD)



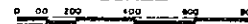
COMPONENTS OF PILOT CISD

COMPONENTS	QUANTITY
1) Agricultural Infrastructure Development	
a) Canal Rehabilitation	3,400 m
Canal Rehabilitation	38 units
Turnout	6,660 m
Service Road (Main & Lateral Canals)	1 unit
b) Intake Facility Rehabilitation	2 units
c) Diversion Dam Rehabilitation (Tinang & Lucong CISs)	
d) Groundwater Collecting Conduit (GCC)	1.0 km
GCC (Sta Rita & Marita CISs)	2.0 km
GCC (Baluto CIS)	2 wells
e) Shallow Wells Development (Equipment & Wells)	
2) Farm Road Development	
a) Barangay Road	8,200 m
b) Farm-to-market Road	500 m
3) Agricultural Development	
a) Farming Technology Demonstration Farm (FTDF)	2 farms
b) Seed Multiplication Station (SMS)	1 station
c) Pilot Primary Marketing Station (PPMS)	2 stations
d) Post-harvest Technology Demonstration Farm (PTDF)	2 farms
4) Institutional Development	
a) Support Assistance for Strengthening of IAs	L.S.
b) Support Assistance for MFIA	L.S.
c) Assistance for Seminar and Training	L.S.

LEGEND :

- RIVER/STREAM/CREEK
- EXISTING CANAL (LINED)
- EXISTING CANAL (UN-LINED)
- EXISTING CANAL TO BE IMPROVED (LINED)
- GROUNDWATER COLLECTING CONDUIT
- EXISTING TURNOUT TO BE IMPROVED
- PROPOSED TURNOUT
- PROVINCIAL ROAD
- SERVICE ROAD TO BE IMPROVED
- SERVICE ROAD TO BE CONSTRUCTED
- BARANGAY ROAD TO BE IMPROVED
- FTDF FARMING TECHNOLOGY DEMONSTRATION FARM
- PPMS PILOT PRIMARY MARKETING STATION
- IRRIGABLE AREA LIMIT

SCALE



LIST OF CISs IN PILOT CISD

NAME OF CIS	POTENTIAL AREA
Sta Rita CIS	135 Ha.
Marita CIS	100
Baluto CIS	740
TOTAL	975

CHAPTER 1 BACKGROUND

The purpose of the Improvement of Communal Irrigation Systems through Physical and Institutional Development and Rural Development in Southern Tarlac Province aims at uplifting the rural economy by solving the basic problems of the people such as persistence of poverty and income inequality, reducing high unemployment and underemployment by creating employment opportunity and rectifying urban/rural and regional disparity. The final target of the project is to attain the desirable annual income for low-income farmers and to realize healthy and worthy living environment in the Project area.

The master plan as a model project for improvement of CISs consists of agricultural infrastructure development, farm road development, agricultural development and institutional development and covers an arable land of 9,785 hectares in 19 communal irrigation systems (CISs). Taking into account magnitude of the project component, required term for the institutional arrangement on the farmers' association and availability of funding source, the Project is expected to implement by taking two phases; Phase-I and Phase-II.

According to the implementing schedule of the master plan, Phase-I development should be carried out as a pilot of the Project for initial period of two years by special funding source, while Phase-II development should be carried out for a period of four years thereafter by another funding source.

For the immediate implementation of Phase-I development, development components of Phase-I are selected based on criteria for the selection of priority components and studied in detail by pre-feasibility level.

CHAPTER 2 PRIORITY COMPONENT

2.1 Criteria for Selection of Priority Components

Criteria for selection of priority components is established by considering the project as a model project of improvement of CISs as follows:

1) Technical aspects

Priority components are selected from technical point of view as a sample for improvement of structures and facilities with practical manner, model structures and facilities for future development of engineering and other countermeasures for improvement of the deteriorated facilities.

2) Location and acquisition of ROW for demonstration farm

Location of demonstration farm is selected at the accessible place by the project members and visitors from the outside and also at the available site in ROW acquisition, particularly for the proposed primary marketing station.

3) Viable IAs

Farmers' association in the pilot project is selected among viable IAs as a leading body for the implementation of the project with active participation of farmers concerned. Viable IAs is assessed according to maturity of IA organization, fee collection records of amortization, IA fund and equity, financial status in avail and utilization of production loan, legal registration and other aspect.

2.2 Selection of Priority CISs

CISs for a pilot project is selected three CISs, viz, Sta Rita, Marita and Baluto CISs through assessment by the above-mentioned criteria, especially the present function and activities of IAs and location of those CISs (refer to Table 2-2-1).

Sta Rita and Marita CISs are considered as advanced active IAs and easily organized the proposed MFIA. Both two CISs are irrigated through new irrigation facilities of GCC by gravity system instead of the existing irrigation system with brushdams. Baluto CIS has no IA organized so far and expected to organize an IA during a period of Phase-I development. This Baluto CIS had some history of irrigation facilities with NIA that the facilities was once constructed by assistance of NIA in mid-1980s, however, because of flood of Bambang river, most of the constructed facilities were washed away and still remained a credit to NIA on amortization of the construction cost to be repaid. It will be just a sample to be solved these problems by farmers' participatory approach through establishing / strengthening of IA.

2.3 Selection of Priority Components

The Pilot CISD to be implemented as a pilot of the improvement of communal irrigation systems consists of the following components:

1) Agricultural Infrastructure Development

a) Canal Rehabilitation

Canal Type-II (Exc. 1.7 m ³ , Conc.0.5 m ³)	Length	700 m
Canal Type-III (Exc. 2.0 m ³ , Conc.0.6 m ³)	Length	1,700 m
Canal Type-IV (Exc. 2.4 m ³ , Conc.0.7 m ³)	Length	1,000 m
Turnout	Unit	38
Service Road, Main C. (W.3.0 m,Gr.0.6 m ³)	Length	4,200 m
Service Road, Lateral C.(W.2.5 m,Gr.0.3 m ³)	Length	2,400 m

b) Intake Facility Rehabilitation

Type-V (Ex.1,600 m ³ ,Riprap3,800 m ³ ,RCP.250m)	Unit	1
--	------	---

c) Diversion Dam Rehabilitation

Type-II (Rubber Dam W.20m,H.3m, Tinang CIS)	Unit	1
Type-III(Rubber Dam W.36m,H.1m, Lucong CIS)	Unit	1

d) Groundwater Collecting Conduit

Type-I (RCP.1.0Km, CorrP.0.5Km,Sta Rita&Marita CISs)	1
Type-III (RCP.2.0Km, CorrP.0.7Km,Baluto CIS)	1

e) Shallow Wells Development

Drilling Equipment & Accessories	LS	1
Shallow Wells	Unit	10

2) Farm Road Development

a) Barangay Road

Aggregate subbase and base course	Length	8,200 m
-----------------------------------	--------	---------

b) Farm-to-market Road

Aggregate subbase and base course	Length	500 m
-----------------------------------	--------	-------

3) Agricultural Development

a) Farming Technology Demonstration Farm (FTDF)

Input materials for 20 Ha LS 2

b) Seed Multiplication Station (SMS)

Seed production and inspection/control equipment LS 1

c) Pilot Primary Marketing Station (PPMS)

Post-harvest facilities and equipment LS 2

d) Post-harvest Technology Demonstration Farm (PTDF)

Production equipment LS 2

4) Institutional Development

a) Support Assistance for Strengthening of
Irrigator's Association (IA)

Equipment and materials LS 1

b) Support Assistance for Model Federation of
Irrigator's Association (MFIA)

Equipment and materials LS 1

c) Assistance for Seminar and Training

Vehicle, training equipment and materials LS 1

CHAPTER 3 IMPROVEMENT AND DEVELOPMENT OF IRRIGATION AND DRAINAGE

3.1 Canal and Canal Structure

The capacity of the main canal at the upstream of Baluto CIS will be increased for the groundwater to be available by collecting conduit plan for the new water resources development. The Baluto CIS main canal with 1.88 kilometers in length shall be rehabilitated with concrete lining in order to keep its proper hydraulic cross-section.

In improvement of the irrigation facilities, the turnouts for the lateral and irrigation ditches shall be rehabilitated with slide gates for proper water management.

3.2 Intake Structure

The intake structure of Telebanca CIS shall be improved as an example of the improvement works of the brush dam at Bamban river. For the low weir method with stop-log in diagonal crossing of the river, stone riprap works are provided partly as river-bank protection. The collecting pipes are provided inside these riprap works during wet season, and during dry season the open canals are used (refer to Figure F-1-4 of Appendix I).

3.3 Diversion Dam

These CISs of Lucong and Tinang have the O'gee-type weir with wooden flap gates of about 2.0 meter span (upstream support), which have malfunctioned with water leakage and caused back water in flood giving damages to the upstream embankment by over-flowing. The dams of Lucong and Tinang CIS are rehabilitated with rubber dam in view of water tightness, easy operation and economy (refer to Figure 3-3-1).

3.4 Groundwater Collecting Conduit

The groundwater collecting conduit are proposed at Sta Rita, Marita and Baluto CISs for the new water resources. The length of collecting conduit are proposed as follows. The daily water requirement of Sta Rita and Marita CISs is $0.43 \text{ m}^3/\text{s}$ during dry season. Then, the length of collecting conduit is proposed by one kilometer for irrigation water of $0.43 \text{ m}^3/\text{s}$. While, the daily water requirement of Baluto CIS is $1.34 \text{ m}^3/\text{s}$ during dry season. The length of collecting conduit is proposed 2.6 kilometers. However, in considering topographical condition, the maximum length is 2.0 kilometers at Baluto CIS.

3.4.1 Collecting Water Discharge

The collecting water discharge is calculating by the following formula:

$$q = \frac{2nK \{ H - (P_o / W)_o \}}{2.3 \log (4 H/D)} \times 10^3$$

where:

- q : Unit collected water (m³/s/km)
- K : Coefficient of permeability 1×10^{-4} (m/s)
- P_o: Water pressure in conduit 0 (t/m²)
- W_o: Unit weight of water 1.0 (t/m²)

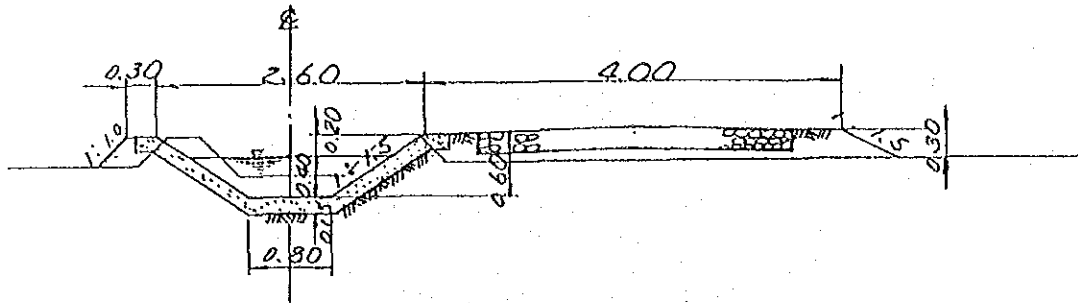
The calculated collecting discharge is shown in Table F-1-15 and F-1-16 of Appendix F.

3.4.2 Feeder Canal

The feeder canal in the upstream areas will be with culvert because the depth of the canal is 2.5 meters. The section of the culvert will be of semicircle due to shallow water depth. The arched and corrugated pipe (2.0 m X 1.0 m) shall be provided for the feeder canal. The feeder canal of which the depth is less than 2.0 meters, will be in open canal with concrete lining (refer to Figure 3-4-1 and 3-4-2).

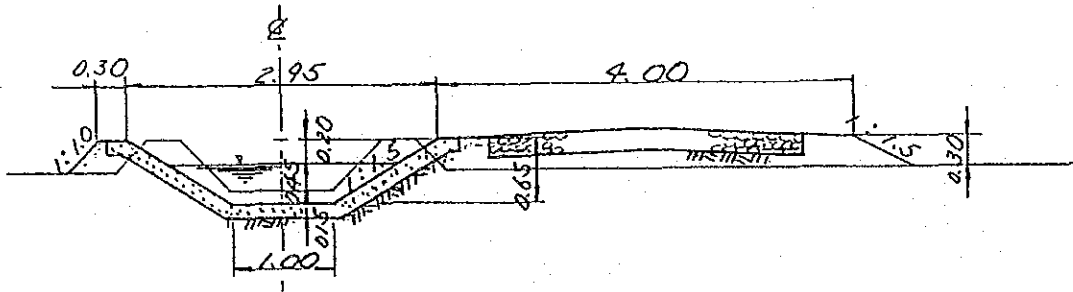
3.5 Shallow Well

Since groundwater resources is abundant in the eastern part of the Study Area, it was proposed Groundwater Collecting Conduit (GCC) along Bamban river in the Pilot CISD where topographic and hydrogeological conditions are suitable for effective utilization of the resources for gravity irrigation. The area far from Bamban river in the Study Area is generally not justifiable for gravity irrigation purpose. Although abundant groundwater resources in the area is only stable irrigation resources during dry season, it is proposed that two units each of shallow well with 4-inch pump in six CISs are installed for supplementary irrigation in dry season as an example of proper utilization of the resources and stabilization of cropping intensity. Considering further development of the groundwater resources in the area, a set of drilling rig with accessories will be provided by the project. Proposed sites for shallow wells are in six CISs, viz San Bartolome CIS, San Isidro CIS, Lucong CIS, Magao CIS, Sto Rosario CIS, and Caluluan CIS. Among these six CISs, shallow wells in Lucong CIS have a particular roll to keep stable production of qualified rice seed in the Seed Multiplication Station (SMS).



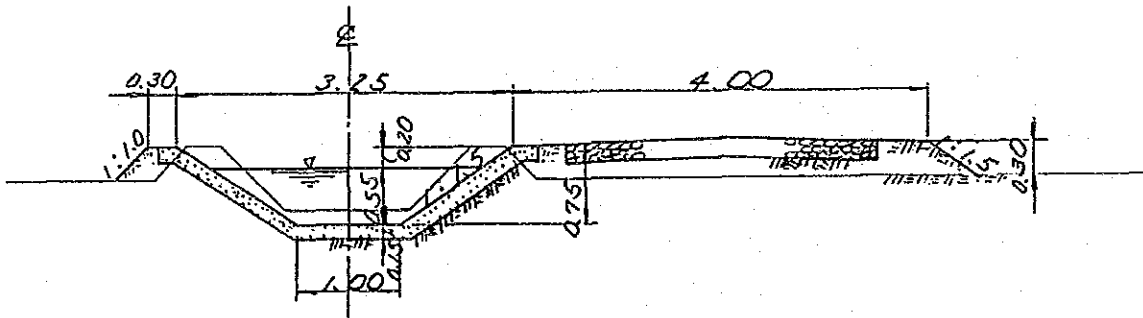
TYPE-II ($Q = 0.4 \text{ m}^3 / \text{s}$)

Marita CIS : GCC STA.2 + 530 ~ STA 2 + 900



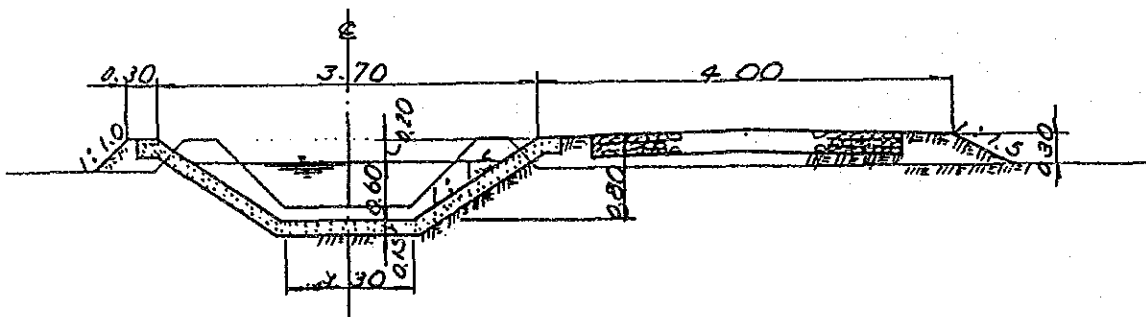
TYPE-III ($Q = 0.9 \text{ m}^3 / \text{s}$)

Marita CIS : GCC STA.2 ~ STA.2 + 530
Baluto CIS : STA.1 + 490 ~ STA.1 + 880



TYPE-IV ($Q = 1.2 \text{ m}^3 / \text{s}$)

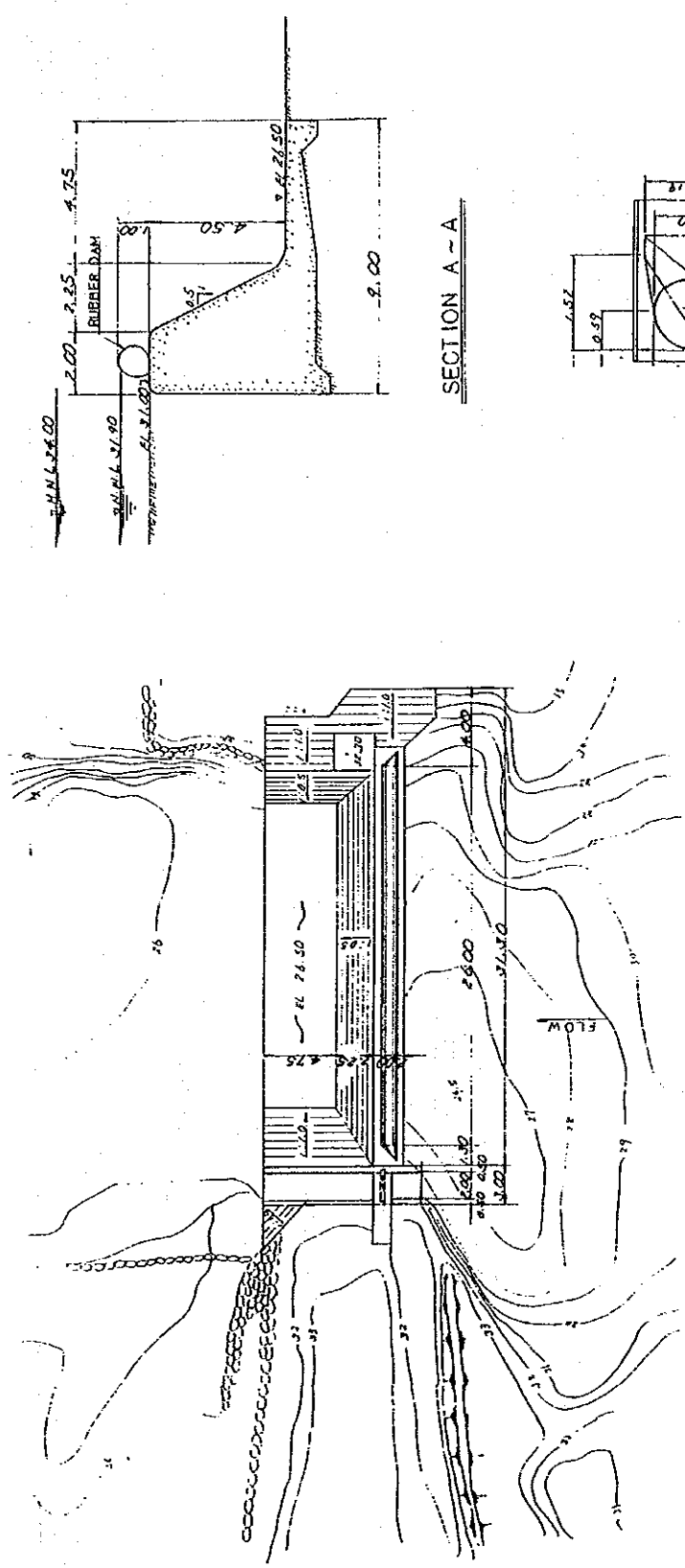
Sta Rita CIS : CCG STA.1 + 500 ~ STA.2
Baluto CIS : STA.0 ~ STA.1 + 490



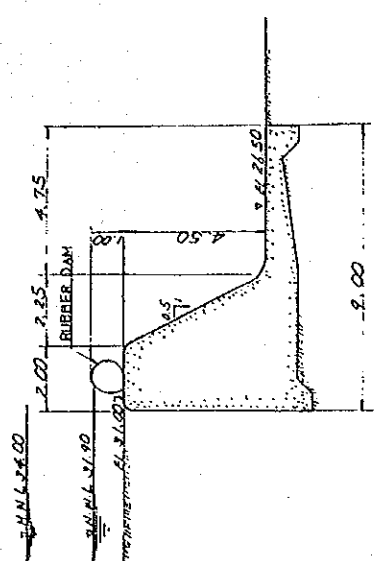
TYPE-V ($Q = 2.1 \text{ m}^3 / \text{s}$)

Baluto CIS : GCC STA.2 + 500 ~ STA.3

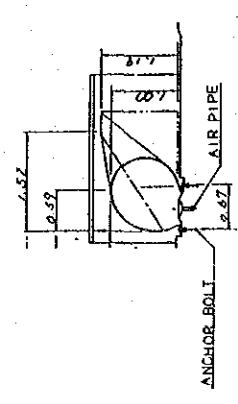
Figure 3-1-1 Typical Section of Irrigation Canal



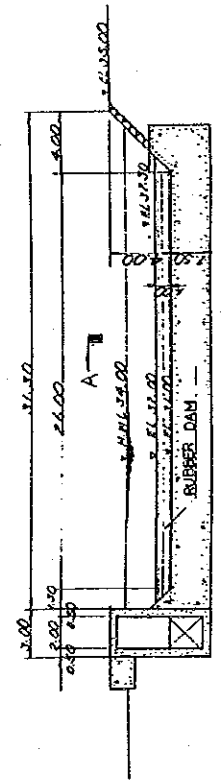
PLAN OF DAM



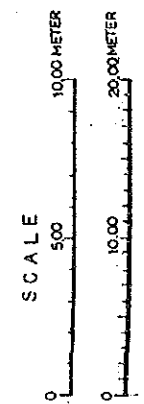
SECTION A-A



DETAIL OF RUBBER DAM



PROFILE OF DAM



CORRECTIONAL REHABILITATION SYSTEMS IMPROVEMENT PROJECT	
REPAIR WITH RUBBER DAM	
AT LUONG CIS	
CONCEPCION, TARLAC PROVINCE	
DRAWING NO.	SCALE 1
JAFSA INTERNATIONAL CORPORATION ANGNO	

Figure 3-3-1 Repair with Rubber Dam at Luong CIS

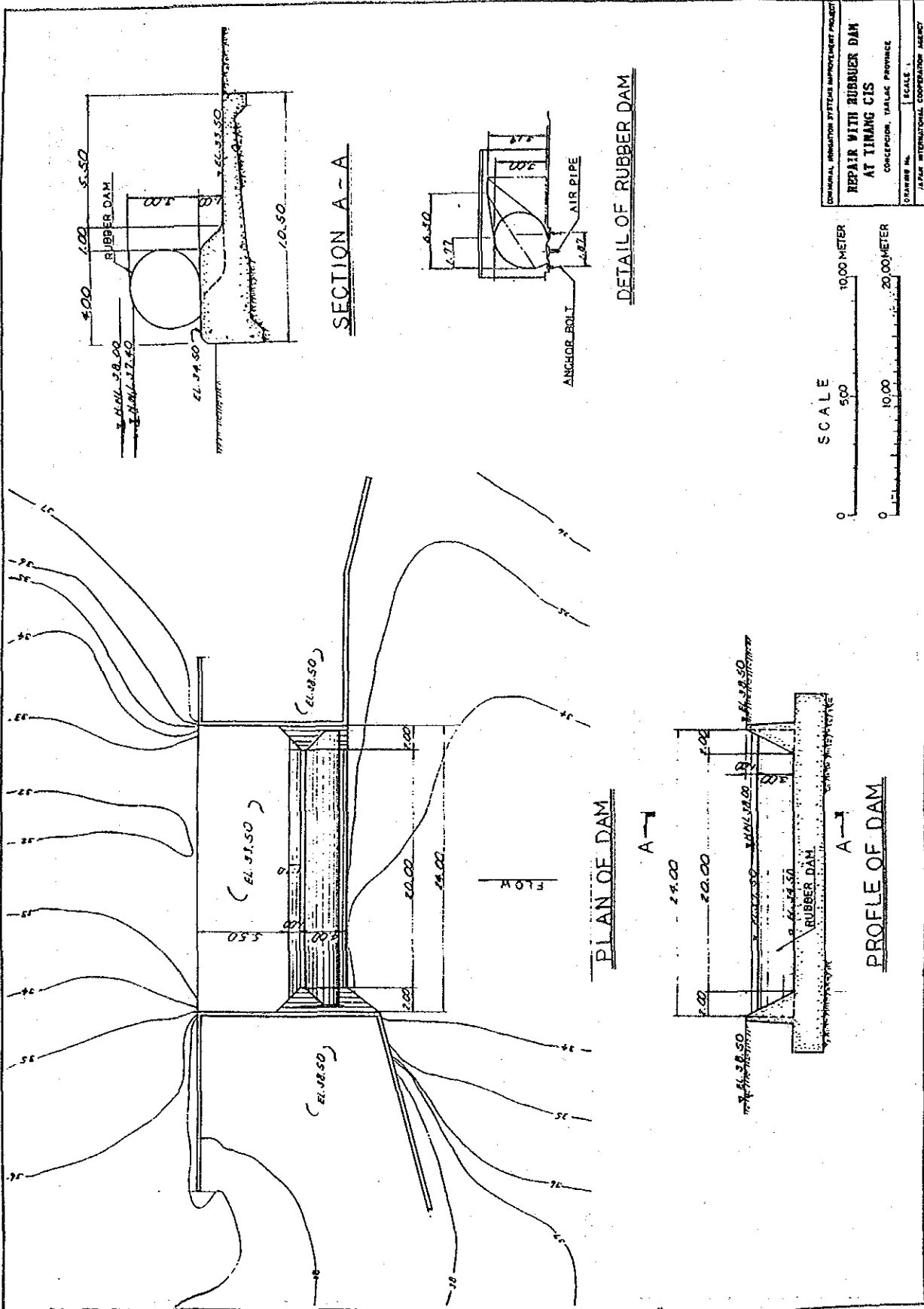


Figure 3-3-2 Repair with Rubber Dam at Tinang CIS

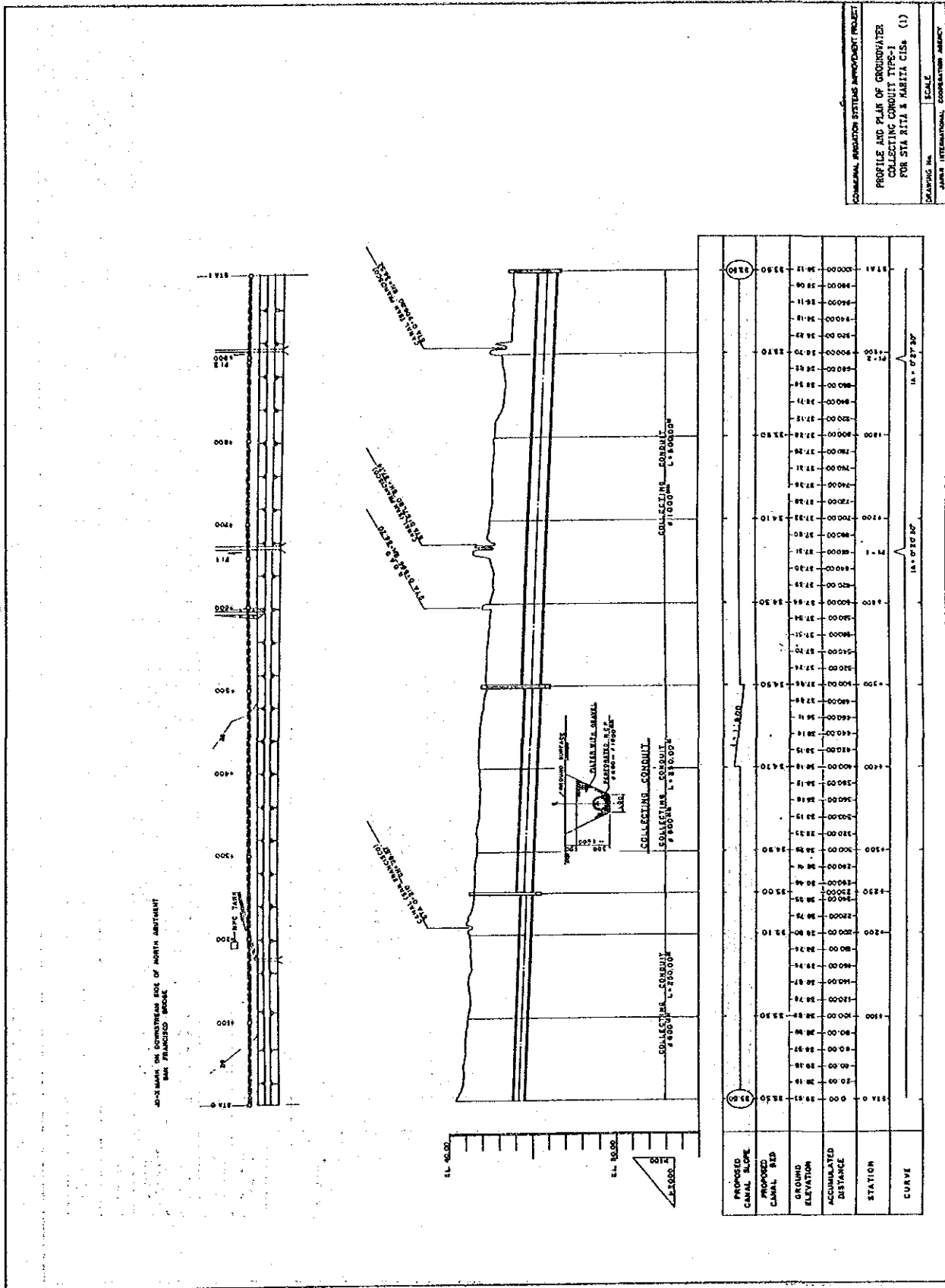


Figure 3-4-1 (1) Profile and Plan of GCC Type-I for Sta Rita & Marita CISS

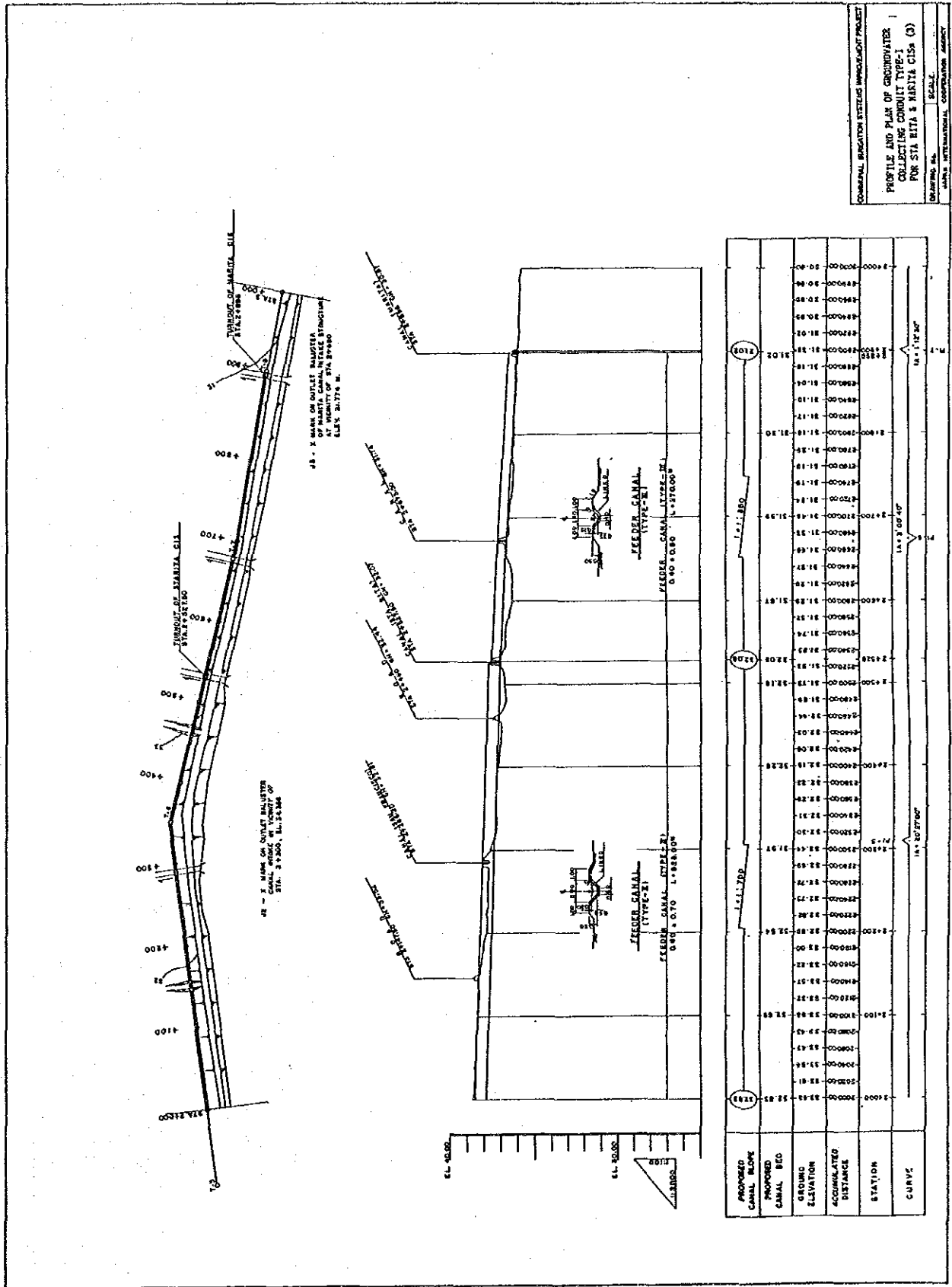


Figure 3-4-1 (3) Profile and Plan of GCC Type-I for Sta Rita & Marita CISS

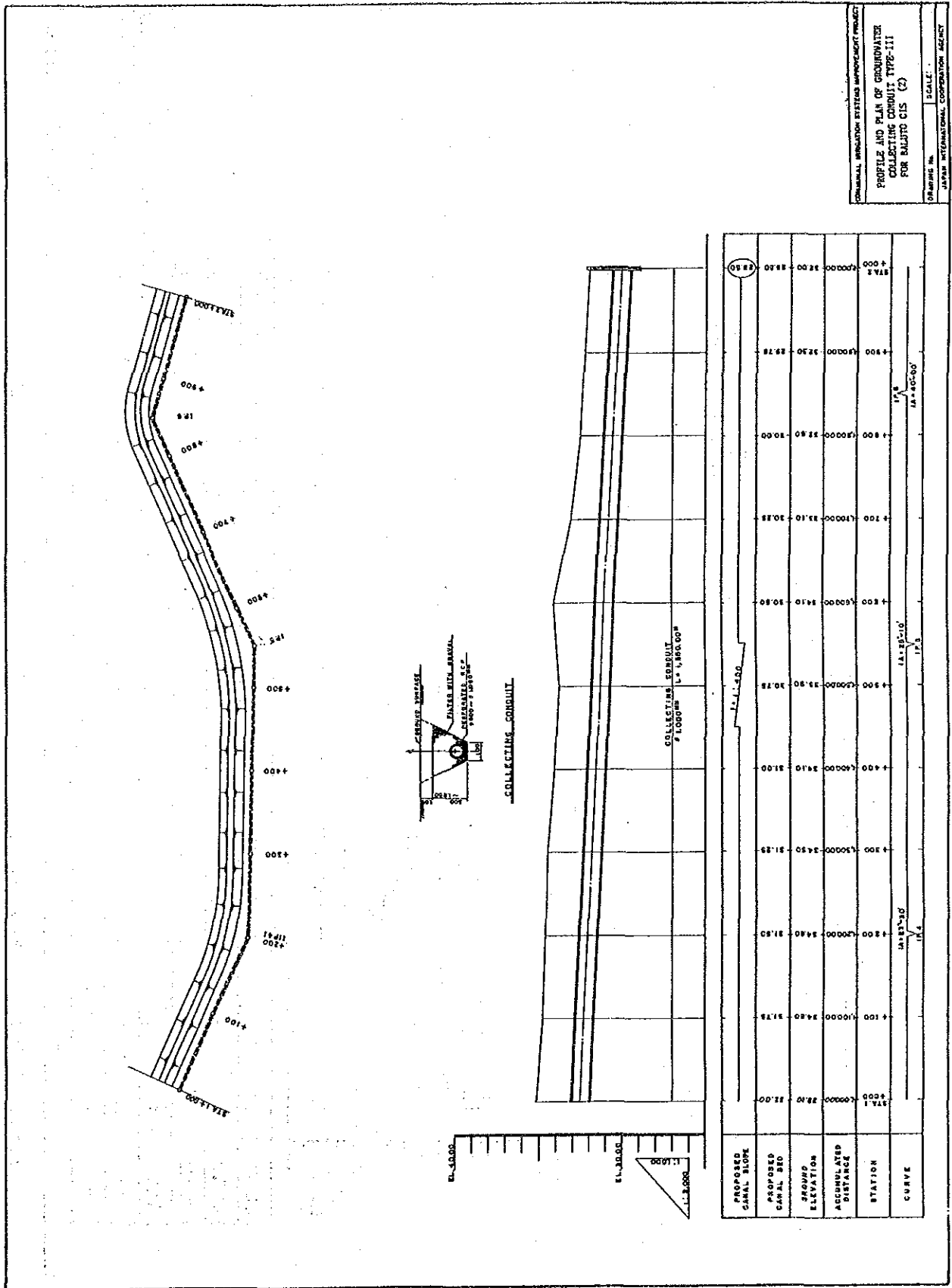


Figure 3-4-2 (2) Profile and Plan of GCC Type-III for Baluto CIS

CHAPTER 4. AGRICULTURAL DEVELOPMENT

4.1 Farming Technology Demonstration Farm Program (FTDF)

As for the farm management, development of farm technology for timely application of fertilizer and pest disease control is still required. Farmers in the area are generally receiving such ideas on new techniques and practice on their farms through the extension technicians assigned by DA. However, timely and effective technical support to the farmers seems to be not enough due to insufficiently assigned technicians and lack of technical and managerial tools in the area.

These problems will be solved by strengthening the extension technicians and proposed Farming Technology Demonstration Farm Program (FTDF).

4.1.1 Size of Demonstration Farm

FTDF seeks to conduct demonstration of farming techniques and transfer it to farmers as a show-window of farming practically adopted techniques on water management, cultivation and crop management for palay production. The farm with an acreage of about 20 hectares per 800 hectares are to be selected allowing for the location, accessibility and organizational activities of each CISOs, and for possible direction area with a extension worker.

4.1.2 Location of Demonstration Farm

Since the Study Area has attained rather high land productivity on palay production. It is proposed that the suitable farms are to be selected as the demonstration farm. In the farm, land holding shall not be changed. Farming in the farm shall be continuously made by the present farmers.

The principal place for demonstration farms are selected by satisfied farmers according to the following conditions;

- 1) Farmers must have at least 2.5 to 5.0 hectares of gravity irrigated land.
- 2) Near to farm-to-market road.
- 3) With water pump to supply the water needed during dry season (optional).
- 4) Trusted and willing to follow the modern technology required by the Department of Agriculture and NIA's crop program.
- 5) Farmers must be a Land Owner/CLT and actual tiller.

After farmers were selected by CISOs president and MAO officer (refer to Appendix H.1.19), their farms were confirmed location by consultants. Demonstration farms were selected allowing for the location, accessibility and organizational activities.

i) Location of Farms for Phase-I

Total two demonstration farms are proposed each in Sta Rita and Marita CISs and Baluto CIS, where are preferable areas for development (refer to Appendix H.1.18 and Figure II.1.3) and will benefit from the groundwater collecting conduit under the Pilot CISD).

ii) Location of Farms for Phase-II

Following to the evaluation of the FTDF, nine demonstration farms are proposed to set up in 16 CISs areas by establishing FTDF program for Phase-II.

4.1.3 Management of Demonstration Farm

MFIA in cooperative with IAs should take the responsibility of the program under managerial and technical support of NIA, DA and other government agencies concerned. The cooperative will provide necessary farm input such as seed, fertilizers and agro-chemicals, while the farmers provides required labor force under the guidance of the extension technician. Farm machinery is principally provided from the farmers, but if the farmers have no proper machinery, farmers are able to get assistant from the proposed Pilot Primary Marketing Station. The demonstration farms shall be utilized by the cooperative as the actual specimen for farmer training program.

A part of the production income should be paid back to the cooperative to amortize the aforesaid prior investment which has used in agro-inputs and to reserve the fund for the cooperative. To show up the farm management to more farmers, the program should be continuously undertaken and the demonstration farms should be relocated possibly in every three years after well performance is confirmed.

4.1.4 Number of Agricultural Extension Technicians

It is proposed that Agricultural Extension Technicians should be assigned as follows;

Agricultural Extension Technicians	2 persons
Irrigated Rice Crop (one person)	
Diversified Crops (one person)	
Counterpart	2 persons

With respect to Agricultural Extension Technicians, to effectively support this program the introduction of Japan Overseas Cooperation Volunteers (JOCV) is recommended.

4.1.5 Facilities and Equipment

1) Equipment for Municipal Agricultural Office (MAO)

Necessary to give Municipal Agricultural Office (MAO) equipment for supporting activity, however, it's better following equipment are lended free to MAO from MFIA.

<u>Equipment</u>	<u>Total</u>	<u>Bamban MAO</u>	<u>Concepcion MAO</u>
Jeep	2	1	1
Motorcycle	2	1	1
Typewriter	2	1	1

2) Facilities and Equipment for Each Demonstration Farm

Office	L.S.
Office Equipment (desk, cabinet, typewriter, etc.)	L.S.
Motorcycle	4 units

4.1.6 Training Program

Training program on farming will scheduled for farmers of the demonstration farm once every week and for leaders of farmers in MFIA twice a month.

4.2 Seed Multiplication Station (SMS)

1) Objective

To establish newly the Seed Multiplication Station (SMS) to assure the supply of high quality certified rice seed to small farmers in project area for increasing at least ten percent of production.

2) Site

Two hectares of common land located at Barangay Cafe, where belongs to Concepcion Seed Producers Multi-Purpose Cooperative, Inc.

3) Distribution of Certified Rice Seed

To procure foundation seed from the PHILRICE at Malingaya in Nueva Ecija, to supply them to contract farmers for multiplication and to rice farmers in project area after conditioning at the SMS.

4) Infrastructure Development

To handle 500 metric ton certified seed per year securely, it is required to develop the following major infrastructure:

- a) Single story seed warehouse annexed with administration and processing room, and supply warehouse, total 726 square meter.
- b) 750 square meter multi-purpose pavement for drying raw seed.
- c) 4-wheel tractor with front bucket for spreading or collecting raw seed effectively on the multi-purpose pavement.
- d) Seed thresher to thresh seed without any mechanical damage.
- e) Stand-by mechanical circulation type seed dryer for drying raw seed even in rainy days.
- f) Air-screen cleaner attached with necessary equipment to process seed.
- g) Stand-by mist sprayer to fumigate seed inside warehouse if required.
- h) Platform scale to weigh taking in-and-out seed.
- i) Transportation vehicles such as forklift and cargo truck.
- j) Seed inspection and control equipment like as moisture meter, trier, blower, etc.
- k) Station support equipment such as pallets, bags, chemicals, etc.

Details of equipment list together with principle technical specifications are shown in Appendix J.2.8.

4.3 Pilot Primary Marketing Station (PPMS)

1) Objective

To establish two Pilot Primary Marketing Station as pilot to solve problems in the project area like nationwide in the Philippines especially for

small farmers, which are summarized as follows being caused on the reciprocal relations:

- a) Shortage of food for the rapidly increasing Filipino population, which requires strengthening project area as rice export field to great Manila.
- b) Unstable food marketing and supply.
- c) Unfair farmgate price of produce.
- d) Ineffective marketing access from production to consuming area.
- e) Ineffective utilization of post harvest and marketing equipment and facility belonging to the Government.
- f) Poor activity of agricultural cooperatives as business enterprises.
- g) Tight agricultural marketing credit facilities.
- h) Insufficient extension services of post harvest and marketing technology.
- i) Unemployment in the project area.
- j) Low income of the rural populace farmers.

2) Necessity and Importance of Improvement

In the Philippines, it is officially reported that total amount of rice import will reach to 650 thousand metric ton in 1990 to ease the shortage.

Also it is reported that the stable grain cultivation area may be reduced in the next 10 years due to the country's shift to urbanization and industrialization, while the population increases to more than 80.0 million by the year 2000. This could mean shortage of grains for the Filipino people, and urbanization and industrialization are easy to bring the concentration onto key towns like as great Manila and serious aggravation of the baneful disparity of per capita income between the urban and the rural areas.

Up to present, food supply has been supported mainly by expansion of cultivation area and improvement of farming technology through such means as soil improvement, irrigation, pest control, improved variety, etc. together with costly farm inputs.

It is studied, however, that the average post harvest loss of rice only in quantity reaches to 22.5 percent in the Study Area, which means 22 thousand tons of the total 98 thousand tons production in 1989 crop year and surely over 30 percent loss of the total production value if considered also the qualitative loss (refer to Appendix J.2.3).

On the other hand, several institutions and sectors such as NFA, PHILRICE, NAPHIRE, NIA, TLRC, DTI, LBP, QGFB, CLSU, and provincial Government have been promoting various research and development activities to improve post harvest and marketing technology and facilities.

The results gained from these efforts in agricultural development and improvement now require completing with building a national target to reduce rice post harvest loss and to improve rice quality and marketing system, with unifying and strengthening these efforts for them to have a greater impact in solving present and future problems of rice post harvest loss and marketing by

the national agency for activating, accelerating private sector, harmonizing the progress in nationwide and marketing at befitting prices to recompense the farmers under medium and long term program that could eventually improve the food supply to Filipino people, and livelihood and income of the small rice farmers.

In this connection, it is rushed to establish Primary Marketing Stations in the Study Area as pilot in the Philippines.

3) Site

Two sites, one of which is two hectares common land located at Sitio Boro belonging to Sta Rita CIS, another is one and a half hectares common property located in Baluto CIS without any legal problems.

4) Infrastructure Development

Prototypes of the Pilot Primary Marketing Station (PPMS) will be designed depending on the magnitude of annual rice production by the CISs.

However, prototype of post harvest and marketing equipment and facilities to be required at Baluto PPMS in case of its 4,000 ton annual marketing volume of paddy is proposed composing of the following major items. For Sta Rita - Marita PPMS handling annual 1,200 ton paddy, space for housing and civil facilities can be reduced to one third (refer to Appendix J.2.2 and J.2.7).

Of the post harvest processing operations such as harvesting, threshing, transportation, drying, storage, milling, etc., drying system is the most important and delicate operation. Number of rainy days in wet (October - December) and dry (March - May) harvest season in the project area is reported to be 48 and 30 days, respectively, which requires the combined employment both of sun and mechanical drying with minimum operation cost and the highest efficiency for guaranteeing fair farmgate price of farmers' produce.

A. Housing / Civil Facilities

A-1	Administration house annexed with quality control rooms and Sari-sari store - Small house to manage the marketing station-	1 house	Single story, total 81 m ²
A-2	Paddy warehouse with ventilated roof fans annexed with rice milling barn and supply warehouse - To keep dried grains in good condition to enable selling at fair price-	1 house	Single story, total 1,440 m ²
A-3	Green house - House to enclose solar dryer for utilizing solar energy effectively to dry grains-	1 house	Single story, total 357.6 m ²

A-4	Multi-purpose pavement - Concrete yard to dry harvested grains and member farmers assembly or sports-	1 yard	Total 3,000 m ²
A-5	Motor pool - To pool and repair equipment-	1 shed	Single story, total 264 m ²
B. Equipment			
B-1	4-wheel tractor with attachment - General usage to haul equipment, transport grains from field to station and support member farmers' farm jobs-	2 sets	4WD, 70ps class diesel
B-2	Power tiller with attachment - General usage to haul equipment, transport grains from field to station at rather poor access condition and support member farmers' farm jobs-	2 sets	10 ps class gasoline
B-3	Portable thresher -Mechanical threshing machine to minimize threshing loss and to upgrade quality -	3 units	Axial flow type, 300 cavans/day
B-4	Portable pre-dryer -On-farm ambulance pre-drying machine to dry bigger volume of grains with high moisture content with high speed -	1 unit	Floating type, diesel engine driven, 5 tons/hr.
B-5	Solar dryer - Multi-purpose crop dryer with minimum operation cost-	1 set	45 metric tons/hr
B-6	Semi-cono rice mill - Milling machine to supply milled rice for member farmers' home consumption -	1 unit	500 Kg/hr
B-7	Cargo truck - To transport grains from farm land to station and from station to market-	2 units	4 tons, 2 X 4, diesel
B-8	Quality inspection and control equipment -Basic devices to inspect and control grains quality -	1 lot	Trier, sample pan, moisturemeter, etc.
B-9	Platform scale - To weigh intake and outgoing grains -	2 units	100 Kg
B-10	Station support equipment - To support effective management of the station -	1 lot	Portable conveyor, gunny sacks, machine tool, typewriter, etc.
C. Maintenance Equipment For Irrigation System			
C-1	Excavator	1 unit	SAE 0.04 m ³ , 12ps diesel
C-2	Concrete mixer	1 unit	One bagger, 8ps gasoline
C-3	Brush cutter	1 unit	1.2 ps gasoline

4.4 Post Harvest Technology Demonstration Farm (PTDF)

1) Objective

To select leading farmers near around the PPMSs both at Sta Rita -Marita and Baluto CISs for transferring post harvest technology to farmers by means of demonstrating practical post harvest operations under the prescribed training program.

2) Site

Each four hectares both at Sta Rita - Marita and Baluto PPMSs belonging to selected private farmers.

3) Major Demonstration Program

Periodical demonstration to farmers will be conducted by Agricultural Production Technician on post harvest belonging to Municipal Agricultural Office of the DA under cooperation with PHILRICE, NFA, NAPHIRE, and CLSU.

- a) How to manage weeding
- b) How to protect plant
- c) How to reduce harvesting loss
- d) How to manage moisture content of rice

4) Infrastructure Development

Simple demonstration equipment such as manual weeder, hand sprayer, power sprayer, reaper, moisture meter and handy megaphone are required to prepare for effective and practical demonstration of post harvest technology, all of which are kept and managed in the related PPMS.

CHAPTER 5. FARM ROAD DEVELOPMENT

5.1 Barangay Road Development

Rural road consists of provincial and Barangay road by its function. Provincial road connects a municipality with other municipality playing an important role in social activities, while Barangay road defined as roads connecting a Barangay with other Barangay, farm, provincial or municipal road in the surrounding area. Since provincial government makes a great effort to improve the road, improvement of the provincial road conditions in the area are rapidly progressing, thus, the provincial road improvement should be excluded from the development plan. For the development plan, Barangay road is categorized into three parts according to their function; Barangay road proper, Barangay road and farm-to-market road. Barangay road proper is defined as any road within the Barangay proper area. Main road in a Barangay proper with a length of 100 to 200 meters is under concreting or planning to be concreted as the multi-purpose pavement, thus, improvement of the Barangay road proper should be excluded from the development plan. Therefore, the development plan should cover Barangay road and farm-to-market road.

The Barangay road development aims at improving the accessibility between the municipal proper and the rural area as well as supporting the agricultural development and the other rural infrastructure development.

The present road density of the Barangay road is rather higher than that of the national average, but rather low in the pavement ratio. Therefore, the development of Barangay road is proposed on the improvement of the existing road conditions (refer to Figure 5-1-1).

Barangay road development to be improved in the Pilot CISD are selected in due consideration of distance between Barangay and municipality, occurrence of water impound or interference in rainy season and bad conditioned road according to Barangay road status (refer to Appendix G.2). As a result, the following Barangay roads are involved in the development plan of the Pilot CISD (refer to Table G-4-6 in Appendix G.4).

<u>Location of the Proposed Barangay Road</u>	<u>Length (m)</u>
(1) Provincial Road - San Vicente - San Nicolas Balas	3,300
(2) San Antonio - Baluto	2,100
(3) Baluto - Calius Gueco	2,800
Total of the proposed Barangay road	8,200

Improvement of Barangay road contributes to save transporting time, reduction of labor force in transportation, increase of transport capacity, acceleration of agricultural productivity and promotion of living activities.

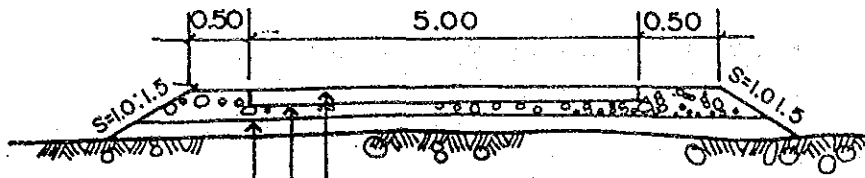
5.2 Farm-to-market Road Development

The development of farm-to-market road aims at improving the accessibility and transportability from Barangay or Barangay road to farms for intensification of carrying capacity of agricultural input and output and output as well as convenience of farmers for easy farming operation.

Farm-to-market road is defined as any road connecting farm to Barangay or Barangay road which is utilized for transportation of agricultural input. These road are rough and farmers are hardly carrying their agricultural products at the proper time. For the development plan, farm-to-market road should be gravelled.

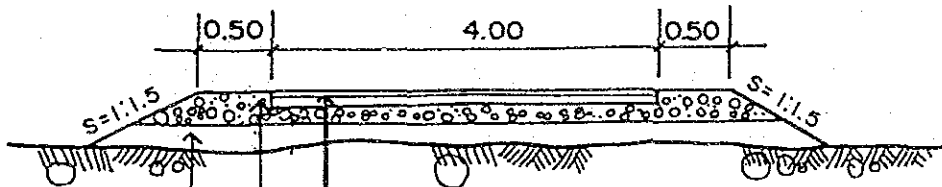
In Pilot CISD area, a farm-to-market road with 500 meters in length in Baluto CIS is selected for improvement (refer to Table G-4-7 in Appendix G.4).

CONCRETING



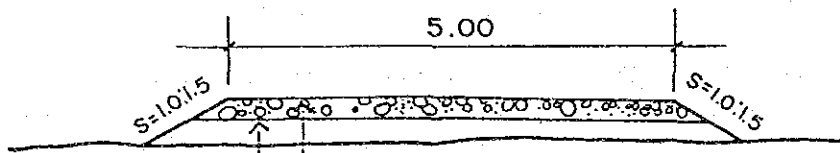
- ITEM 311 - P.C.C. PAVEMENT, t=0.20 M.
- ITEM 201 - AGG. BASE COARSE, t=0.10 M.
- ITEM 200 - AGG. SUB-BASE COARSE, t=0.15 M.

ASPHALTHING (READY MIX)



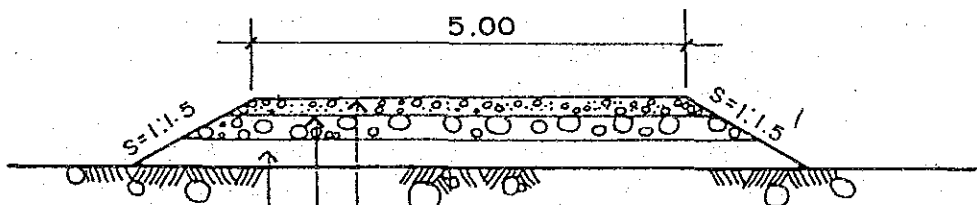
- ITEM 310 - BIT. CONC. SURFACE COARSE, t=0.075 M.
- ITEM 201 - AGG. BASE COARSE, t=0.10 M.
- ITEM 200 - AGG. SUB-BASE COARSE, t=0.15 M.

GRAVELLING I.1



- ITEM 201 - AGG. BASE COARSE, t=0.10 M.
- ITEM 200 - AGG. SUB-BASE COARSE, t=0.15 M.

GRAVELLING I.2



- ITEM 201 - AGG. BASE COARSE, t=0.10 MTS.
- ITEM 200 - AGG. SUB-BASE COARSE, t=0.15 MTS.
- ITEM 107 - COMMON BORROW, t=0.20 MTS.

Figure 5-1-1 Standard Cross-Section of Barangay Road

CHAPTER 6 INSTITUTIONAL DEVELOPMENT

6.1. Support Assistance for Strengthening of IAs

A strong, functional, cohesive and viable irrigators association is indicated by the followings;

- 1) Equitable distribution of water among members
- 2) Management of internal conflicts without outside intervention
- 3) Operation and maintenance of irrigation system, and
- 4) Financial solvency such that amortization could be paid on time

Items from 1) to 3) primarily concern to water management and, the item 4) relates to the amortization payment. The proposed institutional countermeasures which strengthen individual IA are tabled in succeeding pages (refer to Tables 6-1 to 6-5).

NIA's support should be needed in the field of training of farmers, smoothening of documentation and impartial fee collection from IA members. The conference on irrigation water allocation should be undertaken at the beginning of cropping season (two times a year) under the chairmanship of IA President. All CISs sharing same irrigation water source should dispatched the representative(s) to the conference and allocation of water in the subject cropping season should be outlined by discussion. Fine adjustment will be made during the planting season if necessary involving the concerned CISs.

Accordingly, each CIS has to prepare water delivery schedule and cropping calendar before the discussion. The BODs of IA should have the responsibility to prepare it under the assistance and guidance of PIO. The discussion should be held two times a year at the beginning of May and October. PIO will assist the BODs to prepare the schedule, which should be taken into consideration the time rag of irrigation based on the cropping calendar shown in Main Report ; viz. land preparation should be started with the CISs of upper reaches of the river and gradually shifted to the CIS of lower reaches with about two months of time rag.

Based on the conclusion of the conference, the IA should manage water distribution and fine adjustment should be undertaken by PIO's intermediation as occasion demands. PIO especially take care for the water distribution in the CISs on upper reaches.

Before planting season, PIO should promote IA Association Due (ISF) collecting campaign through encouraging and training of BODs and fee collectors. The campaign intends to; i) increase productivity through intensifying farmer's participation to water management activities (refer to Chapter 3.8.2 of Interim Report), ii) strengthen the IA's financial power through depositing the surplus dues, and

finally iii) increase amortization collection rate through upgrading of farm income. ICOs and IOWs make recognize BODs and collectors of the importance and effect of advance collection. Some CISs which are collecting IA association due in advance basis with more than 90 percent of collection rate are to be a touchstone of the promotion; i.e. the case of San Pedro CIS, Lilibangan CIS and Sto Rosario CIS will be a touchstone. The other CISs which have no advance collection system or less collection rate should immediately establish the suitable system by the advice of ICOs and IOWs.

Since solving of internal conflict of IA is being done smoothly without outside intervention now, there seems to be no problem in the Study area.

To undertake imperial fee collection, estimating of exact irrigated area and yield is essential factor. As shown in the Progress Report (II), the collectors who are privileged by the fee collection are the only who are examine the irrigated area and yield twice (before and after harvesting). Thus, two times of verification of irrigated area and yield is recommended as well as awarding to fee collectors. The case of Lucong CIS will be a touchstone of improvement. NIA should expand amortization collecting campaign taking into consideration the introduction of; i) stagewise penalty toward the CIS which could not fulfill the assigned task, and ii) suitable award toward the CIS which could successfully achieve a norm. PIO should grasp the problem such constraints which bring about low collection rate and in this sense, NIA should prepare data base on individual IA members visualizing of; i) socio-economic situation of IA members and collectors in charge, ii) former achievement of amortization payment, and iii) main reasons why he could not pay. Amortization collecting campaign is undertaken by ICOs and IOWs allowing for the above-mentioned data of IA, BODs, collectors and members.

Transportation facilities, audio visual equipment and computer system should be improved or introduced to strengthen the individual IA (refer to Figure 6-1).

Table 6-1 Proposed Model Institution of IA Organization

Water Management (1)

- Water Tender -

Recommended Plan : Water Tenders should be employed on periodical basis. He should check the brush dam(s) every day, while main canals should be checked on rotational basis. He should get a proper salary and one water-tender should cover not more than 100 hectares. Water tender should report every week about the condition of charged area and activities he has done. In large CIS such as Bamban and Lucong, additional specialist in charge of gete keeping, mechanic operation and book keeping should also employed in case of necessity. Water tenders take the responsibility to solve not only internal water conflict but also external water problems through the discussion with concerned water tenders in other CIS.

Evaluation of 19 CIsSs	Bamban CIS	F	San Martin CIS	F	Sto Rosario CIS	F
	San Pedro CIS	F	Baluto CIS	B	Sta Monica CIS	F
Refenal : G-Good	Malanzo CIS	B	Lilibangan CIS	B	Caluluan CIS	B
F-Fair	Bangu CIS	F	San Bartolome CIS	B		
B-Bad	Susuba- Cutcut CIS	B	San Isidro CIS	B		
	Telebanca CIS	F	Lucong CIS	G		
	Sta Rita CIS	F	Magao CIS	B		
	Marita CIS	G	Tinang CIS	G		

Table 6-2 Proposed Model Institution of IA Organization

Water Management (2)

- Mass Work -

Recommended Plan : Mass work should be undertaken at least twice a year before planting season. From time to time, the BODs of IA should ask the members to keep the canals clean and also water tenders are to give a necessary advice to them. There should be a reasonable penalty, which has enough effect for non-participant. Participation rate is desirable at more than 90%, Penalty should be strictly applied to non-participants.

Evaluation of 19 CIs	Bamban CIS	F	San Martin CIS	F	Sto Rosario CIS	G
	San Pedro CIS	G	Baluto CIS	F	Sta Monica CIS	B
Refenal : G-Good	Malonzo CIS	B	Lilibangan CIS	G	Caluluan CIS	B
F-Fair	Bangu CIS	F	San Bartolome CIS	F		
B-Bad	Susuba- Cutcut CIS	B	San Isidro CIS	B		
	Telebanca CIS	F	Lucong CIS	F		
	Sta Rita CIS	B	Magao CIS	F		
	Marita CIS	F	Tinang CIS	G		

Table 6-3 Proposed Model Institution of IA Organization

Water Management (3)

- IA Association Due (ISF) Collection -

Recommended Plan : Reasonable due collectors farmers rate at one collector per 70 to 80 farmers should applied. Due collection should be made not an case-to-case basis but in advance basis. Suitable penalty is to applied to non-payers. An example in Sto Rosario C/S is highly recommended; that is, no irrigation water is given to non-payers. Treasurers should save the collected money for the future use in most interest-born manner and if some amount remains at the end of the season, it should be deposited in the bank using time deposit system. The IA should define the criteria for payment specifying whether the farmer should pay or not in case of damage or dept. Due amount should not exceed farmer's affordability, favorably recommended 100 pesos per cropping or its equivalent.

Evaluation of 19 CISS	Bamban CIS	F	San Martin CIS	B	Sto Rosario CIS	G
	San Pedro CIS	G	Baluto CIS	B	Sta Monica CIS	F
Refenal : G-Good	Malonzo CIS	F	Lilibangan CIS	G	Caluluan CIS	B
F-Fair	Bangu CIS	B	San Bartolome CIS	B		
B-Bad	Susuba- Cutcut CIS	B	San Isidro CIS	B		
	Telebanca CIS	B	Lucong CIS	F		
	Sta Rita CIS	B	Magao CIS	B		
	Marita CIS	B	Tinang CIS	B		

Table 6-4 Proposed Model Institution of IA Organization

Amortization Collection

- Organizational Setup -

Recommended Plan : Collectors should be placed to cover less than 100 hectares or less than 50 farmer members. Same as the case of IA association due collection, IA should define the criteria for payment specifying whether the farmer should pay or not (exempted) in case of damage. Such definition should be made on break-even yield (or income) for payment, penalties and procedures needed for payment exemption, and so forth. To generate the collector's incentives, some privileged for collectors is also to be given. Reasonable penalty not only to non-payer but also to undoable IAs should be considered. On the contrary, the superior IA which keeps to pay complete amount in due time should be favorably privileged.

Evaluation of 19 CISs	Bamban CIS	G	San Martin CIS	F	Sto Rosario CIS	G
	San Pedro CIS	-	Baluto CIS	-	Sta Monica CIS	B
Refenal : G-Good	Malonzo CIS	-	Lilibangan CIS	-	Caluluan CIS	-
F-Fair	Bangou CIS	-	San Bartolome CIS	B		
B-Bad	Susuba- Cutcut CIS	-	San Isidro CIS	-		
	Telebanca CIS	F	Lucong CIS	G		
	Sta Rita CIS	-	Magao CIS	-		
	Marita CIS	F	Tinang CIS	-		

Table 6-5 Recommended Plan on Amortization Collection

Item	Recommended Plan	Model IA
- Number of Collector	1:100ha or 1:50 farmer	Sta Rita Marita Sto Rosario
- Privilege of Collector	Yes (10% of collected amount)	Sta Rita Lucong Sta Monica
- Presence of Penalty for Non Payer	Yes (Non-payer can not recieve water)	Sto Rosario
- Sense of Responsibility of IA Treasurer	Strong	Lucong Marita Sto Rosario
- Estimate of Yield	2 times (before and after harvesting)	Part of Lucong Sta Monica
- Presence of "Affordability to Pay" Criteria	Yes (30 cavan/ha is stand point)	Bamban
- Degree of Penalty Application	Strict	Sto Rosario
- Collection of Amortization	Immediately after Harvesting	(Lilibangan)*
- Privilege for well-found IA	Some amount should be rebated (Excess of 90% of Amortization)	Further improvement should be considered by NIA

* In case of IA association due collection.

6.2 Support Assistance for MFIA

6.2.1 Organization of the Association

Under the Pilot Communal Irrigation Systems Development (Pilot CISD), a total of three (3) CIS will benefit from the groundwater collecting conduit. Separate organization (MFIA) will be formed for each of the CIS, namely, the Marita-Sta Rita MFIA and the Baluto MFIA for the following reasons:

- i) The three CIS is separated by the Bambang River. Though there is a plan to build a bridge across the river, it is still in the planning stage. Communication in the three CISs is difficult especially during the rainy season.
- ii) The present progress of the organizations of the three CIS differs. Baluto CIS is inactive, while the other two are very active under the operation and maintenance stage of the participatory approach.
- iii) Economic status of the farmers also differs. The farmers of Marita and Sta Rita CIS have an average farm size of more or less 2.3 ha while farmers of Baluto CIS have 4.0 ha per farm.

It is expected in the future that these two MFIA's will be integrated and form FIA, since two MFIA's are located on the opposite bank of Bambang River and the discussion on water management and operation and maintenance of the facilities will be smoothly undertaken with common recognition of the problem and constraints. Allowing for the above mentioned reasons, NIA should apply the Participatory Approach from initial stage (Pre-con stage) for Baluto MFIA. While for Marita-Sta Rita MFIA, not only continuous application of the Participatory Approach for O/M stage, but also the adoption of the extended approach necessary for multi-functioning of prioritized IAs and for establishing of MFIA is needed. Further information on this approach is presented herein after.

As shown in Main Report, the sections to be formed in Marita-Sta MFIA are named as : i) Administrative Section, ii) Irrigation Management Section, iii) Agricultural Supervisory Section, iv) Agro-Processing and Marketing Section, and v) Education and Training Section. It is recommended that the chiefs of Complaints Committee, Finance and Development Committee and Audit and Inventory Committee from Marita and Sta Rita IA will form Administrative Section of MFIA. Likewise, the chiefs and co-chiefs of Irrigation Management Committee, Agricultural Supervisory Committee, and Education and Training Committee should form respectively Irrigation Management Section, Agricultural Supervisory Section and Education and Training Section of MFIA. The members of Agro-processing and Marketing Section should be newly nominated from existing Agricultural Supervisory Committee, recommend at 2 persons from each IA, and besides, one Board of Director who are elected from BODs of MFIA should concentratively take care the operation and management of the Section. Accordingly, the sections for Marita-Sta Rita MFIA is composed of 6 persons of Administrative Section, 4 persons each of Irrigation Management

Section, Agricultural Supervisory Section, and Education and Training Section, and 5 persons of Agro-processing and Marketing Section.

The representatives of Marita-Sta Rita MFIA, i.e. the president and vice-president, are to be elected from the candidates run for from among 18 BODs (the total of 7 BODs in Marita IA and 11 BODs in Sta Rita IA). In this case, it is preferable that the president and vice-president will be selected from different IA. At present, the period of assignment as the IA officials are quite same in both IA at one year. Thus, the period of assignment of the MFIA is also recommended at one year. The treasurer, auditor and secretary of the MFIA should be elected from among 6 persons of Administrative Section. As the same case with the election of top representatives, they should not be selected from same IA (refer to Figure 6-2).

The IAs in Marita and Sta Rita CIS should be managed as ever. The setup of MFIA will not affect original IA activities at all. The same can be said on IA committees. However, the present situation of Baluto CIS such that the IA activities are being done only in the wet season, and there is no water tender should be improved. The IA of Baluto CIS should employ 3 water tenders and 6 dues collectors.

6.2.2 Participatory Approach

To set up the Model Federation of Irrigator's Association among the prioritized Communal Irrigation Systems (CISs), the participatory Approach Program shall be applied paying attention to the followings :

- The ICOs should be fielded 8 to 9 months prior to the construction of the facilities. Since this is the first time that the federation of CIS is being undertaken in Region III, the ICOs should provide a strong support for the association. Two ICOs, male and female, are recommended in each MFIA. One female ICO is recommended because during the process of transition from individual IA to federated IA, woman's role in terms of managerial and financial aspects will become more important.
- According to the survey results of the prioritized CISs conducted by the Study Team in February 15, 1990, the representatives of the areas favor the plan and showed their willingness for the organization. It might take rather a long time for the Project to materialize, hence, continued discussions with the BODs and other concerned farmers should be undertaken to clarify the favorable motives.
- Implementation of the project is finally determined when 80% of the members agree with the plan. If they disagree, alternative plans will be considered.

- During the pre-construction phase of the Participatory Program, the ICOs and the BODs should exert their best effort to identify the potential leaders of the proposed association. The association then will be registered with the Cooperative Development Authority (CDA) as the "with stock, with profit" corporation. The assigned ICOs therefore, in cooperation with the Department of Agriculture will train the farmers on the concept of cooperative activities, procedural set-up and the proper management of the established association.
- At present there are about 190 registered members in Baluto CIS, however, 85 are also members of Marita and Sta Rita CIS. This number will change in the future. Assigned ICOs are tasked to initiate the cooperative movement and not to impose the farmers of his idea.
- The criteria for the qualification of memberships, definition of by-laws and registration to CDA are to be undertaken by the farmers at their own initiative. Accordingly, some members of the IA will also establish and register associations by themselves.
- NIA should decide in advance whether amortization of the proposed irrigation facilities and post-harvest facilities should be charged to the association or not. Although such decision may change in the future depending on the financial resources of the project, the following conditions should hopefully be realized, namely : Since this is the first time that the proposed organizational set-up is being undertaken in Region III, the amortization for the irrigation facilities should be cheaper and the service fee to be levied for the post-harvest facilities should also be reasonable enough. After the chargeable cost would have recovered, service fees collected would become NIA funds and should be utilized for the implementation of various training programs for the farmers. Excess funds can also be used as revolving funds for the next project.

6.2.3 Amortization and MFIA Association Dues Payment

Among 3 CISs which will form 2 MFIA, Bluto CIS presently has debt to NIA amounting to 262 thousand pesos, and as of now, the CIS has no plan to amortize it. In case the proposed plan would be realized, this debt should surely be repaid by the assumable 190 members of Baluto MFIA. The amount of 262 thousand pesos needs, provided that the members would amortized it as same amount as adjacent CIS at 170 pesos a year, at least eight years' of amortization period. Thus, the amortization amount for the proposed facilities should be, if allowing for this situation, set up at low level. Otherwise, the members of Baluto IA are deemed to disagree to the plan.

In case of Marita-Sta Rita MFIA, both IAs are now amortizing to NIA. Marita IA is levied on 13 thousand pesos of annual repayment with 10 years of remaining period, while Sta Rita IA has an annual obligation of 30 thousand pesos with 3 years of remaining period. Both cases suggest that it is very difficult to levy more financial burden on farmers and is impossible to increase amortizing amount.

Since the MFIA gears toward multi-functionalization of IA, it is natural to require more O/M cost for the organization than ever. This O/M cost should be charged by MFIA members. Concerned three IAs are now collecting O/M cost (as IA dues) on case to case basis when required. Both MFIA's should have the liability to operate and maintain proposed facilities such as PTFD, SMS, PPSM and FTDF and annual operation and maintenance costs for these facilities are estimated at 1,075 thousand pesos per MFIA. While, if the proper service charge which is reasonably lower than market price will be charged to members when they use the proposed facilities, i.e. threshers, dryers, transportation facilities, rice mill and so on, the operation and maintenance costs are easily raised from these charges. In this case, the amortization to NIA can be expected to amount to more or less 3,000 thousand pesos in total of both MFIA's. Accordingly, it can be expected that the proposed facilities for agricultural development will be easily operated and maintained by MFIA. Thus, the collection of MFIA association dues should be undertaken in the form of "operation charge" by the section in charge (before to Figures 6-3 to 6-4).

6.2.4 Required Facilities

The following facilities will be required for provision of support assistance for MFIA.

First, NIA should employ ICO/low for development of the organization. Taking into account the number of existing ICOs and LOWs in PIO, more two persons will be needed. Also, stationaries, the facilities related to printing and editing will be required for assistance and preparation for the organization.

Second, utility jeeps and trucks will be necessary for both MFIA's to operate and maintain proposed facilities as well as to propagate to other area. As mentioned above, the collection of service charge will be made in the form of operation charge and in this sense, the financial management of MFIA will be get more complex. Therefore, the computer systems will be needed in both organizations.

Figure 6 - 1 Proposed Strengthening Plan of IA

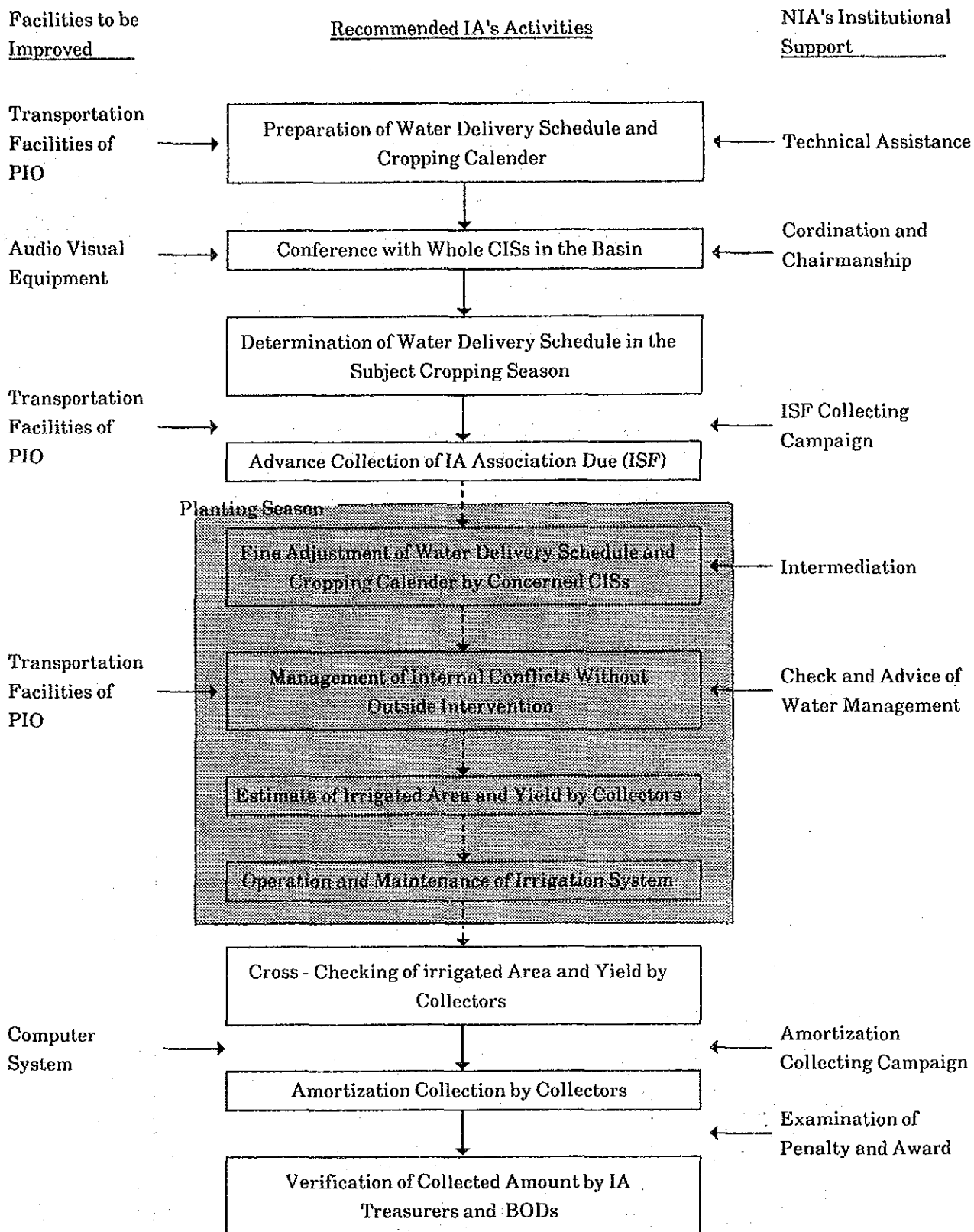
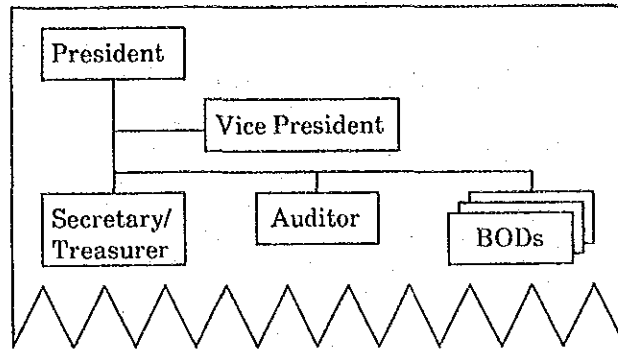


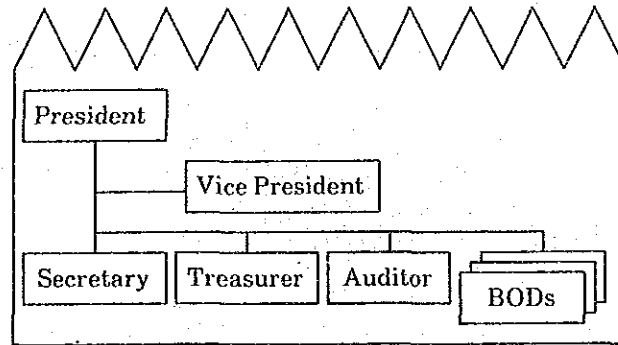
Figure 6 - 2 Organizational Setup in Marita - Sta Rita MFIA

Marita CIS BODs (7BODs)

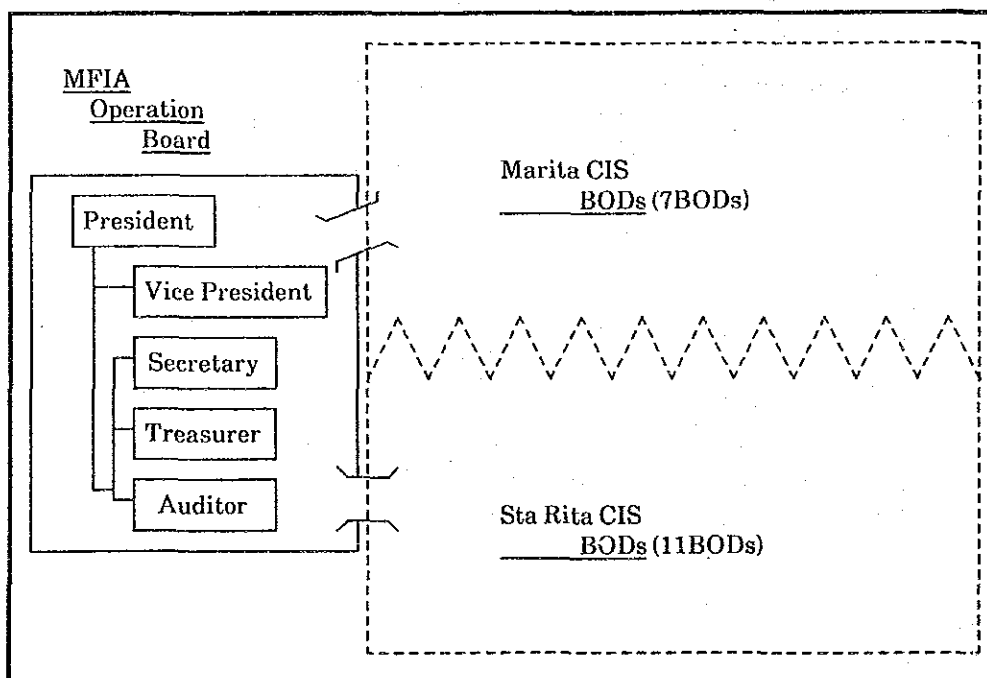


Present
Situation

Sta Rita CIS BODs (11BODs)



Marita - Sta Rita MFIA



With
Project
Situation

Figure 6-3

Expected Cash Flow for Service Chage Collection
(Marita-Sta Rita MFIA)

P 186,420	Service Charge for Threshing 1]				
+					
P 950,420	Service Charge for Drying 2]				
+					
P 42,240	Service Charge for Transportation 3]				
+					
P 15,000	Service Charge for Milling 4]				
P 1,194,080	Sub Total				
+					
P 37,920	Selling Amount of Certified Paddy Seed 5]				
P 1,232,600	Total Service Charge				
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">NIA Fund</td> <td style="width: 50%; text-align: center;">Association Dues 6]</td> </tr> <tr> <td style="text-align: center;">P 157,000.-</td> <td style="text-align: center;">P 1,075,000.-</td> </tr> </table>		NIA Fund	Association Dues 6]	P 157,000.-	P 1,075,000.-
NIA Fund	Association Dues 6]				
P 157,000.-	P 1,075,000.-				

- Note 1. Assumptions made in the calculations;
- Paddy Production in Marita-Sta Rita MFIA:

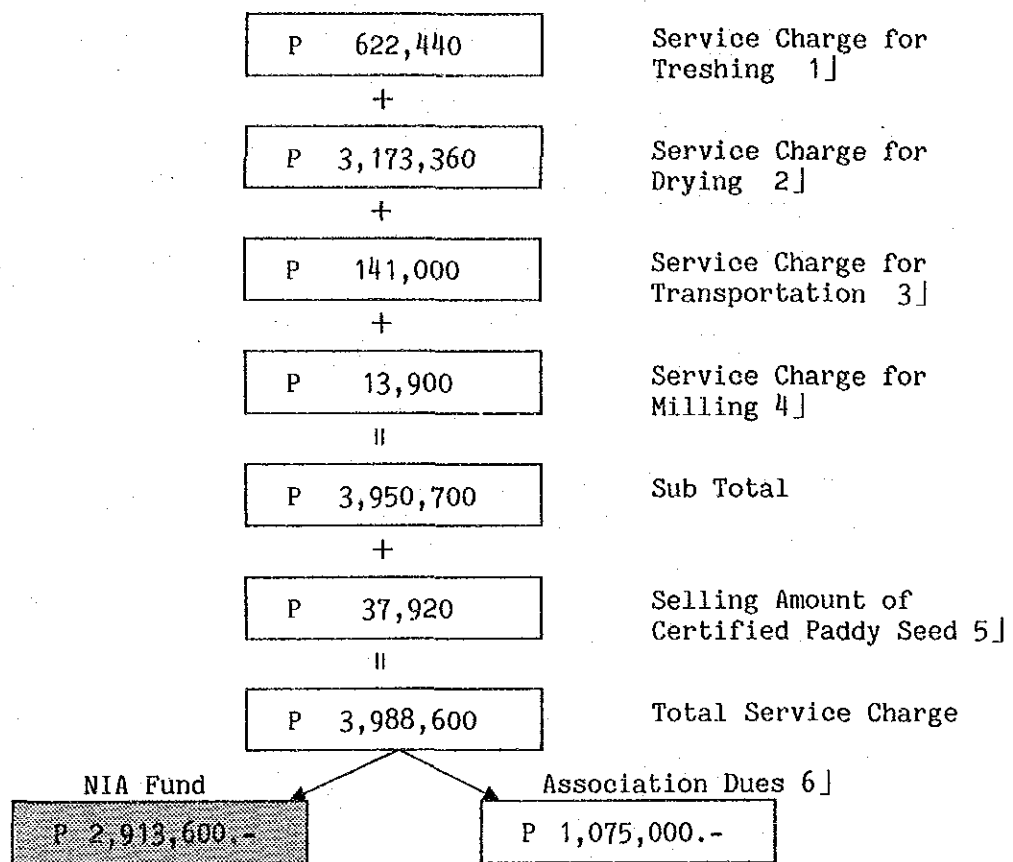
Wet Season	835ton/year	...	◇
Dry Season	360ton/year	...	◇
Total	1,195ton/year	...	◇
 - Self-Consumption of Paddy: 125ton/year ... ◇
 - Marketable Paddy: 1,070ton/year ... ◇
 - Mean Paddy Price in all Season: $(P3.5/kg(wet) + P4.5/kg(dry)) \div 2 = P3.90/kg$... ◇
 - Expected Threshing Charge: 4% of threshing amount ... ◇
 - Expected Drying Charge: P0.9/kg ... ◇
 - Expected Transpotation Charge: P2.00 per sack ... ◇
 - Expected Milling Charge: P0.20/kg of white rice ... ◇
 - Weight Recovery of Paddy (24% M.C → 14%M.C): 88.37% ... ◇

2. The Formula Adopted:

- 1] $\diamond \times \diamond \times 1,000kg \times \diamond$
- 2] $\diamond \times \diamond \times 1,000kg \times \diamond$
- 3] $\diamond \times \diamond \times 1,000kg \div 50kg \times \diamond$
- 4] $\diamond \times \diamond \times 0.60(\text{Milling Recovery}) \times 1,000kg$
- 5] $3ton/ha \times 2ha \times P6.32/kg \times 1,000kg$
- 6] Correspond with O/M cost for FTDF, SMS, PPMS and PTDF

Figure 6-4

Expected Cash Flow for Service Charge Collection
(Baluto MFIA)



Note 1. Assumptions made in the calculations;

- Paddy Production in Baluto MFIA:	Wet Season	2,550ton/year	①
	Dry Season	1,440ton/year	②
	Total	3,990ton/year	③
- Self-Consumption of Paddy:		116ton/year	④
- Marketable Paddy:		3,874ton/year	⑤
- Mean Paddy Price in all Season:	(P3.5/kg(wet) + P 4.5/kg(dry)) ÷ 2 = P 3.90/kg		⑥
- Expected Threshing Charge:	4% of threshing amount		⑦
- Expected Drying Charge:	P0.9/kg		⑧
- Expected Transpotation Charge:	P2.00 per sack		⑨
- Expected Milling Charge:	P0.20/kg of white rice		⑩
- Weight Recovery of Paddy (24% M.C→14%M.C):	88.37%		⑪

2. The Formula Adopted:

1] $\text{①} \times \text{②} \times 1,000\text{kg} \times \text{③}$

2] $\text{④} \times \text{⑤} \times 1,000\text{kg} \times \text{⑥}$

3] $\text{⑦} \times \text{⑧} \times 1,000\text{kg} \div 50\text{kg} \times \text{⑨}$

4] $\text{⑩} \times \text{⑪} \times 0.60(\text{Milling Recovery}) \times 1,000\text{kg}$

5] $3\text{ton/ha} \times 2\text{ha} \times \text{P}6.32/\text{kg} \times 1,000\text{kg}$

6] Correspond with O/M cost for FTDF, SMS, PPMS and PTDF

6.3 Assistance for Seminar and Training Program

6.3.1 Seminars and Training for MFIA Members

The Seminars and training for MFIA members should be undertaken to give them know-how for multi-functioning and operation and maintenance of the proposed facilities. Trainees should be selected by the ICOs concerned, composed not only of males but also female trainees. This program should be undertaken immediately after the implementation of the project will be accepted by the government. Training should be implemented by NIA with the assistance of the Department of Agriculture (DA) and LBP in matters of cooperative endeavors. Training Program should include: i) farm facility management, ii) auditing management and skills, iii) operation and maintenance of new irrigation facilities, iv) marketing research, and y) operation and maintenance of post-harvest facilities. Training should be continuously provided to the same personnel for a longer period of time. Training should also be provided with some visual aids, hence, Audio and Visual Equipment should be provided to the NIA Regional Training Center in Concepcion, Tarlac. Trainers from the private sectors, like successful people in agricultural cooperatives and auditors of banks should be tapped to provide training. With respect to auditing management and operation and maintenance of post-harvest facilities, the introduction of Japan Overseas Cooperation Volunteers (JOCV) is to be considered.

The initial funding for the training should first be provided by NIA. The expenses can be recovered gradually from the service fee the members pay for the use of the post harvest facilities provided.

6.3.2 Seminar and Training for Other CIS Members

The remaining 16 CISs outside MFIA are now on the various stages of institutional development process. The CISs namely, San Pedro, Bangcu, Susuba-Cutcut are placed on the primary stage which is classified as the CIS with no IA or not functioning IA. Besides, the IA of Tinang CIS has been established by farmer's own effort without any assistance from governmental agencies. Although any support from NIA is not provided now, the IA of Tinang can be put on the most advanced stage (O/M stage) on which other 7 CIS (except Marita and Sta Rita CIS for MFIA) are placed now.

NIA should provide proper seminar and training allowing for the development process of the IA. The proposed FRDF, SMS, PPMS and PTDF are expected to provide visual training material not only to the farmers in MFIA, but also to the inhabitants living in outside MFIA area. Through the introduction of audio-visual equipment to NIA's training center, the level of training will elevate. As presented in Figures 6-3 and 6-4, the amount repayable to NIA is good enough to cover these training expense for other CIS members. Accordingly, the financial burden of the farmers who could not afford to pay for the education and training will be lightened to some extent. Another problem of inaccessibility to NIA's training

center in Dutang-A-Matas will be improved through introduction of micro-bus for trainee.

CHAPTER 7. DEVELOPMENT COST

7.1 Condition of Cost Estimate

The project cost is estimated under the following conditions:

- 1) The project cost is estimated based on the current market prices in February 1990.
- 2) The construction is carried out by contract basis.
- 3) The unit price of materials, labor and civil works are mainly based on the analysis of unit construction cost updated by NIA in February, 1990. Those which are not available in the above-mentioned analysis are estimated by adding up all necessary cost for materials, labor and machine at the current market price (refer to Appendix L).
- 4) Engineering and administration cost is considered as 20% of the construction cost and physical contingency with 15% is also included in the project cost.
- 5) The exchange rate between Philippine Peso and U.S. Dollar is adopted at US\$ 1.00 = P 22.50.
- 6) The percentage for foreign and local currency portion is adopted according to Funding Institutions Standard prepared by NIA (refer to Appendix L).

7.2 Project Cost

The total project cost of Pilot CISD at current price is estimated at 221 million Pesos, of which 152.4 million Pesos is for foreign currency portion and 68.6 million Pesos for local currency portion (refer to Table 7-2-1 and Appendix L for in detail).

The annual operation and maintenance cost is composed of salary and wages for O & M organization staff, administration and general expenditure, equipment depreciation and repair cost, fuel and oil cost, maintenance cost of the facilities and office facilities, special expenditure for training/seminar/demonstration programs, and about ten percent of the total O & M cost as physical contingency.

The annual operation and maintenance cost for Pilot CISD is amounted at 5.42 million Pesos (refer to Table 7-2-2 and Appendix L).

Table 7-2-1 Summary of Development Cost of Pilot CISD at Current Price

Description	Unit	Q'ty	Unit Cost (Peso)	F.C. (1,000 Pesos)	Amount		Remarks
					L.C. (1,000 Pesos)	Total (1,000 Pesos)	
1. Agricultural Infrastructure Development				58,000	43,000	101,000	
1.1 Canal & Canal Structures							
7. Sta Rita CIS				11,600	15,000	26,600	
8. Marita CIS				2,200	3,600	5,800	
10. Baluto CIS				2,200	2,800	4,800	
				7,200	8,800	16,000	
1.2 Intake Structures				900	1,400	2,300	
8. Telebabca				900	1,400	2,300	
1.3 Diversion Dams				2,800	500	3,400	
14. Lucong CIS				1,000	200	1,200	
16. Tinang CIS				1,800	300	2,200	
1.4 Groundwater Collecting Conduit (GCC)				40,900	25,200	66,100	
(1) GCC for Sta Rita CIS and Marita CIS				17,700	9,800	27,500	
(2) GCC for Baluto CIS				23,200	15,400	38,600	
1.5 Shallow Wells				1,700	800	2,600	
(1) Drilling Rig w/ accessories				1,400	600	2,000	
(2) Shallow Wells Installation				300	300	600	
2. Farm Road Development				8,400	12,600	21,000	
2.1 Barangay Road				8,200	12,300	20,500	
2.2 Farm-to-market Road				200	300	500	
3. Agricultural Development				80,000	11,000	91,000	
3.1 Farming Technology Demonstration Farm (FTDF) 2 places				140	60	200	
3.2 Seed Multiplication Station (SMS)				2,800	600	3,400	
3.3 Pilot Primary Marketing Station (PPMS) 2 places				76,700	10,200	86,900	
3.4 Post-harvest technology Demonstration Farm (PTDF) 2 places				180	70	250	
4. Institutional Development				6,000	2,000	8,000	
4.1 Supporting Assistance for Strengthening of IA				1,300	600	1,900	
4.2 Support Assistance for MFIA				3,700	1,200	4,900	
4.3 Support Assistance for Seminar & Training Program				1,000	200	1,200	
Total				152,400	68,600	221,000	

Table 7-2-2 Summary of Annual Operation and Maintenance Cost for Pilot CISD
(Unit: 1,000 Pesos)

Description	Amount
1. Agricultural Infrastructure Development	2,710
1.1 Canal & Canal Structure	408
7. Sta Rita CIS	60
8. Marita CIS	79
10. Baluto CIS	269
1.2 Intake Structure	56
6. Telebanca CIS	56
1.3 Diversion Dams	129
14. Lucong CIS	43
16. Tinang CIS	86
1.4 Groundwater Collecting Conduit	2,040
(1) GCC Type-I	850
(2) GCC Type-III	1,190
1.5 Shallow Wells	77
2. Farm Road Development	340
2.1 Barangay Road	330
2.2 Farm-to-market Road	10
3. Agricultural Development	2,150
3.1 Farming Technology Demonstration Farm (FTDF)	60
3.2 Seed multiplication Station (SMS)	130
3.3 Pilot Primary Marketing Station (PPMS)	1,890
3.4 Post-harvest Technology Demonstration Farm (PTDF)	70
4. Institutional Development	220
4.1 Support Assistance for Strengthening IA	50
4.2 Support Assistance for MFIA	120
4.3 Support Assistance for Seminar & Training Program	50
Total	5,420

CHAPTER 8. IMPLEMENTING PROGRAM

8.1 Executing Agency

Considering the jurisdiction of irrigation and the past outstanding performance of NIA in this field, implementing agency shall be NIA with strong partnership of IAs and MFIA to be organized under the Project of Pilot CISD and also other government agencies concerned particularly with DA.

Under the administration of NIA Head Office and Regional Irrigation Office, Project Office headed by Implementation Manager (IM) shall be established directory under the Provincial Irrigation Engineer (PIE) of NIA (refer to Figure 8-1-1). The IM shall supervise the implementation of the project in consultation with the PIE and in cooperation with provincial/field engineers and officers of the other government agencies. Particularly the IM shall be paid special attention to the institutional aspects participated closely with the project by members of IAs or MFIA.

8.2 Implementing Schedule

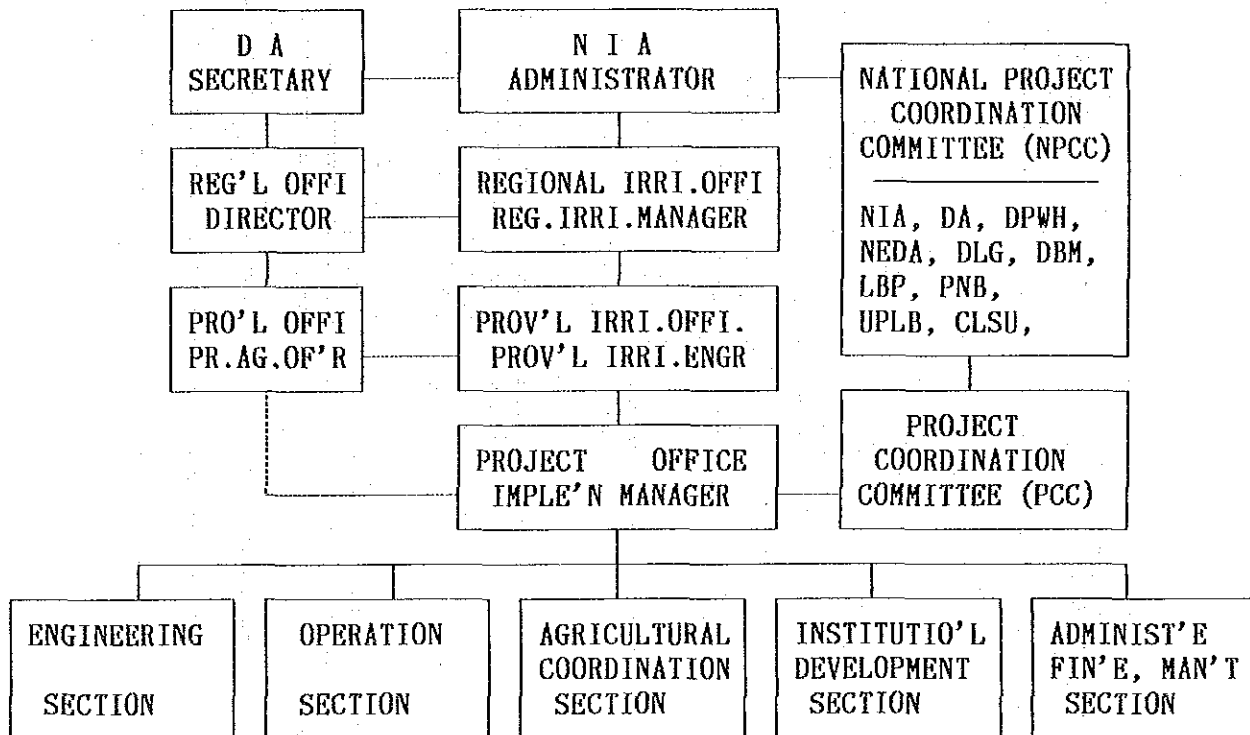
Pilot CISD Project should be carried out for a period of two years as pilot for model project implementation of improvement of communal irrigation systems (refer to Figure 8-2-1).

The physical development and basic institutional development will be sufficiently completed within the scheduled period, however, some activities particularly in institutional aspects shall be necessary to follow up continuously by NIA successfully to reach the target of the project.

8.3 Operation and Maintenance of the Project

After completion of construction of Pilot CISD, all facilities constructed / provided and equipment by the Project shall be turned over to the farmers' association of MFIA. The MFIA shall be responsible for the operation and maintenance of the said facilities and equipment under sufficient assistance and guidance of NIA through the PIE.

Figure 8-1-1 Organization of Project Office for Implementation



Note : Services of the Section

- Engineering Section : Planning and investigation, Design and specifications, Construction management,
- Operation Section : Systems management, Research and development, Equipment control and evaluation, Equipment maintenance and repair,
- Agricultural Coordination Section : Water management, Farming demonstration program, Seed multiplication, Post-harvest and marketing, Post-harvest technology demonstration program,
- Institutional Development Section : IAs organization, Seminar and training, Public affairs and information,
- Administrative Services, Finance, Management Section : Personnel and general services, Procurement and property, Legal, Management and budget, Accounting, Cash,

Figure 8-2-1 Implementing Schedule of Pilot CISD

Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Preparation Work (Detail Design, Preparation of Tender, Tender and Contract) Implementation																									
1. Agricultural Infrastructure Development 1.1 Canal & Canal Structure 1.2 Intake Structure 1.3 Diversion Dams 1.4 Groundwater Collecting Conduit 1.5 Shallow Wells																									
2. Farm Road Development 2.1 Barangay Road 2.2 Farm-to-market Road																									
3. Agricultural Development 3.1 Farming Technology Demonstration Farm 3.2 Seed Multiplication Station 3.3 Pilot Primary Marketing Station 3.4 Post-harvest Technology Demonstration Farm																									
4. Institutional Development 4.1 Support Assistance for Strengthening IA 4.2 Support Assistance for MFIA 4.3 Assistance for Seminar & Training Program																									
Engineering Services																									
Project Administration																									

CHAPTER 9. PROJECT EVALUATION

9.1 Introduction

Each CIS is a system for agricultural production, which consists of agricultural facilities, organization of farmers and farming technics. Aiming at improvement of such CISs, content of the Priority Project (the Project) is from irrigation facilities development to marketing development. Therefore, increase of agricultural production and farm income will be achieved effectively and multiplicatively through accomplishment of every components of the Project.

In this chapter, economic analysis is carried out from the standpoints of national economy by studying future project costs and benefits. Financial analysis is also carried out from the standpoints of farmers to be benefited. Project costs and benefits are estimated by constant price as of February 1990.

9.2 Project Cost

9.2.1 Financial Project Cost

The project capital cost is estimated at 221 million Pesos in financial value, which consists of 68.6 million Pesos of local currency portion and 152.4 million Pesos of foreign currency portion. The implementation period is assumed to be two years and the annual disbursement schedule is formulated in accordance with the implementation schedule of the Project (refer to Table N-1-1 in Appendix N).

Financial value of annual operation and maintenance cost is estimated at 5.42 million Pesos, which is wholly local currency portion (refer to Table N-1-3 in Appendix N).

9.2.2 Economic Project Cost

Economic project cost is estimated by applying opportunity cost of 0.39 for wages of unskilled construction labor in local currency portion and standard conversion factor of 0.78 for the rest of local currency portion. The economic project cost is evaluated at 197.67 million Pesos indicating conversion factor of 0.89 (refer to Table N-1-2 in Appendix N).

Economic operation and maintenance cost is evaluated at 3.20 million Pesos showing conversion factor of 0.59 (refer to Table N-1-3 in Appendix N).

The opportunity cost of unskilled construction labor is derived from multiplying the standard conversion factor (0.78) and the ratio of hired farm labor cost (65 Pesos per man-day) to financial wage rate of unskilled construction labor (130 Pesos per man-day).

9.3 Project Benefits

9.3.1 Tangible Benefit

Tangible benefits of the Project are quantified based on the following concept (refer to Table 9-3-1):

1) Agricultural Production Benefit

Agricultural production benefit accrues from increase of production, upgrading of quality of palay and reduction of post harvest losses of palay. Increase of production is realized by increase of yields of palay and cash crops as well as enlargement of cropping acreage through development of groundwater collecting conduits and shallow wells. Upgrading of quality of palay is expected from post harvest and institutional development. Upgrading of quality is evaluated at 0.9 Pesos financially and 0.36 Pesos economically in incremental value of palay of one kilogram. Reduction of post harvest losses of palay is ensured through post harvest development, etc. Post harvest losses are expected to reduce from 16.5 percent to 10.5 percent by the Project (refer to Tables N-3-1 & N-3-2 in Appendix N).

2) Barangay Road Benefit

Benefits accrue from concrete pavement of Barangay roads with the total length of 8.2 km. Barangay road benefits are counted as saving of vehicle operating cost (VOC). VOC saving is computed on agricultural use and non-agricultural use transportation separately (refer to Tables N-4-1 & N-4-2 in Appendix N). Future traffic volume of non-agricultural transportation is projected based on the results of traffic volume survey executed by the Study Term by applying annual growth rate of four percent (refer to Table N-4-3 in Appendix N).

3) Farm-to-Market Road Benefit

This benefit arises from gravel pavement of existing foot paths with the total length of 0.5 km. Without project situation, agricultural inputs and outputs will be transported by manpower through foot paths. On the other hand, manpower will be substituted by vehicle transport with future project condition. Farm-to-market road benefit materializes as transportation cost saving through this substitution of transportation method (refer to Table N-4-4 in Appendix N).

4) O & M Cost Saving Benefit

Existing 2 brush dams have been destroyed by flood several times a year and reconstructed by bulldozer after each destruction. After implementation of the Project, above reconstruction cost is to be saved through construction of the groundwater collecting conduits and semi-permanent structures in stead of brush dams (refer to Table N-4-5 in Appendix N).

9.3.2 Other Benefits

In addition to above mentioned tangible benefits, the following socio-economic benefits are expected to be realized with the Project:

- Increase of farm income will improve farmers' living standard such as nutrition, education and health, etc.

- Employment opportunity will be generated during the construction as well as O & M of the Project. Farming practices will also require much farm labor.
- Development of road network among villages and between villages and urban areas will improve social and living environment such as communication, traffic for work and school, public services and commerce. It will benefit not only farmers but also the whole residents of the project area on upgrading living standard.
- Institutional development will improve communication among CIS farmers influencing technical upgrading of crop cultivation and farm management. Favourable impacts on technical aspects will be expected on farmers around the CIS areas.
- The Project will be a precedent on improvement of CISs in the Philippines. Therefore, the Project will contribute toward nation-wide progress on CISS improvement as well as socio-economic rural development in southern Tarlac Province. This will alleviate disparity in living standard between rural and urban areas.

9.4 Economic and Financial Efficiency of the Project

9.4.1 Comparison of Cost and Benefit

1) Economic Internal Rate of Return

The internal rate of return (IRR) is employed to evaluate the Project from the viewpoints of national economy. The IRR of the Project is computed at 13 percent considering the project life of 50 years (refer to Table N-7-2 in Appendix N).

The IRR of the Project is not so high as the economic index. However, the Pilot CISD is a model project on improvement of CISs through physical and institutional development for thousands of CISs in the Philippines and includes pilot structures for further development in engineering aspects. Thus, the implementation of the Pilot CISD will play an important role to materialize the development concept of the Master Plan.

2) Sensitivity Analysis

In order to evaluate the sensitivity of the Project against the changes in future economic conditions, sensitivity analyses are studied (refer to table 9-4-1). The parameters employed are increase in project costs, reduction in benefits and combination of these parameters (refer to Tables N-7-3, N-7-4, & N-7-5 in Appendix N).

9.4.2 Farm Budget Analysis

Typical farm household in the Priority Project Area is middle farm of

part owner. There is a little difference in farm size conditions between the selected three CISSs and 19 CISSs. However, the effects of the Project on farm budget can be evaluated by using the results of the farm budget analysis on typical farm models of 19 CISSs, as follows: (refer to Tables N-6-3 & N-6-4 in Appendix N).

In without project situation, monthly average net farm income is estimated at about 1,300 Pesos for small farm and about 1,800 Pesos for middle farm. These figures are below the rural poverty threshold of about 2,000 Pesos in Region III. In with project situation, monthly average net farm income is expected to increase to about 2,000 Pesos for small farm and about 2,800 Pesos for middle farm. As for annual disposable income, it is expected to increase by about 7,500 Pesos for small farm and about 11,600 Pesos for middle farm. These incremental disposable income will contribute toward upgrading the living standard of farmers.

Table 9-2-1 Financial and Economic Project Cost

Description	Financial	Economic
1. Capital Cost (million Pesos)		
Agricultural Infrastructure Development	101.0	86.4
Farm Road Development	21.0	16.7
Agricultural Development	91.0	87.3
Institutional Development	8.0	7.3
Total	221.0	197.7
2. O & M Cost ('000 Pesos/Year)		
Agricultural Infrastructure Development	2,710	1,599
Farm Road Development	340	201
Agricultural Development	2,150	1,268
Institutional Development	220	130
Total	5,420	3,198

Table 9-3-1 Tangible Benefits at Full Development (Unit : million Pesos)

Description	Benefit	Relating Project Component
a) Agricultural Production	8.99	
Increase of Production	4.64	Agricultural Infrastructure, Agricultural and Institutional Development
Upgrading of Quality	2.71 ¹⁾	Agricultural & Institutional Development
Reduction of Post Harvest Losses	1.64 ²⁾	Agricultural & Institutional Development
b) Barangay Road	24.62	
Agricultural Transport	0.68	Farm Road Development
Non-agricultural Transport	23.94	Rural Development
c) Farm-to-Market Road	0.02	Farm Road Development
d) O & M Cost Saving	0.01	Agricultural Infra. Development
Total	33.64	

Note : ¹⁾ Palay Production(W/) \times 0.36 Peso/kg(Incremental Value) \times (1-0.105)
²⁾ Palay Production(W/) \times (0.165-0.105) \times 3.24 Peso/kg(Economic Value)

Table 9-4-1 Sensitivity Test

Alternative	IRR (%)
1. 10 % Increase of Project Cost	12
2. 10 % Decrease of Benefit	12
3. Combination of 1. and 2.	11

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