CHAPTER VI PROJECT IMPLEMENTATION

6.1 Organization for Project Implementation

6.1.1 Executive agencies of the Project

The Office of the Governor, Province of Benguet, shall be the executive agency for the Project and shall exercise overall coordination of the following activities:

a. Technical Services,

b. Project Planning,

c. Project Management,

d. Finance and Administration.

The Governor shall be responsible for project implementation and will organize the project office of LT/HIRDP with full mobilization of the Provincial Staffs and the La Trinidad Municipality Staffs.

The following coordinating agencies shall assist the PGB in their specific field:

a. National Irrigation Administration (NIA)

b. Department of Public Works and Highways (DPWH)

c. Local Water Utilities Administration (LWUA)

d. Benguet Electric Cooperative Inc. (BENECO)

e. Land Registration Commission (LRC)

f. Ministry of Agriculture (MA)

g. Benguet State University (BSU)

The Office of the Governor has a practical capability and much experience in carrying out the detailed design, construction control of civil works, and operation and maintenance of the completed facilities of the Provincial Project.

Every coordination agency also has a sufficient level of the technical knowledge and experiences to implement his specific project, and can assist the Office of the Governor as well as the project office of LT/HIRDP.

The Office of the Governor shall execute the detailed design and construction supervision in recruiting a consultant firm, the implementation of the construction of the Project and the guidance and coordination of O & M of the completed project facilities.

6.1.2 Project office of LT/HIRDP

At the field level, the detailed management and coordination of project implementation will be undertaken by the Project Office of LT/HIRDP, which will be organized by the Office of the Governor. The Project Office shall coordinate and supervise the activities which shall include the following:

a. Survey

b. Planning and Design

c. Construction Supervision

The technical staff of the Project office shall be provided by the agencies concerned. The proposed implementation organization chart is shown in Fig. 6.1.1.

(1) Project office equipment

Project office equipment shall be procured with the intention of extending the effect of the rural development project through the training of the Project office staff. Project office equipment shall consist of vehicles, office machines including micro computers and typewriters, survey equipments, agricultural technique extension concerned, etc.(for details, see Table J.2.6).

(2) Project office staff

The Project office shall be headed by a Project Manager. Each section shall have one (1) chief officer, and each subdivision shall have one (1) assistant officer.

6.2 Implementation Schedule

The implementation period has been estimated at three (3) years in total. The project implementation schedule is shown in Fig. 6.2.1. First year will be allocated to the preparatory works including tendering, survey and mapping, detailed design works, and preparatory works for the construction works. The actual construction works will be commenced from the second year. The construction works for irrigation and drainage facilities, drinking and domestic water supply facilities and rural road will need a period of two (2) years.

The existing road in the Project area will hardly be utilized for passing of the construction machinery and transporting construction materials due to the rough and irregular surface condition and narrow road width, the construction program shall be carefully determined with the consideration of effective complication of construction works. Construction of the irrigation facilities, the drainage improvement works and rural road construction shall be executed during the dry season to eliminate the damage by the heavy rainfall and resulting flood.

The indispensable equipments for project implementation, agricultural extension service and garbage disposal shall be provided to the Project office on the First year to expect an earliest appearance of the input effect of the equipments.

6.3 Construction Plan

The major construction works are composed of the following items:

(1) Irrigation facilities

Irrigation facilities consist of water storage pond, intake weirs, water conduit pipe, canals and on-farm irrigation structures. Eleven (11) ponds and eight (8) intake weirs are proposed.

(2) Drainage improvement

Drainage improvement works are proposed to the Balili river, the Bolo creek, the Bayabas creek and a part of the small creeks in Zone I. Major works are excavation of river bed, widening of river section, side slope lining and installation of a regulating sluice gates at the downstream of the Bolo creek so as to maintain the water level for pumping irrigation water during the dry season.

(3) Rural road

The improvement of the existing rural road and new construction of the farm to market roads are proposed in Zone II and Zone III. The concrete pavement for the improvement and the gravel pavement for the new constructed road are main subject of the works including provision of road drainage facilities, i.e. gutters, pipe and box culverts.

(4) Drinking and domestic water supply

Drinking and domestic water supply facilities are proposed in Zone II and Zone III. It is composed of deep wells, water purification facilities and water distributing facilities.

(5) Rural electrification

Electric power supply is proposed in Zone III. Extension of the electric wires connected with Zone I and Zone III is proposed.

(6) Sewerage

The sewage canals lined with concrete are required as a countermeasure to solve the sewage problem in Zone I. The total canal length 0.5 kms is proposed.

(7) Rural community center

Seven (7) rural community centers are proposed to promote the rural development programs.

As shown above, the construction works of the Project consist of various works, deep well, excavation, earth, concrete and piping works. The heavy duty construction equipment is required for the construction works of the irrigation facilities and the drainage improvement to conduct a large quantity of the earth works. Construction site is located in the mountainous area with much annual rainfall up to 3,500 - 4,000 mm. The construction works of the irrigation facilities and the drainage improvement shall be planned to execute during the dry season with taking account of easy drainage of the construction site or moisture control of the earth materials for excavation or embankment.

In Zone II and Zone III, existing roads are hardly utilized to transport the construction machinery and materials due to the rough surface and narrow road width, so that it is important to adjust the road construction schedule in the concrete pavement

order in consideration of the other concerned construction works which will be used for the said road for a large amount of transportation.

The pre-boring and pumping up test shall be executed during dry season in consideration of the fluctuation of the groundwater level and the pumping capacity of the deep wells.

As a result of the study, the construction plan has been tabulated as shown in Table 6.2.1.

6.4 Cost Estimate

6.4.1 Basic assumptions

The construction costs have been estimated on the following assumptions.

1) Unit prices are analyzed on the basis of the constant 1987 price level.

2) Exchange rate used in the estimate is shown as follows:

US $ 1.0 = ₱ 21.0

3) Construction work would be executed on full contract basis. The machinery and equipment required for construction work shall be provided by the contractors due.

4) Taxes on construction materials, machinery and equipment to be imported shall be excluded from the cost estimate.

5) The construction cost based on unit costs shall be divided into foreign and local currency portions.

6) As a physical contingency provision, 10 percent of the direct construction cost shall be included in the construction cost.

7) Price contingency shall also be taken into account at an annual escalation rate of 3 percent for the foreign currency portion and 5 percent for the local currency portion.

8) The associated costs to be financed by the Government shall not be included in the estimate.

6.4.2 Financial construction cost

The total construction costs of the Project are estimated at 301.5 million pesos, comprising 175.2 million pesos equivalent to 58.1 percent of the total construction costs for the foreign currency portion and 126.3 million pesos equivalent to 41.9 percent of the total construction costs for the local currency portion. A summary of the construction costs is shown in Table 6.4.1.

6.4.3 Annual disbursement schedule

The annual disbursement schedule has been established on the basis of the construction implementation schedule. Details are shown in Table 6.4.2.

6.4.4 Annual operation and maintenance costs

Annual operation and maintenance costs include salaries for project administration and staff, materials and labor costs for repair and maintenance of O&M equipment, and running costs of the project facilities. The annual operation and maintenance costs are estimated at 2.2 million pesos. The summary is given in Table 6.4.3.

6.4.5 Replacement costs

Some of the facilities, especially mechanical equipment have a shorter durable life than that of the civil constructions and are likely to require replacement at some time within the estimated project life cycle. The Table 6.4.4 shows the durable life and replacement cost for the mechanical equipment.

6.5 Organization for Operation and Maintenance

6.5.1 Operation and maintenance

At the field level, operation and maintenance responsibilities for various Project components facilities shall be directly shared in accordance with the following arrangements.

(1) Irrigation systems shall be operated and maintained by the communal irrigation system association under the technical guidance provided by NIA staff ;

(2) Drainage and sewerage systems shall be maintained by the Municipal Government of La Trinidad ;

(3) Barangay and new roads shall be maintained by the DPWH district office concerned ; provincial roads shall be maintained by the Provincial Engineer's Office concerned ;

(4) Domestic and drinking water supply systems shall be operated and maintained by the barangay water association under the technical guidance provided by LWUA staff ;

(5) Rural community centers shall be maintained by the barangay council ; and

(6) Electrification systems shall be maintained by BENECO.

The Provincial and Municipal Government shall provide adequate funds, staff and equipment to assure the effectiveness of operation and maintenance of the Project. To coordinate these activities, the Project Office shall be re-organized into the O&M Office of LT/HIRDP after completion of the construction work. The O&M Office shall be established as a part of the Provincial Government, and shall also perform the meteorological-hydrological and water quality observation.

6.5.2 Farmers' organizations

(1) General profile of farmers' organization in the Project area

There are five Communal Irrigation System (CIS), i.e., Pico CIS, Bahong CIS, Alapang CIS, Alno CIS and Bineng CIS, as present irrigator's organization in the Project area. 473 of 1,129 farm households in the whole Project area are registered in those CISs in all. Some of those, Alapang CIS and Alno CIS, are in name only. The

others have not been functioning well due to lack of irrigation water and inadequate irrigation facilities.

Some farmers' cooperatives or associations have been organized in La Trinidad. However, almost all of those are inactive mainly due to shortage of funds and less willingness.

(2) Plan of farmers' organization

Irrigation practice should impartially cover wide range of the Project area. As for operation and maintenance of proposed irrigation system, incentive and systematical corresponding by well organized farmers themselves are also required as an irrigators' organization. The irrigators' organization shall also act a farmers' organization with functions for agricultural activities. Accordingly, establishing of well trained and active irrigators' organization is the most essential and effective way not only for irrigation practice but also for agricultural technique extension activities.

In order to ensure the irrigation development and to manage smoothly and effectively the operation and maintenance of proposed irrigation system, stratified irrigators' organization are proposed as follows :

1) Farmer - Irrigators' Group (FIG)

Farmer - Irrigators' Group (FIG) which shall be established in each irrigation block, is the unit of farmers' organizations.

2) Farmer - Irrigators' Association (FIA)

Farmer - Irrigators' Association (FIA) shall be set up in each Zone, which shall be composed of FIGs existing in each Zone. The FIA shall assimilate existing CISs, covers same Zone.

3) Federation of FIA (FFIA)

Those FIAs shall be federated into one farmers' organization, namely, the Federation of FIA (FFIA).

For the planning of irrigation and cropping schedule, the overall plan on the said schedules in the whole irrigation service area shall be made by each FIA with advice of the O & M Offices. In line with FIAs' decisions and recommendations, respective FIGs shall practice irrigation and agricultural activities. FFIA shall govern whole FIAs so as to promote smooth irrigation practice and overcome some constrains for irrigation, and accelerate servicing of agricultural extension supports carried out by the

Office of the Provincial Agriculturalist which shall be strengthened by this Project through procuring equipments.

(3) Activities of FIG

FIG shall play the leading part of actual irrigation practice. The main activities of FIG are summarized as follows :

1) Scheduling of water delivery within the irrigation block,

2) Preparing guide line for irrigation method and practice, especially for severe drought condition,

3) Cleaning, maintenance and operation for irrigation facilities in the irrigation block,

4) Removing minor obstacles and repairing damages on irrigation facilities, and

5) Collecting irrigation service fees or contributions, and remitting them to offices that it may concern through FIA and FFIA.

Table 6.4.1 Summary of Construction Cost

Item	Foreign Currency (10^6₱)	Local Currency (10^6₱)	Total (10^6₱)
1. Construction Cost	122.5	94.6	217.1
1.1 Irrigation Facilities	35.8	32.0	67.8
1.2 Drainage Improvement	23.0	15.7	38.7
1.3 Rural Road	36.5	26.4	62.9
1.4 Drinking and Domestic Water Supply Facilities	23.8	17.3	41.1
1.5 Rural Electrification Facilities	1.0	1.0	2.0
1.6 Sewage Facilities	1.3	1.2	2.5
1.7 Rural Community Center	1.1	1.0	2.1
2. Land Aquisition	-	2.0	2.0
3. O & M Equipment	4.6	0.3	4.9
4. Administration Cost and Engineering Services	21.7	5.3	27.0
Sub- Total	148.8	102.2	251.0
5. Physical Contingency	14.7	10.2	24.9
T o t a l	163.5	112.4	275.9
6. Price Contingency	11.7	13.9	25.6
Grand Total (Financial Cost)	175.2	126.3	301.5

(Exchange Rate : US$ 1 = ₱21.0)

Table 6.4.2 Annual Disbursement Schedule of the Construction Cost

(Unit : 10^6 ₱)

Item	1st year			2nd year			3rd year			TOTAL		
	F.C.	L.C	Total	F.C.	L.C	Total	F.C.	L.C	Total	F.C.	L.C	Total
1. Construction Cost	3.1	2.4	5.5	59.9	46.7	106.6	59.5	45.5	105.0	122.5	94.6	217.1
1.1 Irrigation Facilities	0.7	0.7	1.4	12.1	11.9	24.0	23.0	19.4	42.4	35.8	32.0	67.8
1.2 Drainage Improvement	0.6	0.5	1.1	12.5	8.5	21.0	9.9	6.7	16.6	23.0	15.7	38.7
1.3 Rural Road	1.0	0.7	1.7	18.6	13.5	32.1	16.9	12.2	29.1	36.5	26.4	62.9
1.4 Drinking and Domestic Water Supply Facilities	0.8	0.5	1.3	14.1	10.3	24.4	8.9	6.5	15.4	23.8	17.3	41.1
1.5 Rural Electrification Facilities	-	-	-	1.0	1.0	2.0	-	-	-	1.0	1.0	2.0
1.6 Sewage Facilities	-	-	-	1.3	1.2	2.5	-	-	-	1.3	1.2	2.5
1.7 Rural Community Center	-	-	-	0.3	0.3	0.6	0.8	0.7	1.5	1.7	1.0	2.1
2. Land Aquisition	-	2.0	2.0	-	-	-	-	-	-	-	2.0	2.0
3. O & M Equipment	4.6	0.3	4.9	-	-	-	-	-	-	4.6	0.3	4.9
4. Administration Cost and Engineering Services	10.1	2.4	12.5	5.8	1.5	7.3	5.8	1.4	7.2	21.7	5.3	27.0
Sub-Total	17.8	7.1	24.9	65.7	48.2	113.9	65.3	46.9	112.2	148.8	102.2	251.0
5. Physical Contingency	1.6	0.7	2.3	6.6	4.8	11.4	6.5	4.7	11.2	14.7	10.2	24.9
Total	19.4	7.8	27.2	72.3	53.0	125.3	71.8	51.6	123.4	163.5	112.4	275.9
6. Price Contingency	0.6	0.4	1.0	4.4	5.4	9.8	6.7	8.1	14.8	11.7	13.9	25.6
Grand-Total	20.0	8.2	28.2	76.7	58.4	135.1	78.5	59.7	138.2	175.2	126.3	301.5

Table 6.4.3 Annual Operation and Maintenance Cost

Items		O&M Cost (1,000 pesos)
1. Project Office		
1-1	Office Expenses	50
1-2	Staff Salaries	135
2. O&M Cost for the Facilities		
2-1	Irrigation Facilities	
	Operation Cost	120
	Maintenance Cost	1,128
2-2	Drainage Facilities	
	Maintenance Cost	12
2-3	Rural Road	
	Maintenance Cost	240
2-4	Drinking and Domestic Water Supply Facilities	
	Operation Cost	385
	Maintenance Cost	76
2-5	Rural CommunityCenter	7
	Total	2,153

Table 6.4.4 Replacement Cost

	Items	Useful life (year)	Replacement Cost (1,000 pesos)
1.	O&M Equipment		
	Garbage Disposal Trucks	10	1,600
2.	Project Facilities		
2-1	Irrigation Facilities		
	Pump	20	990
	Vulves and Others	20	6,837
2-2	Drainage Facilities		
	Gate	30	2,400
2-3	Drinking and Domestic Water Supply Facilities		
	Pump	20	1,270
	Pipe, Valve and Others	20	17,200

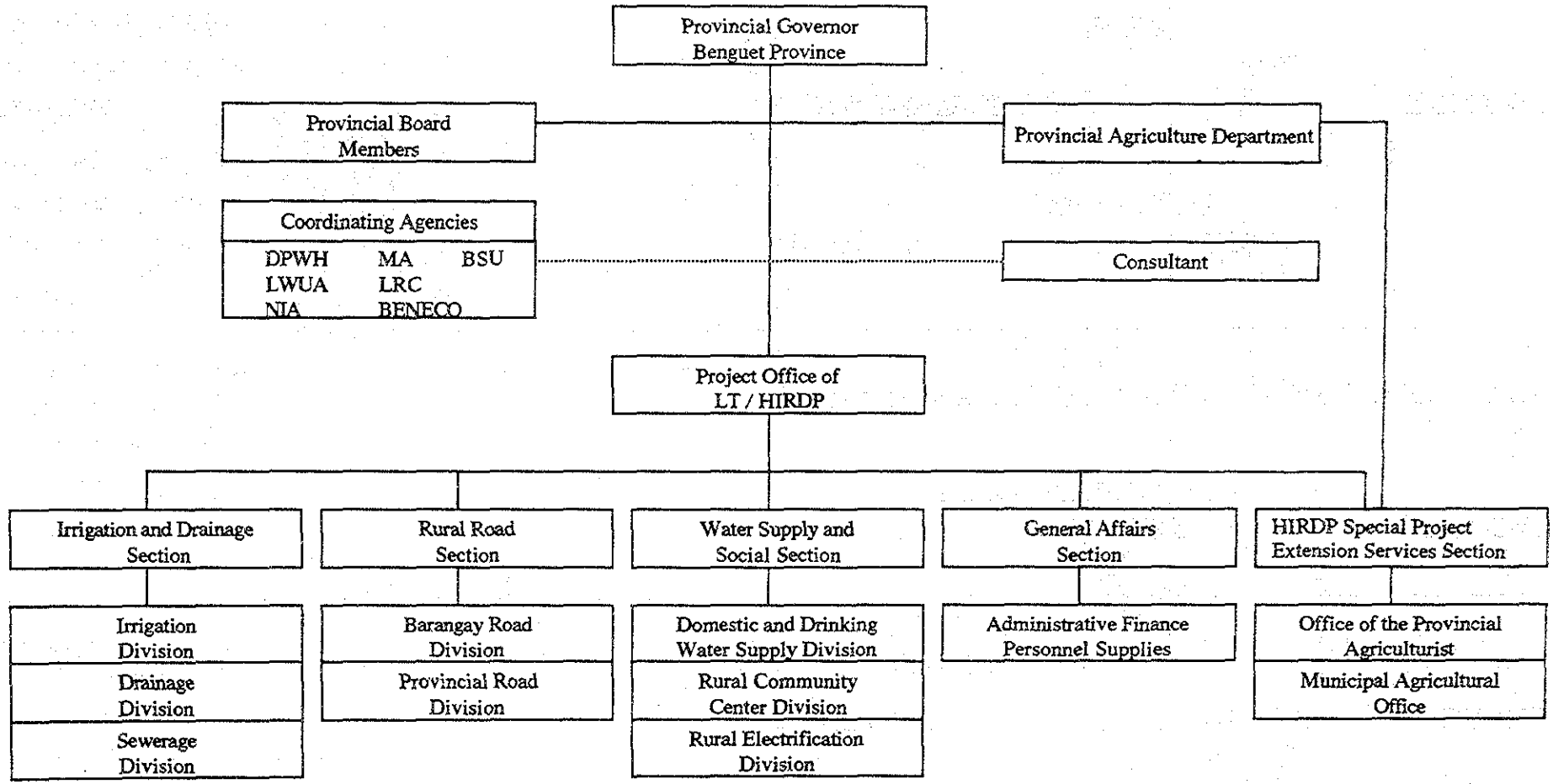

Fig. 6.1.1 Proposed Implementing Organization Chart

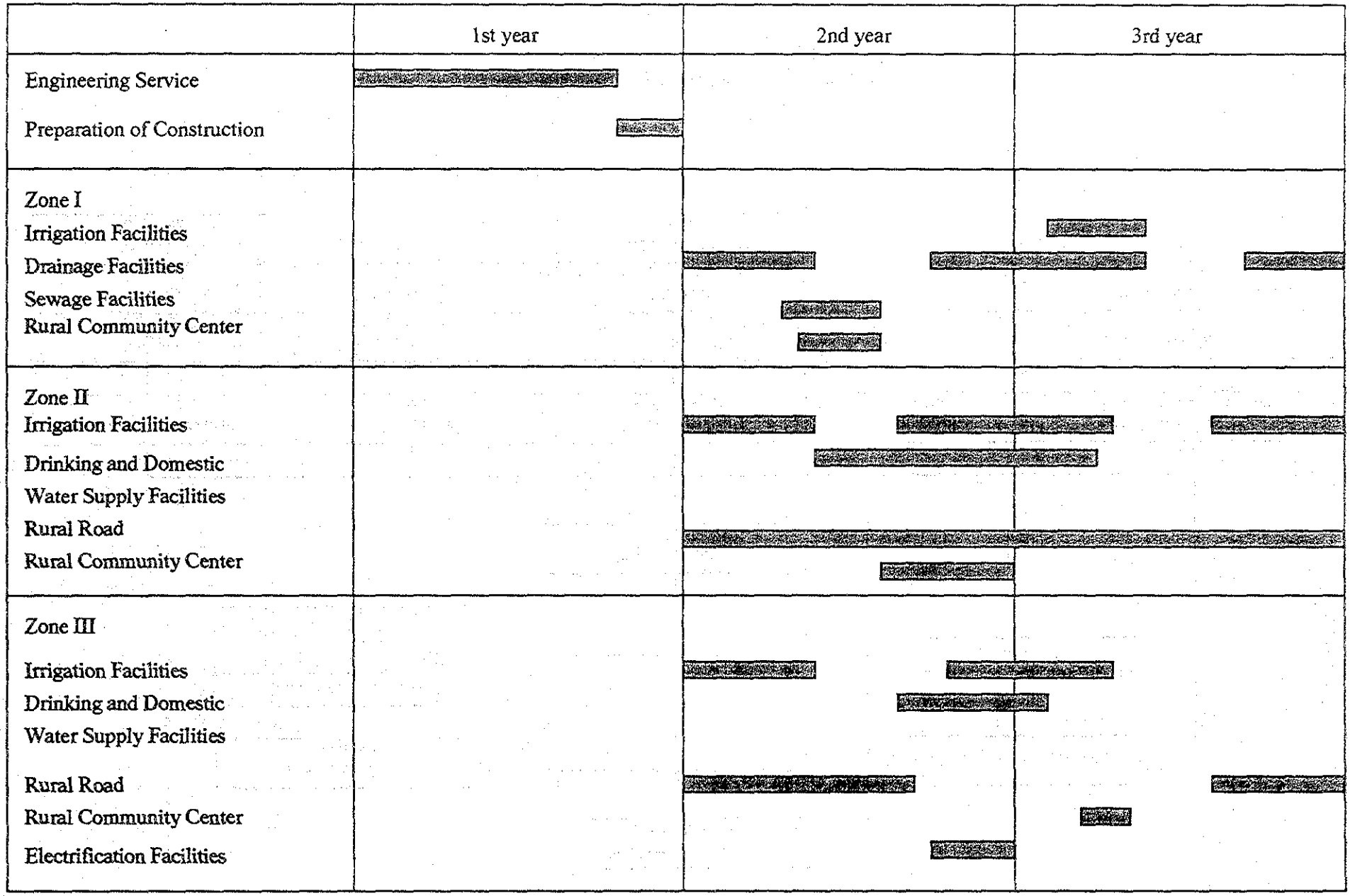

Fig. 6.2.1 Implementation Schedule of the Project

CHAPTER VII PROJECT EVALUATION

7.1 General

The evaluation of the Project has been carried out in terms of economic, financial and socio-economic aspects. The economic feasibility has been evaluated by calculating the economic internal rate of return (EIRR), net present value (NPV) and benefit cost ratio (B/C). Sensitivity analyses have also been carried out in order to elucidate the economic viability of the Project against the changes in the economic benefits, costs and the construction period. The financial feasibility has been evaluated by analyzing the effects of the Project on a typical farm budget. The socio-economic impact from the implementation of the Project has also been studied briefly.

7.2 Economic Evaluation

7.2.1 Basic assumptions

The economic evaluation has been carried out on the following basic assumptions :

(1) A conventional assessment ways will be adopted. The economic evaluation will be carried out on the directly productive components of the Project as : (i) irrigation ; (ii) drainage; and (iii) rural roads.

(2) The costs in the economic evaluation will also be studied on directly productive components in accordance with the assumption above mentioned.

(3) From the viewpoint of national economy as a whole, the transfer payments such as contract taxes, duties, subsidies, interests and depreciations should be considered as a domestic monetary movement without direct productivity. These transfer payments should be, therefore, excluded from the economic costs.

(4) Price contingencies will be excluded from the economic costs.

(5) The construction period will be three (3) years including one (1) year for detailed design.

(6) The economic useful life of the Project will be 35 years.

(7) All prices are expressed in constant 1987 prices.

(8) An exchange rate of US$ 1.00 = ₱ 21.0 is used throughout the report.

7.2.2 Economic factors

For the evaluation of economic prices and costs, the following criteria have been used. Each economic factor has been studied on reference to the Appraisal Report on the Highland Agriculture Development Project (HADP) performed by the Asian Development Bank (ADB).

(1) Economic prices for agricultural outputs and inputs

Prices of internationally traded inputs (fertilizer) have been estimated on the basis of projected international market prices by the World Bank, subject to the necessary adjustments, and are all expressed in 1987 constant value. Economic prices of all imported farm inputs except fertilizer have been converted from the current market price, assuming that 90 percent of the market price consists of foreign exchange and 10 percent of local currency which is adjusted using a standard conversion factor of 0.86. Economic prices of locally produced farm inputs have also been converted from the farmgate prices using a standard conversion factor. A shadow wage rate of 0.80 has been used for both family and hired farm labor. All economic prices of outputs have been converted into economic prices using a standard consumption conversion factor of 0.85. Financial farmgate prices of farm inputs and outputs have been estimated on the basis of current farmgate prices prevailing in the Project area as of 1987.

(2) Conversion factors of construction

The individual financial costs have been split into four (4) categories as transfer payment, foreign exchange, unskilled labor and others in local currency.

The economic opportunity cost of unskilled construction labor might be assumed to equal that of hired farm labor of ₱ 35 /man-day. Related to the financial wage rate of ₱ 55 /man-day for construction labor, this would give a conversion factor of (₱ 35 / ₱ 55) x 0.86 (SCF) = 0.55. The conversion factors for each cost component were as follows :

	Conversion Factor
Foreign Exchange Component	1.0
Local Currency (Unskilled Labor) Component	0.55
Local Currency (Others) Component	0.86
Transfer Payment Component	0.0

7.2.3 Economic benefits

Economic benefits have been calculated with respect to the following components: (i) irrigation ; (ii) drainage ; and (iii) rural roads.

(1) Irrigation

Benefits have been estimated as the difference between the future values of annual net crop production with and without project conditions. The net production value is defined as the difference between the gross production value and crop production cost.

The annual incremental net production values creditable to irrigation and agricultural extension services were estimated to be ₱ 17.325 million as shown in Table 7.2.1. The irrigation benefit may be expected to increase linearly on a yearly basis so that the full benefits may be reached about five (5) years after the completion of physical project implementation.

Negative benefits accrued from the procurement of land presently used for agricultural production was considered in the planted area under the with - project condition.

(2) Drainage

The annual drainage and flood control benefits creditable to the Project have been estimated to be ₱ 7.335 million. This presents the estimated average annual reduction in flood damage and the incremental net production values of agricultural crops in Zone I.

Monetary estimates of flood control benefit have been made including damage to residential and non-residential houses, personalty, realty, etc. Average annual reduction in flood damage has been estimated at ₱ 1.020 million as a likely value. The procedures for calculating are shown in Table 7.2.2, Table 7.2.3 and Table 7.2.4.

Investigations have demonstrated that farmers are reluctant to grow any crop plants in flood-prone areas in Zone I during the wet season, as cultivation in this season poses a serious risk of loss due to heavy rainfalls and flooding. The provision of adequate drainage to cope with the seasonal inundation problems would allow the farmer to grow crops even in the wet season without the risk of flood damage or loss. The additional marginal production increase due to the farmer's ability to grow crop plants even during the wet season would be an added benefit going directly to the credit of the drainage program. This extra marginal benefit has been estimated at 6.315 million pesos , a figure arrived at by multiplying the 29,100 pesos net return per ha. of land with the increased vegetable cropping area made available and amounting to 217 ha. The benefit associated with the provision of drainage ("drainage benefit") may be expected to reach its full scale some five (5) years after completion of physical project implementation.

(3) Rural roads

The benefits accruing from the amelioration and upgrading of roads can be considered as being due to the cost savings made as a result of more efficient vehicle operation to meet agricultural and non-agricultural transport needs. These benefits are referred to as vehicle-operating cost saving (VOC Savings) in the table. The benefits associated with new farm to market road construction schemes in the vegetable areas may be considered as being due to the resulting enhancement in the efficiency of goods (produce) transportation by using more efficient vehicular transport instead of the tradition head-carrying mode of transportation.

The benefits calculation are summarized in Table 7.2.5, Table 7.2.6 and Table 7.2.7 and the results are given below:

		Benefit (Million ₱)
Rehabilitation of Roads	VOC Savings on Agri. Transport	0.179
	VOC Savings on Non-Agri. Transport	1.053
Construction of New Roads	Transport Savings	0.356
Total		1.588

The benefits to agricultural and non-agricultural transport due to the construction of a rural road network may be expected to increase linearly on a yearly basis, so that the full benefits may be reached about five (5) and ten (10) years after completion of physical project implementation, respectively.

7.2.4 Economic costs

The economic costs have been considered in accordance with the calculation of the economic benefits.

(1) Capital cost

The financial costs have been converted into the corresponding economic costs by applying the conversion factors of construction for each cost component, as follows (for details, see Table 7.2.8) :

(Unit : ₱'000)

Cost Component	Financial Cost	Economic Cost
1. Construction Cost		
1.1 Irrigation	67,800	55,400
1.2 Drainage	38,700	32,600
1.3 Rural Roads	62,900	52,800
Sub-Total	169,400	140,800
2. O & M Equipment	3,300	3,300
3. Administration and Engineering Services	21,100	18,700
4. Physical Contingency	19,200	16,100
Total	213,000	178,900

(2) Annual operation and maintenance costs

The financial operation and maintenance costs have been converted into economic costs, using the conversion factors of construction below:

(Unit : ₱)

Project Component	Financial Cost	Economic Cost
Irrigation	1,248,000	661,000
Agricultural Extension Services	301,000	239,000
Drainage	12,000	10,000
Rural Roads	240,000	181,000
O & M Office	185,000	145,000
Total	1,986,000 (1,685,000)*	1,236,000 (997,000)*

* : Excluding Agricultural Extension Service

Annual operation and maintenance costs for agricultural extension services have been considered as arising from the commencement of the Project to the fifth year after completion of physical project implementation.

(3) Replacement costs

The financial replacement costs have been converted into economic costs, using the conversion factors of construction below :

Project Component	Useful Life (year)	Financial Cost (₱)	Economic Cost (₱)
Irrigation	20	7,827,000	6,832,000
Drainage	30	2,400,000	2,093,000

7.2.5 Economic internal rate of return (EIRR)

For the purpose of assessing the EIRR of the Project, only quantifiable benefits and relevant costs have been considered for calculation purposes. Therefore, the EIRR has been calculated for the project components of : (i) irrigation ; (ii) drainage ; and (iii) rural roads. The EIRR has not been studied for each economic component for the following reasons :

(1) Drainage benefits will be materialized in cooperation with irrigation and agricultural extension services ;

(2) Irrigation and agricultural extension services will be assured and enhanced by the rehabilitation and new construction of rural roads ; and

(3) Rural roads benefits attributable to VOC savings on agricultural transport will be assured by irrigation and agricultural extension services.

Based on the above, the EIRR of the Project has been estimated at about 10.2 percent. Net present value (NPV) and benefits cost ratio (B/C) have also been calculated at ₱ 41,545,000 and 1.25 respectively at a discount rate of 8 percent. Table 7.2.9 gives the calculation results.

7.2.6 Sensitivity analysis

In order to evaluate the soundness of the Project against the possible changes in future economic conditions, sensitivity analyses have been performed on the following assumptions :

Case-1 : 10 percent increase in investment costs

Case-2 : 10 percent decrease in benefits

Case-3 : One-year delay in implementation

The effects of these changes on EIRR are summarized as below :

Case	EIRR (%)
Case-1	9.4
Case-2	9.3
Case-3	9.7

7.3 Financial Evaluation

The financial feasibility has been evaluated by analyzing the effects of the Project on a typical farm budget.

7.3.1 Cost recovery

Direct cost recovery from farm beneficiaries would be limited to (i) the irrigation systems; (ii) domestic and drinking water supply systems; and (iii) rural community centers. Repayment requirements would be as follows :

(i) Irrigation Facilities :

All operation, maintenance and replacement costs would be borne by the communal associations responsible for irrigation systems.

(ii) Domestic and Drinking Water Supply Facilities :

Barangay water associations would be responsible for all operation, maintenance and replacement costs.

(iii) Rural Community Centers :

All operation and maintenance costs would be borne by the barangay councils.

All operation, maintenance and replacement costs for other project components would be met through budgetary allocations of the responsible agencies concerned and these will be indirectly recovered from taxes.

7.3.2 Farm budget analysis and payment capacity

Farm budget analyses on average size farmers have been studied under both the future with and without project conditions. Payment capacity is defined as the ability of farmers benefiting from the Project to bear the expenses required for operation and maintenance of the Project facilities as well as meet the repayments of capital cost. Payment capacity is measured by the balance which farmers can actually earn from the Project after farm expenses and living costs have been deducted from the gross farm income.

The payment capacity under the Project at the full development stage has been estimated as follows:

(Unit : pesos/year)

Items	Zone I		Zone II		Zone III	
	Without	With	Without	With	Without	With
Farm Size (ha)	0.87		0.70		0.91	
Net Farm Area (ha)	0.70		0.46		0.65	
Total Cultivated Area (ha)	1.32	2.39	1.02	0.99	1.35	2.13
Total Net Income	56,900	129,000	52,500	83,000	33,600	82,500
Net Farm Income	52,700	124,800	49,500	79,900	28,000	76,900
Non-Farm Income	4,200	4,200	3,100	3,100	5,600	5,600
Total Expenses*	50,200	80,600	45,900	53,200	32,600	53,300
Payment Capacity	6,700	48,400	6,600	29,800	1,000	29,200

* : Including irrigation fee under with conditions.

In the calculation of payment capacity, only agricultural benefits have been considered, because other monetary benefits attributable to flood control and rural roads have been estimated as accounting for only few percent of the payment capacity derived from agricultural benefits.

7.3.3 Surplus of farm household

Surpluses of average size farmers under the with-project conditions in each Zone were calculated tentatively by deduction of repayment required from the payment capacity described above. The amounts of repayment required have been calculated, based on the cost recovery schedule. The results of the calculations can be summarized as follows :

(Unit : pesos/year)

Items	Zone I	Zone II	Zone III
Farm Size (ha)	0.87	0.70	0.91
Net Farm Area (ha)	0.70	0.46	0.65
Total Net Income	129,000	83,000	82,500
Total Expenses *	80,600	53,200	53,300
Payment Capacity (A)	48,400	29,800	29,200
Repayment Required			
a) Irrigation	570	280	390
b) Domestic, Drinking Water	1,200	1,200	1,200
c) Rural Community Center	20	20	20
Sub-Total (B)	1,790	1,500	1,610
Surplus	46,610	28,300	27,590
(B)/(A)	0.04	0.05	0.06

As for the rural electrification program in Zone III, the annual electric charges have been estimated at about ₱ 2,000 with the assumptions : (i) monthly consumption rate of 92 kWh (Domestic Houses); and (ii) present power rate of ₱ 1.77 /kWh (Small Residence). The surplus in Zone III has been estimated at ₱ 27,590, so that, farming families would be able to afford electric services.

7.4 Socio-Economic Impacts

The benefits accruing from the implementation of the Project will not only be directly measurable ones that show up in an economic evaluation. Rather, the Project is likely to result in various secondary or intangible benefits in terms of the favorable socio-economic impact which is bound to generate among the rural population and their economy. The principal spinoff effects of the Project may be described as follows.

(1) Supply of vegetables and cut-flowers

The demand to vegetables and cut-flowers in the Metro Manila, the Ilocos and the Central regions is prospected to increase by 300,000 tons in the year 2000 in comparing the year 1986. It is expected that the vegetable production in the Project area will be 13,600 tons after completion of the Project resulting in 7,200 tons increase from the present level. In those situation, the region I involving the Project area as the supply base of the said agricultural produce will play very important role in the national economy.

(2) Increased employment and training effect

During project implementation, a large number of skilled and unskilled workers would be required, totalling about 14,000 man-months. After construction, operation and maintenance of the project facilities would require a substantial permanent staff of employees. This would contribute to improve local economic condition.

Many personnel would be recruited from the local communities to manage and operate the Project and trained. Those personnel would contribute to smooth implementation of the similar kind of the development project in the region. Thus, the training effect would be of importance in terms of encouraging local participation in the development effect.

(3) Feeling of happiness and stabilization of rural society

As a result of increased farm household income and increased property value owing to the Project, a feeling of happiness of farmer will rise widely and the rural society become stabilized.

(4) Transport system

To meet the transport needs for the increased production outputs under the Project, the existing local transportation system will need to be improved and expanded.

This, in turn, would create new employment opportunities as well as permitting closer community, social, and development relations.

(5) Rural roads

The obvious tangible benefits resulting from a better or new road system will bring are likely to be complemented by intangible benefits which, while the reality is difficult to quantify. These indirect benefits can be defined in terms of better mobility, improved access to health and education facilities, improved government services, shorter commuting times for the elementary and secondary school children, etc. .

(6) Potable and household water supply

The provision of household water supply systems will have a beneficial effect on the regional conduct of life, with an assured source of water that is safe to drink and use in terms of hygienic and sanitary conditions. The result would be improved conditions of public health and safe(r) agricultural produce free from chemical or other contaminants ingested through the polluted irrigation water. The non-economic effect would be quite considerable in terms of a net reduction of adult and especially infant morbidity and mortality due to waterborne and water-related infectious and parasitic diseases.

The general improvement in public health conditions would be to the benefit of the community as a whole, and this in turn, would spin off into improved per capita productivity and economic performance as the investment and running costs for the health services would diminish with a healthier population.

(7) Rural electrification

Electrification of the barangay would entail a considerable upgrading in the amenities available to the rural communities. The major benefit due to electrification would be better lighting and access to modern communication (radio, TV, etc.). Artificial lighting could be a benefit to the farm working late at night in the peak season. In off-peak seasons, lighting could provide the farming household with an opportunity to engage in such works as cloth weaving, repair of household equipment, community activities, and meetings. The availability of proper room lighting will enrich community life in the rural areas.

Direct benefits can naturally be expected in the form of net savings in fuel and maintenance costs as a result of the use of electricity in place of kerosene and diesel.

(8) Sewage and refuse disposal trucks

The use of certain water channels within the Project area for refuse and waste disposal increases the risk of diseases spreading and poses health hazes. The proposed sewage system and the provision of a refuse/waste collection service by dump truck as well as the passing of some enforceable health ordinances would greatly improve public health and hygiene.

(9) Rural community centers

owing to the provision of rural community centers, it is expected to accelerate such activity development as expansion of health care knowledge, extension of improved farming practice, strengthening of O&M of irrigation schemes and agricultural cooperatives, and executing farmers' schoolrooms and rural cultural circles, enlightening rural woman and to contribute to activate social communication.

7.5 Project Justification

7.5.1 General

The Project provides for basic infrastructure for increased production of commercial vegetables, including irrigation and drainage facilities and rural roads. The Project also provides for agricultural extension services through which the farmer's bargaining position would be strengthened. In addition, a better social infrastructure would be provided under the Project, including domestic and drinking water supply systems, rural electrification, sewage canals and rural community centers, which would result in many favorable socio-economic consequences. These Project components are mutually reinforcing and ensure a maximum impact of the investment.

7.5.2 Projected demand for, and supply of, vegetables

The future demand for vegetables in Metro Manila, Ilocos Region and Central Luzon Region have been estimated on the assumptions of a normal population growth rate, increase in per capita income and income elasticities of demand for each vegetable.

Total demand for vegetables in three regions in the year 2000 is estimated to increase by about 300,000 tons or 35 percent of the 1986 demand. The increased production of 7,200 tons in the Project area in the year 2000 will fall short of the projected increase in demand by about 2.4 percent in the above three regions. Therefore, it is unlikely that the Project would cause an excess supply that would outstrip the future demand for vegetables.

7.5.3 Beneficiaries

A total of 950 farm families, most of whom are small subsistence farmers cultivating less than one ha, will share the direct Project benefits. The Project will also indirectly benefit about 4,800 other families in La Trinidad through the refuse collection truck service, and uncountable families in the external influence areas of the rehabilitated and new opened rural roads.

7.5.4 Economic viability

It can be seen that the required investment costs are relatively high in comparison with the tangible monetary benefits expected in the agricultural sector, so that the Project can not reach an EIRR level of 15 percent required as the qualifying condition for funding by international loan agencies. The Project is estimated to yield an EIRR level of 10.2 percent, however, the Project involves many intangible benefits answering basic human needs and other social impact, particularly to the cultural community development that composed the Cordillera Region. The Project is justified to be carried out with high priority.

7.5.5 Financial viability

The financial impact of the Project on the average family farm size has been examined through farm budget analysis. Total net income would be expected to increase 1.6 to 2.5 times as compared with a future without project condition. Surpluses of farm households would also substantially increase. Thus the Project would be financially viable at the farm level, and would be adequate incentives for further development.

Table 7.2.1 Irrigation Benefit

ZONE / CROPS	Planted Area		Net Return per ha		Annual Profit		Net Incremental Benefit
	Without	With	Without	With	Without	With	
	(ha)	(ha)	(pesos/ha)	(pesos/ha)	(pesos)	(pesos)	(pesos)
ZONE I	305	323			7,197,700	12,431,300	5,233,600
Strawberry	56	40	60,500	104,900	3,388,000	4,196,000	808,000
Vegetables*1	249	283	15,300	29,100	3,809,700	8,235,300	4,425,600
ZONE II	343	325			10,293,900	18,613,000	8,319,100
Rose	60	59	88,500	167,600	5,310,000	9,888,400	4,578,400
Vegetables*1	283	266	15,300	29,100	4,329,900	7,740,600	3,410,700
Intercropping*2	60	60	10,900	16,400	654,000	984,000	330,000
ZONE III	146	230			1,470,800	5,243,000	3,772,200
Rice	50	50	40	100	2,000	5,000	3,000
Vegetables*1	96	180	15,300	29,100	1,468,800	5,238,000	3,769,200
						Total	17,324,900

Note :

*1 Vegetables : Lettuce, Garden pea, Green onion, Chinese cabbage, Baguio bean, Celery.

*2 Intercropping : Celery, Green onion, Gladiolus.
Net return of intercrop was estimated half of the normal cropping.

Table 7.2.2 Estimation of Flood Damage to Houses

Return Period (year)	High Water Level (El.m)	Max. Inundated Area (ha)	(Residential Houses) Damaged Number *1	Values *2 (₱ '000)	Damage Rate *3	Flood *4 Damage (₱ '000)	(Non-residential Houses) Damaged Number *1	Values *2 (₱ '000)	Damage Rate *3	Flood *4 Damage (₱ '000)	Total Houses Damage (₱ '000)	Other Damage *5 (₱ '000)	Total Flood Damage (₱ '000)
1.5	1,308.0	0	0	0	0	0	0	0	0	0	0	0	0
2	1,308.7	30	3	300	0.15	45	0	0	0	0	45	9	54
5	1,310.5	88	41	4,100	0.16	656	3	1,350	0.12	162	818	164	982
10	1,311.3	119	97	9,700	0.21	2,037	9	4,050	0.18	729	2,766	553	3,319
20	1,312.0	143	153	15,300	0.24	3,672	18	8,100	0.21	1,701	5,373	1,075	6,448
50	1,313.1	176	297	29,700	0.29	8,613	49	22,050	0.25	5,513	14,126	2,825	16,951
100	1,313.9	195	385	38,500	0.34	13,090	69	31,050	0.30	9,315	22,405	4,481	26,886

Note :

*1 The number of damaged residential houses was estimated with growth rate of 1.5 % p.a. based on the number of houses described on the topographical maps exposed in 1981-1982. The number of damaged non-residential houses was counted based on the same topographical maps.

*2 Values of residential house were estimated with the rate of ₱ 100,000 per house, and non-residential houses of ₱ 450,000 per house. These value rates were estimated from the data prepared by National Census and Statistics Office through some adjustment.

*3 Damage rate was culculated based on the figures below considering the distribution of houses number in each inundation depth class.

Inundation depth (cm)	Damage rate
- 50	0.124
50 - 99	0.210
100 - 199	0.308
200 - 299	0.439
300 -	0.572

*4 Flood damages to houses were calculated as the product of values and damage rate for various return periods.

*5 Other damages were estimated as 20 % of total houses damage based on the results of flood damage inventory survey. Other damages consist of personal property and real property etc..

Table 7.2.3 Estimated Reduction in Flood Damage to Houses

Return Period (year)	Without		With		Damage Reduction (₱ '000)
	Inundated Area (ha) *1	Flood Damage (₱ '000) *2	Inundated Area (ha) *3	Flood Damage (₱ '000) *4	
1.5	0	0	0	0	0
2	30	54	0	0	54
5	88	982	0	0	982
10	119	3,319	31	58	3,261
20	143	6,448	55	275	6,173
50	176	16,951	88	982	15,969
100	195	26,886	107	2,200	24,686

Note :

*1 For details, see APPENDIX G.

*2 Source : Table K.2.2.

*3 Inundated area with Project conditions was calculated as inundated area without Project conditions minus 88 ha., which is present inundated area at five(5)-year return period.

*4 Flood damage with Project conditions were derived from Fig. K.2.1 in relation to the inundated area.

Table 7.2.4 Estimated Average Annual Reduction in Flood Damage to Houses

Return Period (year)	Probability *1 of Occurance	Damage *2 Reduction (₱ '000)	Expected *3 Reduction (₱ '000)
1/1.5	—	0	—
1/2	0.235	54	12.7
1/5	0.200	982	196.4
1/10	0.075	3,261	244.6
1/20	0.040	6,173	246.9
1/50	0.020	15,969	319.4
1/100	—	24,686	—
Total (Average Annual Reduction)			1,020.0

Note :

*1 Probability of occurance (Fn) is calculated as follows :

Fn = (Pn-1 - Pn+1) / 2,

where Pn-1 and Pn+1 are probabilities of exceedance in front and behind the Pn, which corresponds to Fn.

*2 Source : Table K.2.3.

*3 Expected reduction was calculated as the product of damage reduction and probability of occurence for various return periods.

Table 7.2.5 VOC Savings on Agricultural Transport (1/2)

Influence Area	Project Conditions	Crop	Annual Traffic (doz,ton)	Jeepney (1t) Traffic (doz, t)	Required Transport*1 (Vehicle)	Road Length (km)	Total Length (km)	VOC (P '000)	Small Truck (2t) Traffic (doz, t)	Required Transport*1 (Vehicle)	Road Length (km)	Total Length (km)	VOC (P '000)	Total VOC (P '000)	VOC Savings (P '000)
A II - 1	W/O	Rose	91,445	91,445	183	3.30	603.9	3.10							
		Veg.	178.81	178.81	358	3.30	1,181.4	6.07						9.17	
	W	Rose	91,445	45,723	91	3.30	300.3	0.70	45,723	61	3.30	201.3	0.74		5.27
		Veg.	178.81	89.41	179	3.30	590.7	1.37	89.41	89	3.30	293.7	1.09	3.90	
A II - 2	W/O	Rose	63,580	63,580	127	3.30	419.1	2.15							
		Veg.	116.88	116.88	234	3.30	772.2	3.97						6.12	
	W	Rose	63,580	31,790	64	3.30	211.2	0.49	31,790	42	3.30	138.6	0.51		3.51
		Veg.	116.88	58.44	117	3.30	386.1	0.90	58.44	58	3.30	191.4	0.71	2.61	
A II - 3	W/O	Rose	253,526	253,526	507	3.80	1,926.6	9.90							
		Veg.	475.99	475.99	952	3.80	3,617.6	18.59						28.49	
	W	Rose	253,526	126,763	254	3.80	965.2	2.24	126,763	169	3.80	642.2	2.38		16.32
		Veg.	475.99	238.00	476	3.80	1,808.8	4.20	238.00	238	3.80	904.4	3.35	12.17	
A II - 4	W/O	Rose	339,095	339,095	678	1.90	1,288.2	6.62							
		Veg.	623.37	623.37	1,247	1.90	2,369.3	12.18						18.80	
	W	Rose	339,095	169,548	339	1.90	644.1	1.49	169,548	226	1.90	429.4	1.59		10.78
		Veg.	623.37	311.69	623	1.90	1,183.7	2.75	311.69	312	1.90	592.8	2.19	8.02	
A II - 5	W/O	Rose	190,741	190,741	381	3.10	1,181.1	6.07							
		Veg.	350.65	350.65	701	3.10	2,173.1	11.17						17.24	
	W	Rose	190,741	95,371	191	3.10	592.1	1.37	95,371	127	3.10	393.7	1.46		9.88
		Veg.	350.65	175.33	351	3.10	1,088.1	2.52	175.33	175	3.10	542.5	2.01	7.36	
A II - 6	W/O	Rose	77,512	77,512	155	1.55	240.3	1.24							
		Veg.	155.55	155.55	311	1.55	482.1	2.48						3.72	
	W	Rose	77,512	38,756	78	1.55	120.9	0.28	38,756	52	1.55	80.6	0.30		2.13
		Veg.	155.55	77.78	156	1.55	241.8	0.56	77.78	78	1.55	120.9	0.45	1.59	
A II - 7	W/O	Rose	21,861	21,861	44	1.00	44.0	0.23							
		Veg.	42.80	42.80	86	1.00	86.1	0.44						0.67	
	W	Rose	21,861	10,931	22	1.00	22.0	0.05	10,931	15	1.00	15.0	0.06		0.38
		Veg.	42.80	21.40	43	1.00	43.0	0.10	21.40	21	1.00	21.0	0.08	0.29	

Note : 1 : Requiired transport (RT) was calculated as follows : (RT) = 2 x (Traffic)/(Loading Capacity of Vehicle).
2 : Required transport of Rose was calculated as follows : Jeepney (1t) = 1,000doz/Vehicle ; Small Truck (2t) = 1,500 doz/Vehicle
3 : As for the individual traffic cost, see Table K.2.5.

Table 7.2.5 VOC Savings on Agricultural Transport (2/2)

Influence Area	Project Conditions	Crop	Annual Traffic (doz,ton)	Jeepney (1t) Traffic (doz, t)	Jeepney (1t) Required Transport*1 (Vehicle)	Jeepney (1t) Road Length (km)	Jeepney (1t) Total Length (km)	Jeepney (1t) VOC (P '000)	Small Truck (2t) Traffic (doz, t)	Small Truck (2t) Required Transport*1 (Vehicle)	Small Truck (2t) Road Length (km)	Small Truck (2t) Total Length (km)	Small Truck (2t) VOC (P '000)	Total VOC (P '000)	VOC Savings (P '000)
A II - 8	W/O	Rose	1,138,824	1,138,824	2,278	2.35	5,353.3	27.52							
		Veg.	2094.06	2094.06	4,188	2.35	9,841.8	50.59						78.11	
	W	Rose	1,138,824	569,412	1,139	2.35	2,676.7	6.21	569,412	759	2.35	1,783.7	6.60		44.78
		Veg.	2094.06	1,047.03	2,094	2.35	4,920.9	11.42	1,047.03	1,047	2.35	2,460.5	9.10	33.33	
A II - 9	W/O	Rose	125,775	125,775	252	1.30	327.6	1.68							
		Veg.	234.09	234.09	468	1.30	608.4	3.13						4.81	
	W	Rose	125,775	62,888	126	1.30	163.8	0.38	62,888	84	1.30	109.2	0.40		2.76
		Veg.	234.09	117.05	234	1.30	304.2	0.71	117.05	117	1.30	152.1	0.56	2.05	
A II - 10	W/O	Rose	39,411	39,411	79	0.70	55.3	0.28							
		Veg.	79.76	79.76	160	0.70	112.0	0.58						0.86	
	W	Rose	39,411	19,706	39	0.70	27.3	0.06	19,706	26	0.70	18.2	0.07		0.50
		Veg.	79.76	39.88	80	0.70	56.0	0.13	39.88	40	0.70	28.0	0.10	0.36	
A II - 11	W/O	Rose	262,455	262,455	525	0.65	341.3	1.75							
		Veg.	516.69	516.69	1,033	0.65	671.5	3.45						5.20	
	W	Rose	262,455	131,228	262	0.65	170.3	0.40	131,228	175	0.65	113.8	0.42		2.98
		Veg.	516.69	258.35	517	0.65	336.1	0.78	258.35	258	0.65	167.7	0.62	2.22	
A III - 1	W/O	Veg.	531.07	531.07	1,062	5.40	5,734.8	29.99						29.99	
	W	Veg.	531.07	265.54	531	5.40	2,867.4	6.65	265.54	266	5.40	1,436.4	5.31	11.96	18.03
A III - 2	W/O	Veg.	560.00	560.00	1,120	5.85	6,552.0	34.27						34.27	
	W	Veg.	560.00	280.00	560	5.85	3,276.0	7.60	280.00	280	5.85	1,638.0	6.06	13.66	20.61
A III - 3	W/O	Veg.	868.93	869.93	1,738	4.60	7,994.8	41.81						41.81	
	W	Veg.	868.93	434.47	869	4.60	3,997.4	9.27	434.47	434	4.60	1,996.4	7.39	16.66	25.15
TOTAL	W/O													279.26	
	W													116.18	163.08

Table 7.2.6 VOC Savings on Non-Agricultural Transport

Road Section	Vehicle Type	Individual Traffic Cost (₱/km-vehicle) *1		Road Length	Designed Annual Traffic Volume *2	VOC Savings	Total VOC Savings
		Without	With	(km)		(₱'000)	(₱'000)
	L.Car	5.52	2.58	1.6	0	0	
R III-1	Jeep	5.70	2.64	1.6	397	1.94	16.56
	Jeepney	8.05	3.25	1.6	1,904	14.62	
	S.Truck	8.29	3.70	1.6	0	0	
	L.Car	5.52	2.58	2.5	0	0	
R III-2	Jeep	5.70	2.64	2.5	278	2.13	17.36
	Jeepney	8.05	3.25	2.5	1,269	15.23	
	S.Truck	8.29	3.70	2.5	0	0	
	L.Car	5.52	2.58	4.6	0	0	
R III-3	Jeep	5.70	2.64	4.6	674	9.49	79.55
	Jeepney	8.05	3.25	4.6	3,173	70.06	
	S.Truck	8.29	3.70	4.6	0	0	
	L.Car	5.41	2.58	1.0	5,632	15.94	
R II-1	Jeep	5.59	2.64	1.0	12,295	36.27	136.47
	Jeepney	7.95	3.25	1.0	12,970	60.96	
	S.Truck	8.15	3.70	1.0	5,236	23.30	
	L.Car	5.41	2.58	1.8	5,632	28.69	
R II-4	Jeep	5.59	2.64	1.8	12,295	65.29	245.65
	Jeepney	7.95	3.25	1.8	12,970	109.73	
	S.Truck	8.15	3.70	1.8	5,236	41.94	
	L.Car	5.41	2.58	2.0	0	0	
R II-5	Jeep	5.59	2.64	2.0	1,190	7.02	7.02
	Jeepney	7.95	3.25	2.0	0	0	
	S.Truck	8.15	3.70	2.0	0	0	
	L.Car	5.41	2.58	1.1	0	0	
R II-6	Jeep	5.59	2.64	1.1	595	1.93	1.93
	Jeepney	7.95	3.25	1.1	0	0	
	S.Truck	8.15	3.70	1.1	0	0	
	L.Car	5.41	2.58	1.0	5,632	15.94	
R II-7	Jeep	5.59	2.64	1.0	12,295	36.27	136.47
	Jeepney	7.95	3.25	1.0	12,970	60.96	
	S.Truck	8.15	3.70	1.0	5,236	23.30	
	L.Car	5.41	2.58	2.1	4,085	24.28	
R II-8	Jeep	5.59	2.64	2.1	15,469	95.83	127.89
	Jeepney	7.95	3.25	2.1	0	0	
	S.Truck	8.15	3.70	2.1	833	7.78	
	L.Car	5.41	2.58	1.3	3,055	11.24	
R II-9	Jeep	5.59	2.64	1.3	3,174	12.17	123.63
	Jeepney	7.95	3.25	1.3	16,064	98.15	
	S.Truck	8.15	3.70	1.3	357	2.07	
	L.Car	5.41	2.58	1.3	14,398	52.97	
R II-11	Jeep	5.59	2.64	1.3	18,919	72.55	160.68
	Jeepney	7.95	3.25	1.3	4,403	26.90	
	S.Truck	8.15	3.70	1.3	1,428	8.26	
Total							1,053.21

Note : *1 Source : Table K.2.5. *2 Source : Table K.2.8.
*3 As for the individual traffic cost, see Table K.2.5.

Table 7.2.7 Transport Savings by New Roads

Influence Area	Project	Crop	Annual Traffic	Head-carrying (50kg/trip, 50doz/trip)					Jeepney (1t)					Small Truck (2t)					Total VOC	Cost Reduction
				Traffic	Required Trip	Trip Length	Total Length	Cost	Traffic	Required Trans.	Road Length	Total Length	VOC	Traffic	Required Trans.	Road Length	Total Length	VOC		
			(doz. kg)	(doz.kg)	(time)	(km)	(km)	(P '000)	(doz.ton)	(Vehicle)	(km)	(km)	(P '000)	(doz.ton)	(Vehicle)	(km)	(km)	(P '000)	(P '000)	(P '000)
N II - 1	W/O	Rose	118,078	118,078	2,362	0.50	1,181.0	11.81												
		Veg.	217,066	217,066	4,341	0.50	2,170.5	21.71											33.52	
	W	Rose	118,078						59,039	118	0.50	59.0	0.14	59,039	79	0.50	39.5	0.14		32.79
		Veg.	217,066						108.53	217	0.50	108.5	0.25	108.53	109	0.50	54.5	0.20	0.73	
N II - 2	W/O	Rose	48,442	48,442	969	0.75	726.8	7.27												
		Veg.	89,053	89,053	1,781	0.75	1,335.8	13.36											20.63	
	W	Rose	48,442						24,221	48	0.75	36.0	0.08	24,221	32	0.75	24.0	0.09		20.19
		Veg.	89,053						44.53	89	0.75	66.8	0.15	44.53	45	0.75	33.8	0.12	0.44	
N II - 3	W/O	Rose	196,796	196,796	3,936	0.80	3,148.8	31.49												
		Veg.	361,776	361,776	7,236	0.80	5,788.8	57.89											89.38	
	W	Rose	196,796						98,398	197	0.80	157.6	0.36	98,398	131	0.80	104.8	0.38		87.45
		Veg.	361,776						180.89	362	0.80	289.6	0.66	180.89	181	0.80	144.8	0.53	1.93	
N II - 4	W/O	Rose	131,702	131,702	2,634	0.45	1,185.3	11.85												
		Veg.	242,112	242,112	4,842	0.45	2,178.9	21.79											33.64	
	W	Rose	131,702						65,851	132	0.45	59.4	0.14	65,851	88	0.45	39.6	0.14		32.91
		Veg.	242,112						121.06	242	0.45	108.9	0.25	121.06	121	0.45	54.4	0.20	0.73	
N III -1	W/O	Rice	28,333	28,333	567	1.40	793.8	7.94												
		Veg.	522,667	522,667	10,453	1.40	14,634.2	146.34											154.28	
	W	Rice	28,333						14.17	28	1.40	39.2	0.09	14.13	14	1.40	19.6	0.07		151.11
		Veg.	522,667						261.33	523	1.40	732.2	1.68	261.34	261	1.40	365.4	1.33	3.17	
Total	W/O																		331.45	
	W																		7.00	324.45

Note : 1. For procedures of VOC calculation, see foot note of Table K.2.7.
2. Head-carrying cost is estimated as P10/50kg(doz) - 1km trip.
3. As for the individual traffic cost, see Table K.2.5.

Table 7.2.8 Economic Capital Costs

(Unit : ₱ '000)

	Cost Component	Financial Cost	Economic Cost
1.	Construction Cost		
1.1	Irrigation		
	Foreign	32,700	32,700
	Local (Labour)	7,400	4,100
	Local (Others)	21,600	18,600
	Transfer	6,100	—
	Sub-Total	67,800	55,400
1.2	Drainage		
	Foreign	20,800	20,800
	Local (Labour)	2,100	1,200
	Local (Others)	12,300	10,600
	Transfer	3,500	—
	Sub-Total	38,700	32,600
1.3	Rural Roads		
	Foreign	33,200	33,200
	Local (Labour)	3,400	1,900
	Local (Others)	20,600	17,700
	Transfer	5,700	—
	Sub-Total	62,900	52,800
	Sub-Total	169,400	140,800
2.	O & M Equipment		
2.1	O & M Equipment for Agricultural Extension Services		
	Foreign	850	850
	Local (Others)	40	30
	Transfer	0	—
	Sub-Total	890	880
2.2	Project Office Equipment for Implementation and O & M		
	Foreign	2,200	2,200
	Local (Others)	200	170
	Transfer	0	—
	Sub-Total	2,400	2,370
	Sub-Total	3,290	3,250
3.	Administration and Engineering Services		
	Foreign	15,400	15,400
	Local (Others)	3,800	3,300
	Transfer	1,900	—
	Sub-Total	21,100	18,700
4.	Phisical Contingencies		
	Foreign	10,400	10,400
	Local (Labour)	1,300	700
	Local (Others)	5,800	5,000
	Transfer	1,700	—
	Sub-Total	19,200	16,100
Total		212,990	178,850

Table 7.2.9 Economic Rate of Return

(Unit : ₱ '000)

Year in Order	Costs				Benefits			
	Capital Cost	O & M Cost	Replacement Cost	Total	Irrigation	Drainage	Rural Roads	Total
1	17,000	239	-	17,239	-	-	-	0
2	76,000	239	-	76,239	-	-	-	0
3	85,900	239	-	86,139	-	-	-	0
4	-	1,236	-	1,236	3,465	2,283	212	5,960
5	-	1,236	-	1,236	6,930	3,546	425	10,901
6	-	1,236	-	1,236	10,395	4,809	637	15,841
7	-	1,236	-	1,236	13,860	6,072	849	20,781
8	-	1,236	-	1,236	17,325	7,335	1,062	25,722
9	-	997	-	997	17,325	7,335	1,167	25,827
10	-	997	-	997	17,325	7,335	1,272	25,932
11	-	997	-	997	17,325	7,335	1,377	26,037
12	-	997	-	997	17,325	7,335	1,483	26,143
13	-	997	-	997	17,325	7,335	1,588	26,248
14	-	997	-	997	17,325	7,335	1,588	26,248
15	-	997	-	997	17,325	7,335	1,588	26,248
16	-	997	-	997	17,325	7,335	1,588	26,248
17	-	997	-	997	17,325	7,335	1,588	26,248
18	-	997	-	997	17,325	7,335	1,588	26,248
19	-	997	-	997	17,325	7,335	1,588	26,248
20	-	997	-	997	17,325	7,335	1,588	26,248
21	-	997	-	997	17,325	7,335	1,588	26,248
22	-	997	-	997	17,325	7,335	1,588	26,248
23	-	997	6,832	7,829	17,325	7,335	1,588	26,248
24	-	997	-	997	17,325	7,335	1,588	26,248
25	-	997	-	997	17,325	7,335	1,588	26,248
26	-	997	-	997	17,325	7,335	1,588	26,248
27	-	997	-	997	17,325	7,335	1,588	26,248
28	-	997	-	997	17,325	7,335	1,588	26,248
29	-	997	-	997	17,325	7,335	1,588	26,248
30	-	997	-	997	17,325	7,335	1,588	26,248
31	-	997	-	997	17,325	7,335	1,588	26,248
32	-	997	-	997	17,325	7,335	1,588	26,248
33	-	997	2,093	3,090	17,325	7,335	1,588	26,248
34	-	997	-	997	17,325	7,335	1,588	26,248
35	-	997	-	997	17,325	7,335	1,588	26,248

Discount Rate (%)	Present Worth (₱ '000)		NPV	B / C
	Costs	Benefits		
0	221,641	786,848	565,207	3.55
2	199,881	532,510	332,629	2.66
4	183,773	373,636	189,863	2.03
6	171,169	270,959	99,790	1.58
8	160,841	202,386	41,545	1.25
10	152,066	155,145	3,079	1.02
12	144,404	121,646	- 22,758	0.84
14	137,577	97,256	- 40,321	0.70
15	134,418	87,523	- 46,895	0.65

EIRR = 10.2 %

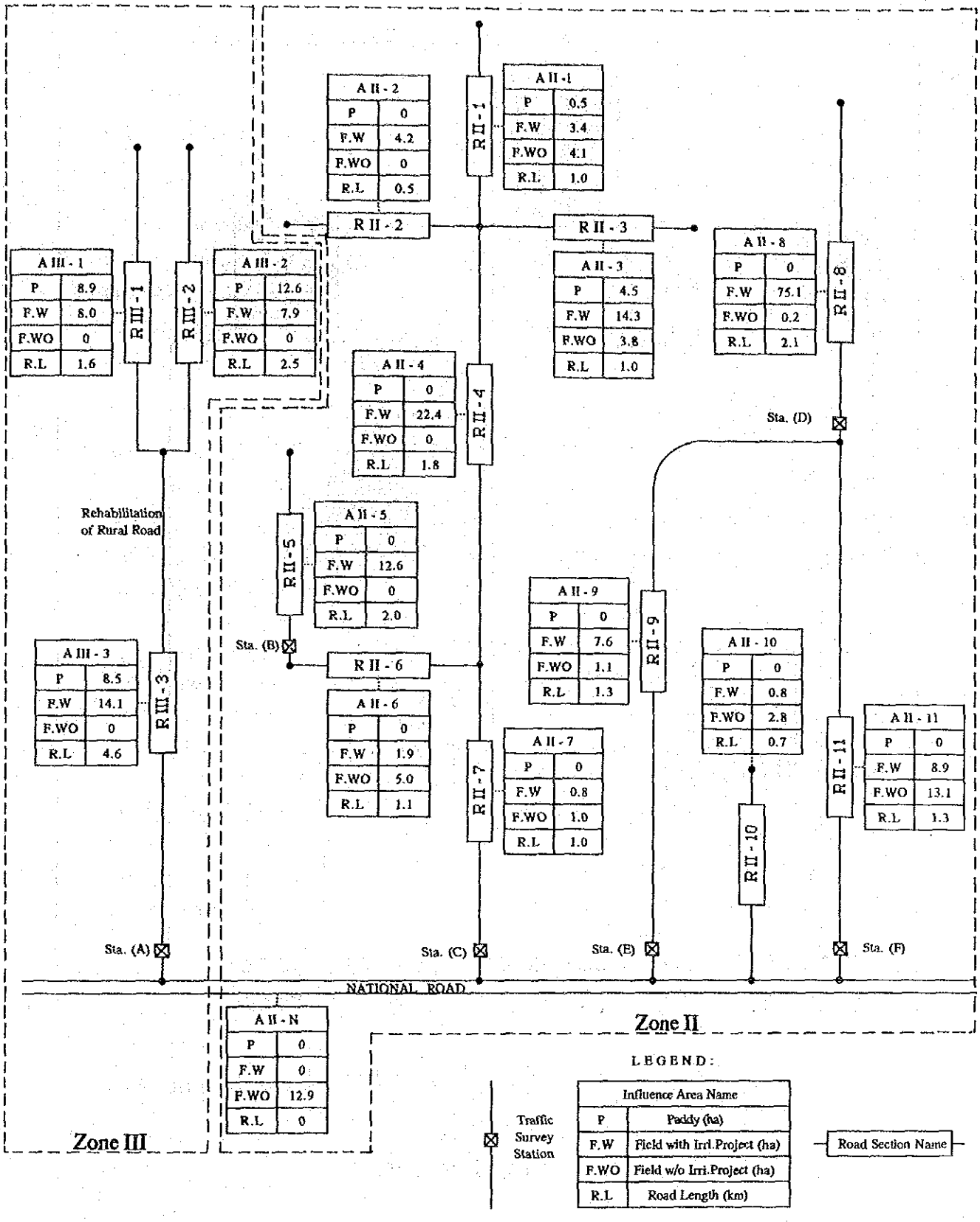

Fig. 7.2.1 Schematic Diagram of Rehabilitation Roads

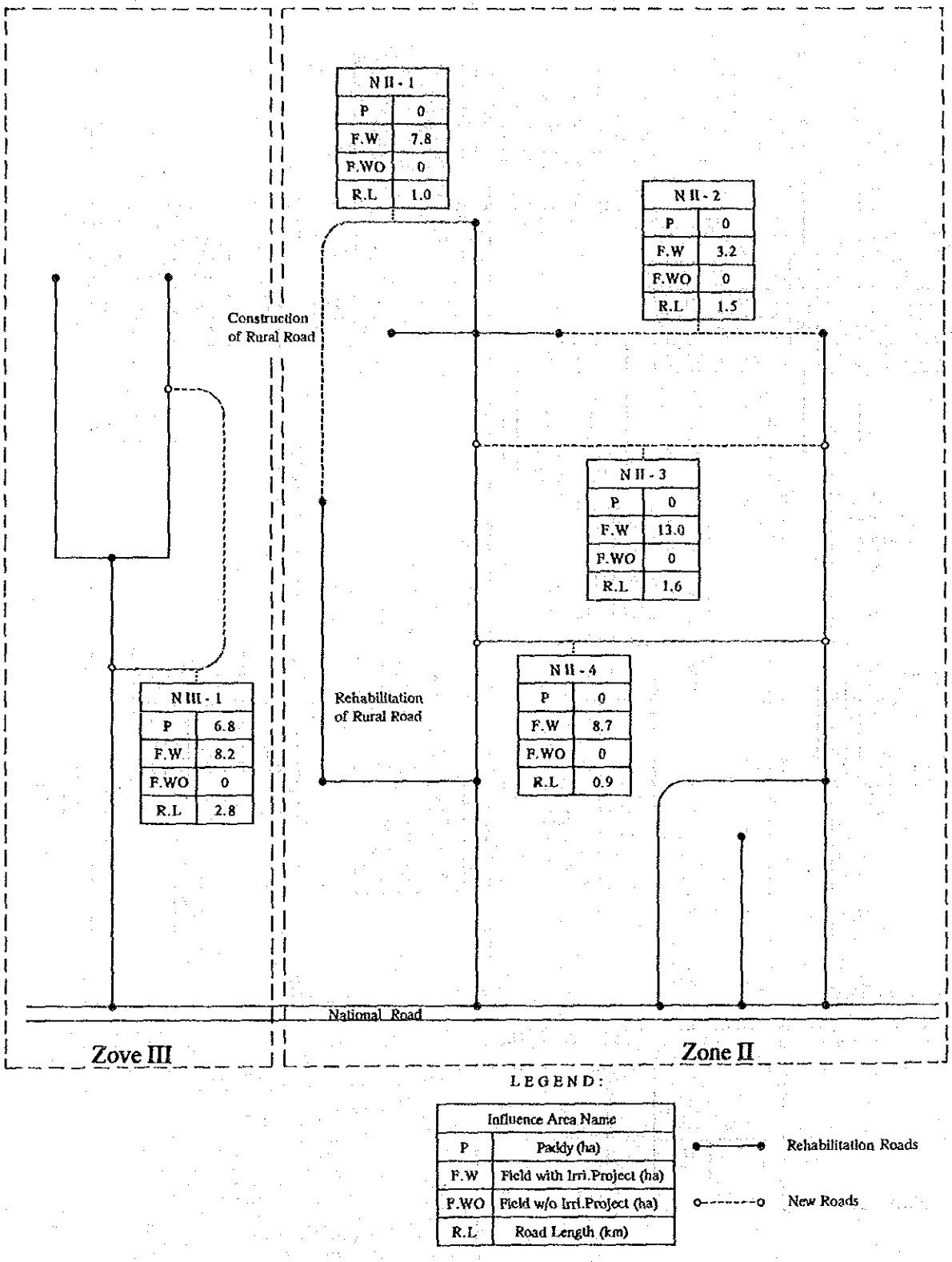

Fig. 7.2.2 Schematic Diagram of New Roads

CHAPTER VIII CONCLUSION AND RECOMMENDATION

8.1 Conclusion

The Highland Integrated Rural Development Project in La Trinidad outlined in this document has been drawn up on the base that the project should be implemented to meet the minimum improvement requirements in terms of providing a sound basis for agricultural production, rural life, and social organization as the essential pre-requisites to the development of the Project area.

The present Project therefore envision a bored variety of measures, including the provision of irrigation systems, the improvement of drainage facilities, the rehabilitation and upgrading of existing inadequate rural roads and the construction of new farm to market roads, the construction of drinking and domestic water supply facilities, the electrification of those rural areas which are not yet connected to the public grid, and the building of community centers.

As these components constitute organic related parts as a whole, the viability and effectiveness of the project will not be attained unless all of the above components are put into practice as a package.

It has been demonstrated that there are no particular technical problems preventing the execution of the construction works mentioned above and that the economic internal rate of return (EIRR) attains a level of 10 percent. In view of these findings it can be concluded that the Highland Integrated Rural Development Project in La Trinidad is technically sound and economically viable and therefore feasible.

It is therefore recommended that the preparation for the survey falling within the scope of the next phase of the Project should be commenced at the earliest possible opportunity.

8.2 Recommendation Concerning the Next Phase Survey

The following important considerations should be borne in mind with respect to the design activities and construction works to be carried out under the next phase.

1) The Principal in connection with the execution of the present Project is the Provincial Government (Governor) of Benguet, and to ensure the smooth execution of the construction projects hereunder, a Project Office should be established and organized under the competence of the Provincial Authorities . Moreover, the scope of the construction works under the Project will encompass a multiplicity of tasks, including the establishment of irrigation systems, drainage facilities, construction of deepwells and pumping stations, improvement of poor existing rural roads and construction of new farm to market roads, as well as the building of rural community centers. It will therefore be of importance to enlist the full cooperation of the various administrative authorities concerned.

2) One of the most essential tasks of the above Project Office shall be the procurement of the land required for the construction and provision, and compensation of the land thus acquired. The Project Office will therefore be called upon to conduct and mediate consultation meetings and negotiations on the land acquisition and land compensation between the land owners and the representatives of the rural communities concerned.

3) The preliminary design work for the facilities and system proposed under the present Project plan has been carried out on the basis of a topographic map on a scale of 1/5,000. Consequently, the survey hereinbelow to be carried out in the next phase will involve the implementation of more accurate topographical surveys for the civil engineering and designing, and of additional underground water investigations so that the detailed design can be completed.

a. With a view to ameliorating the drainage capability of the Balili river and the Bolo creek, a river surveying (1/1,000 plan , profile and cross section survey) and a topographical survey of the associated structures (scale: 1/100).

b. A topographic survey (scale 1/100) for the main structures in the location such as irrigation water intake weirs and reservoirs.

c. A route surveying (1/1,000 plan, profile and cross section surveys) for the rural roads.

d. A topographic survey (scale 1/100) for the planned installation locations for the deep well pump facilities.

e. A topographic survey (scale 1/100) for the planned locations for the rural community centers.

(4) In addition to the three locations covered in this Study, it is considered essential to verify the design parameters by conducting a series of test drills in the locations proposed under the Project plan for sinking the deep wells and by performing a series of water-pumping tests, preferably during the latter part of the dry season.

(5) It is considered essential to confirm a water balance for the irrigation blocks in the Project area through the provision of meteorological/hydrological observation and measuring equipment, the execution of measurements, and the acquisition and addition of appropriate data with a view of establishing an Operation and Maintenance plan.

(6) It is considered essential that regular and periodic tests should be performed to check the quality of the Balili river water used as a source for irrigation water as well as the quality of the drinking and domestic water supplies.

8.3 Recommendations with a View to Strengthening the Agricultural Support and Agricultural Extension Service

In order to ensure that the rural facilities to be provided under this Project exercise their beneficial effect at the earliest time, it is considered essential that organized steps should be taken in the manner detailed hereinbelow to reinforce the agricultural support and agricultural extension services.

1) Making every effort to keep in close mutual cooperation between the authorities responsible for the project execution and testing/ research, thereby assuring the smooth transmission information.

2) Establishment of Farmers' Irrigation Associations and Agricultural Cooperatives and strengthening their organization.

3) Expansion of credit service activities of the Agricultural Cooperatives.

4) To ensure that prices of agricultural produce are maintained at an appropriate level, production adjustments may have to be implemented on the basis of considerations concerning the supply and demand positions for agricultural crops at any given time.

JICA