

## **ANNEX K : FIGURES**



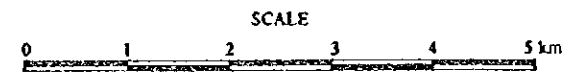
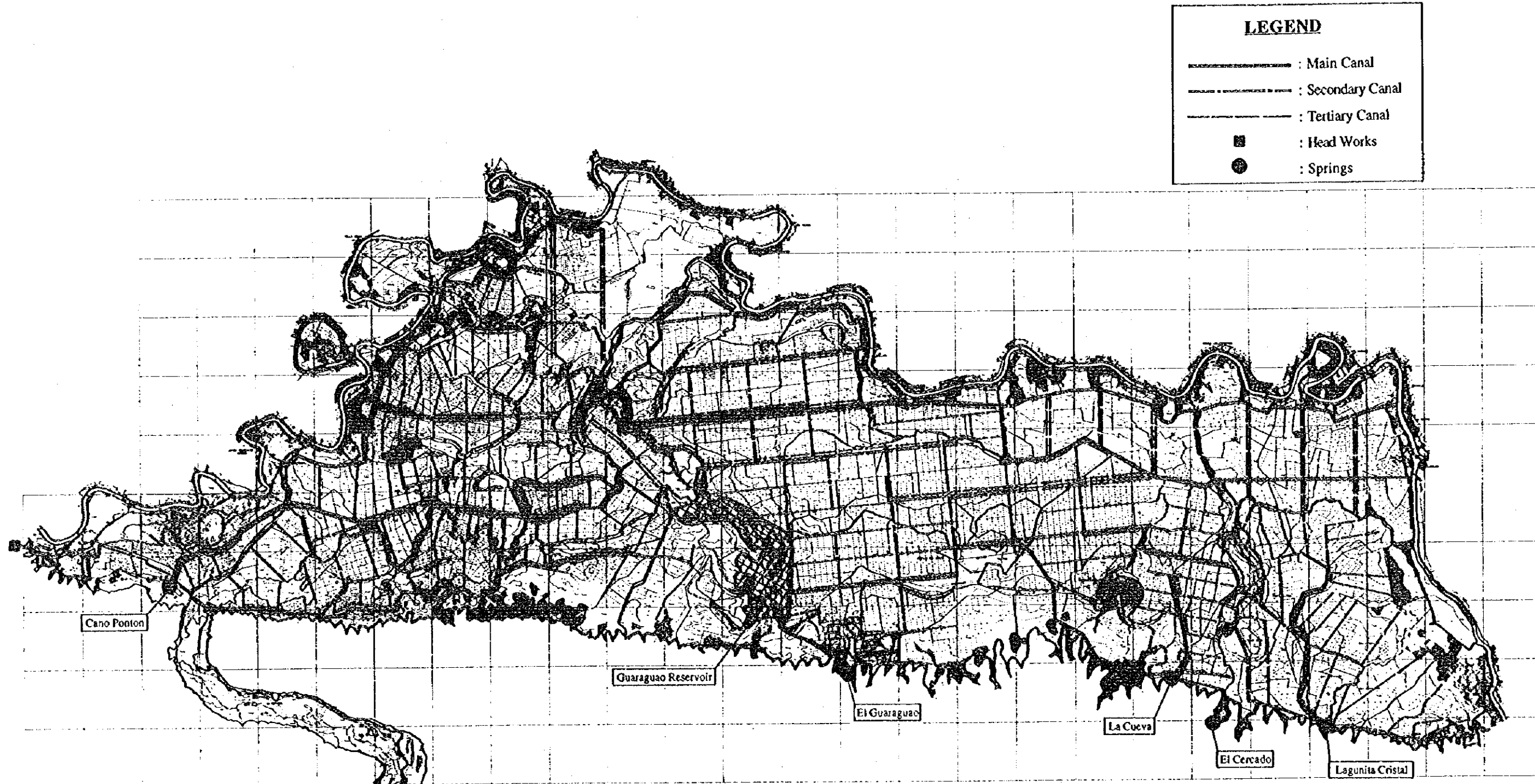
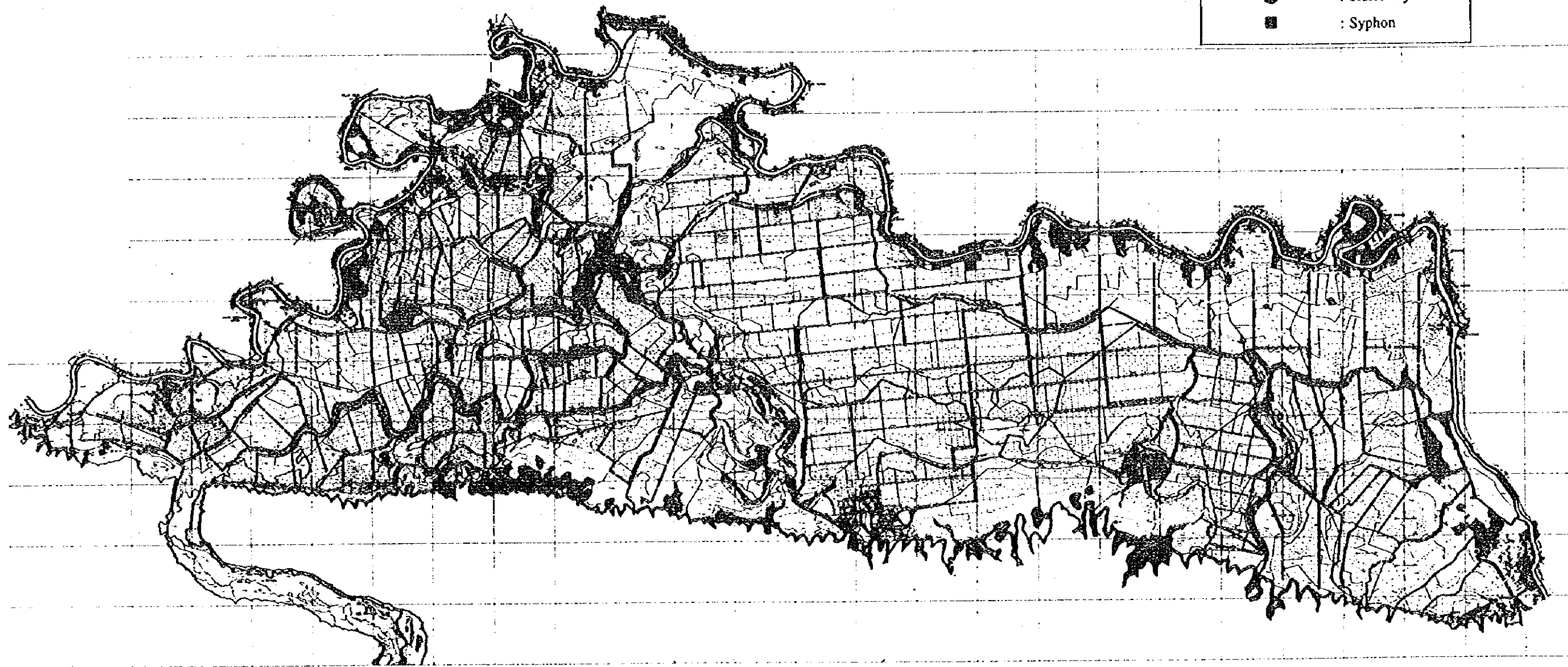







Fig. K.1.1-1 Irrigation Canal System (Alternative A)



LEGEND	
	: Main Canal
	: Secondary Canal
	: Tertiary Canal
	: Sluiceway
	: Syphon

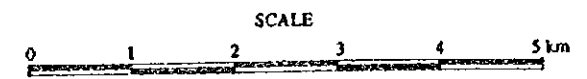


Fig. K.1.1-2 Drainage Canal System (Alternative A)

**LEGEND**

- : Main Road (Rehabilitation)
- : Farm Road (Rehabilitation)
- : Farm Road (New Road)
- : Village Road (Rehabilitation)
- : Maintenance Road (for River)
- : Bridge

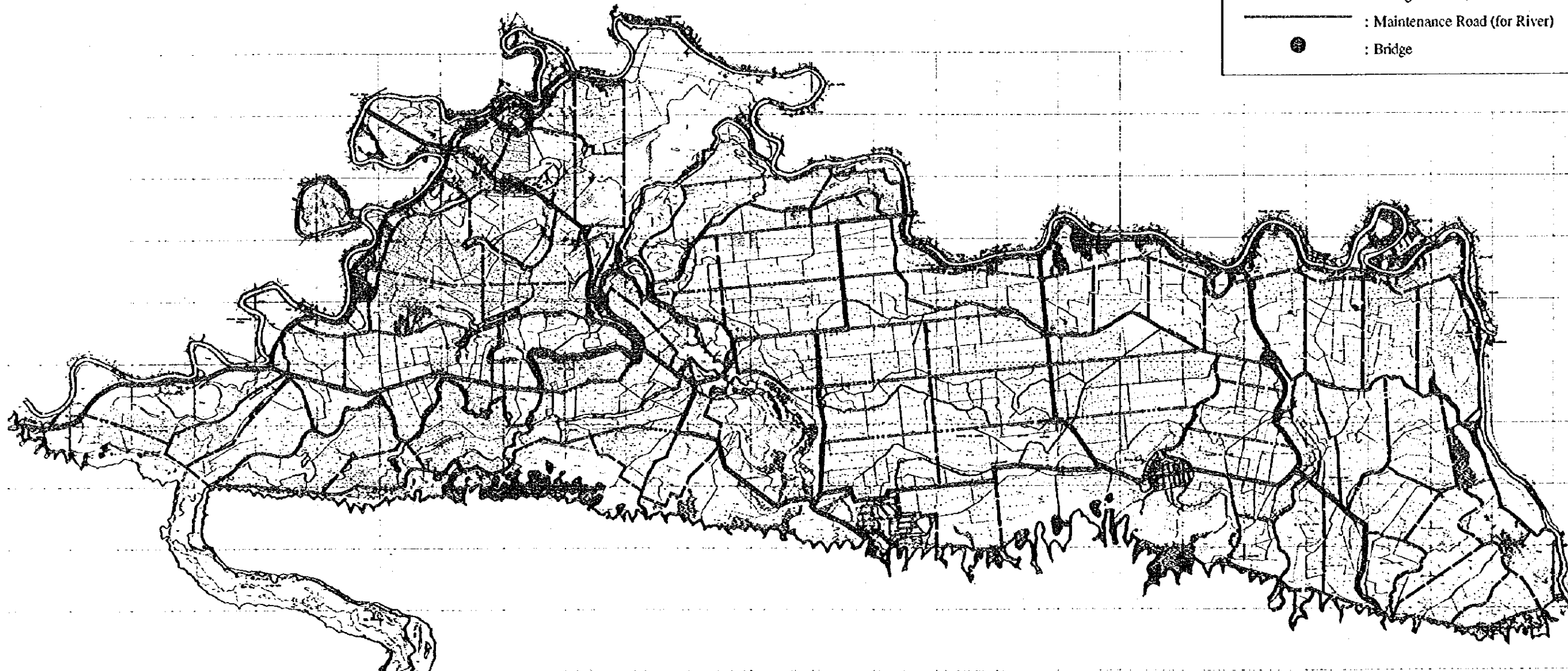
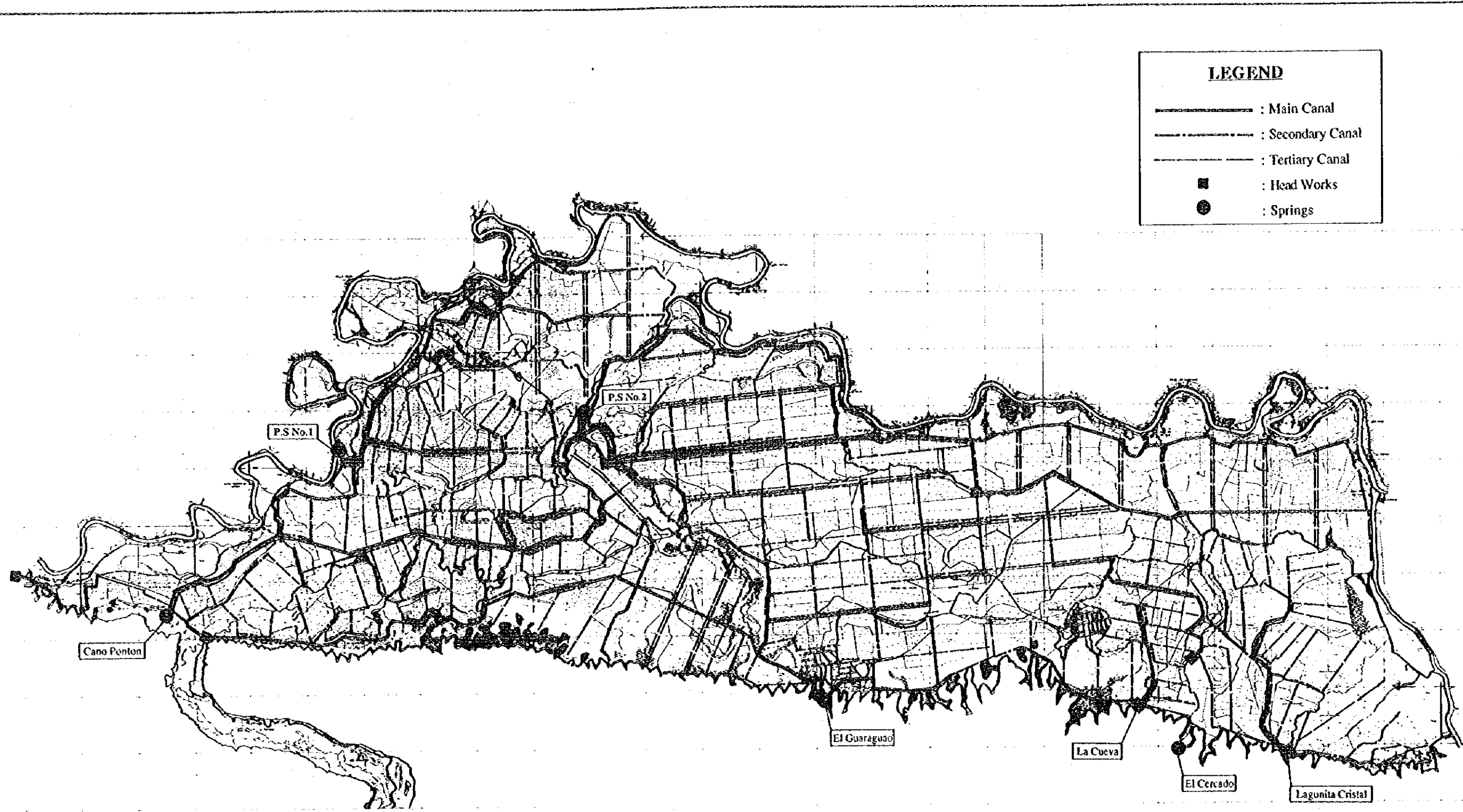


Fig. K.1.1-3 Road Network (Alternative A)



**LEGEND**

—————	: Main Canal
-----	: Secondary Canal
-----	: Tertiary Canal
■	: Head Works
●	: Springs

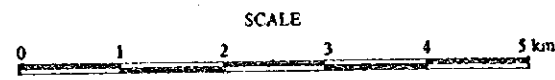
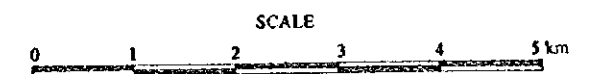
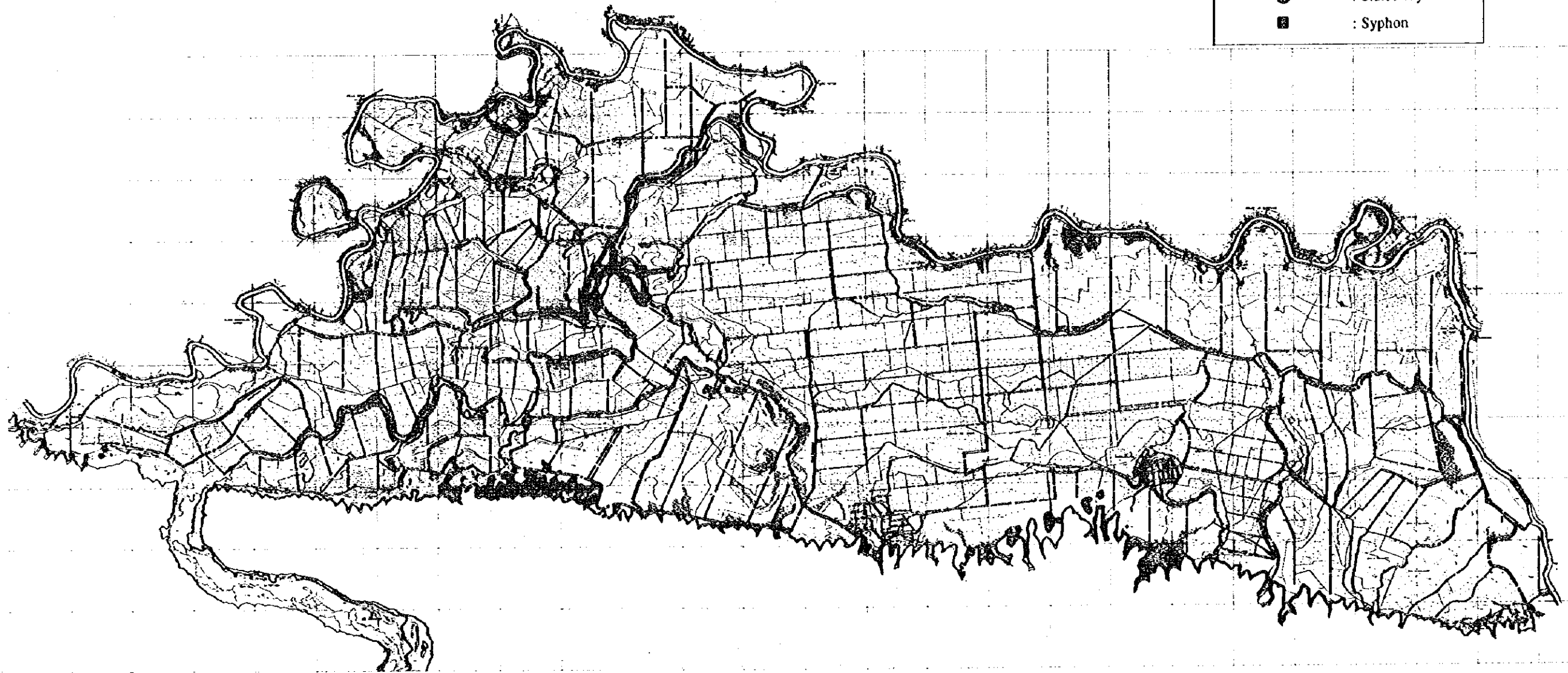


Fig. K.1.2-1 Irrigation Canal System (Alternative B-1)

**LEGEND**

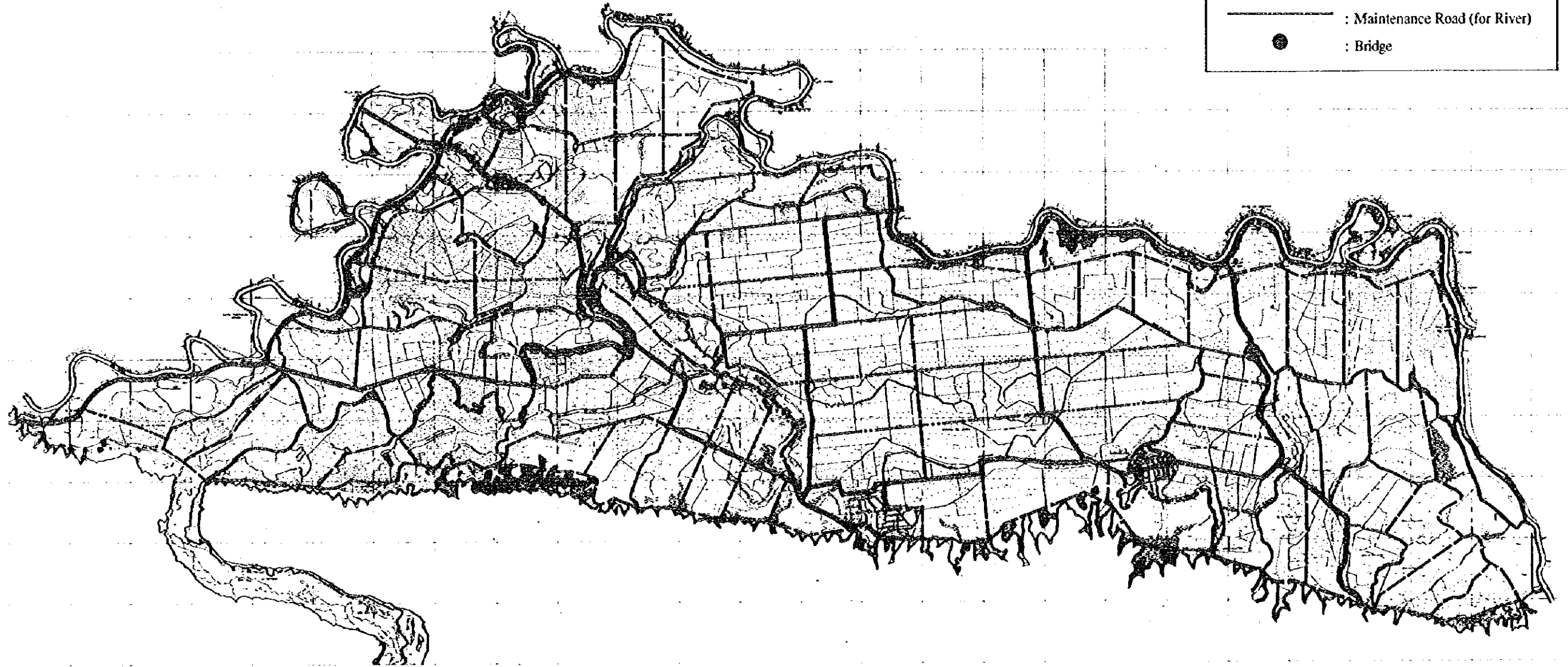
- : Main Canal
- : Secondary Canal
- : Tertiary Canal
- : Sluiceway
- : Syphon



**Fig. K.1.2-2 Drainage Canal System (Alternative B-1)**

**LEGEND**

- : Main Road (Rehabilitation)
- : Farm Road (Rehabilitation)
- : Farm Road (New Road)
- : Village Road (Rehabilitation)
- : Maintenance Road (for River)
- : Bridge



**Fig. K.1.2-3 Road Network (Alternative B-1)**





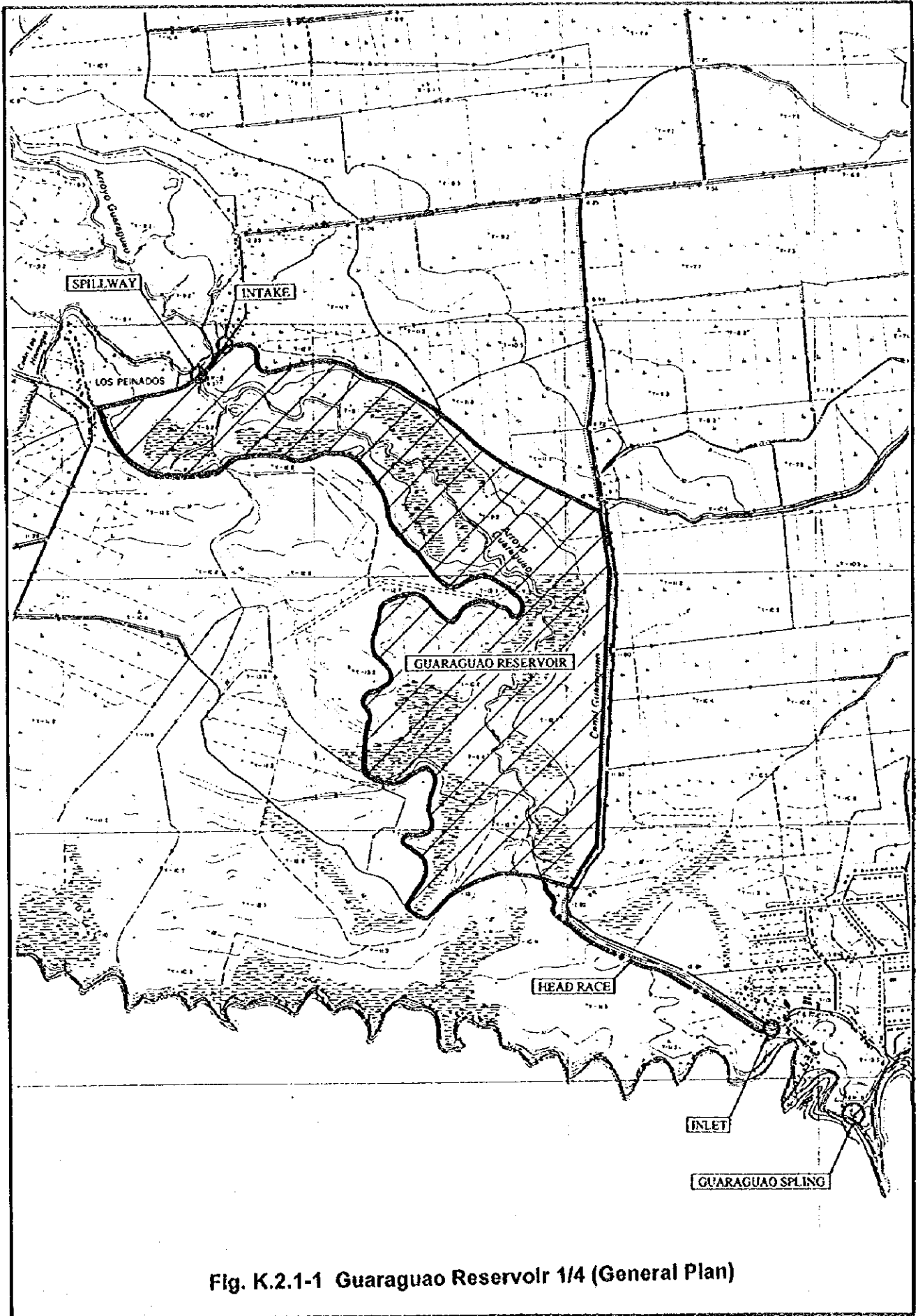


Fig. K.2.1-1 Guaraguao Reservoir 1/4 (General Plan)







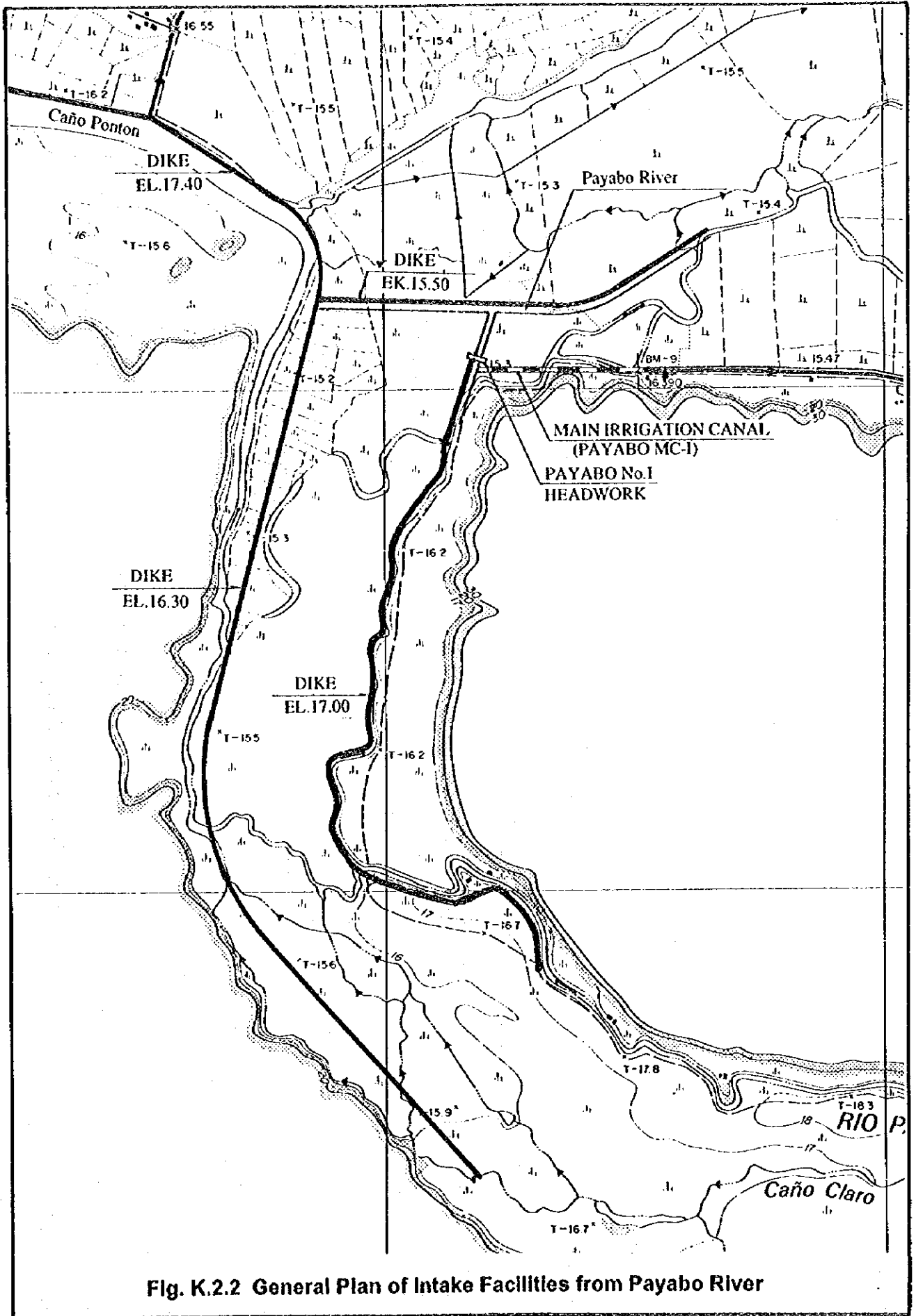


Fig. K.2.2 General Plan of Intake Facilities from Payabo River

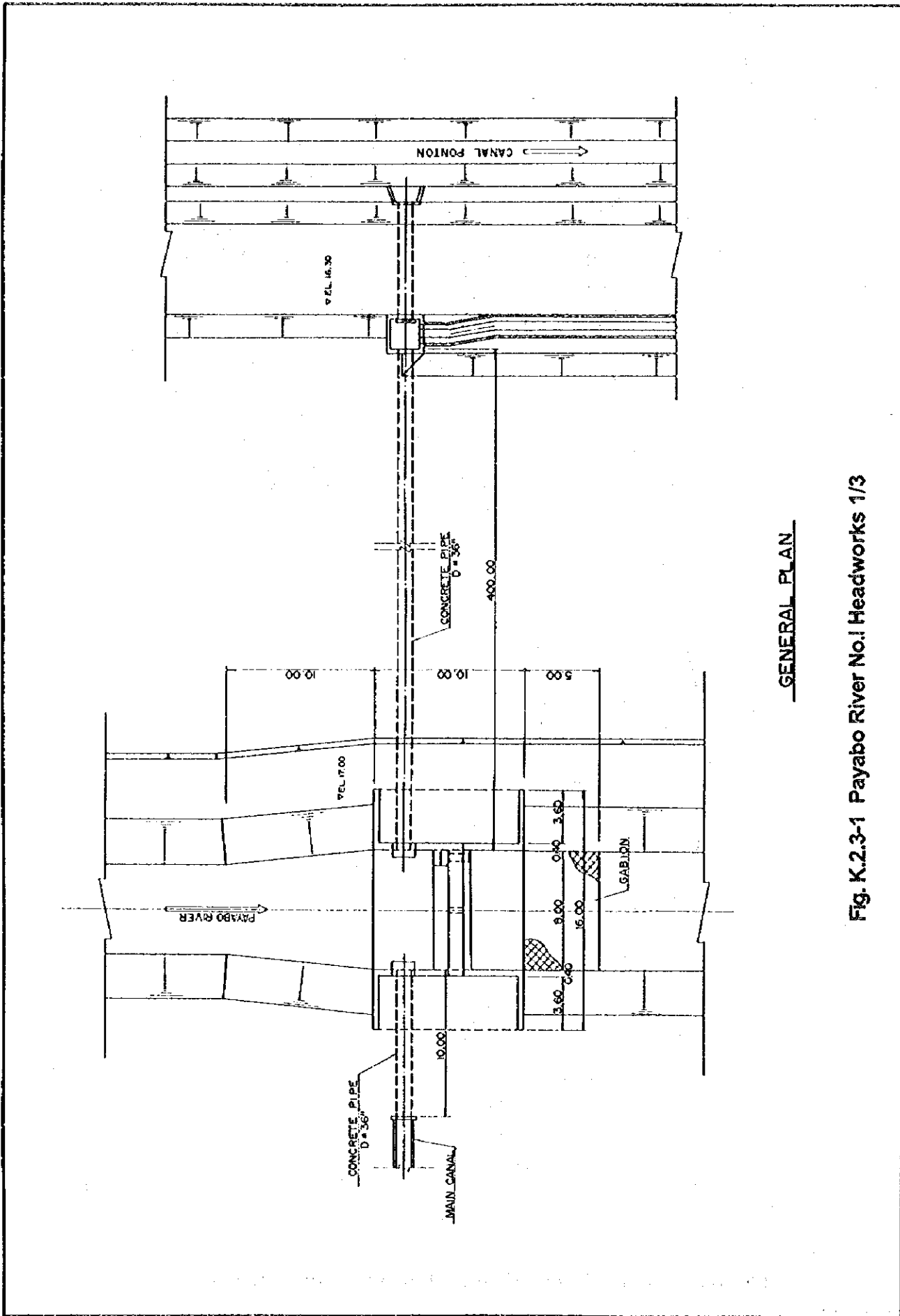


Fig. K.2.3-1 Payabo River No.1 Headworks 1/3

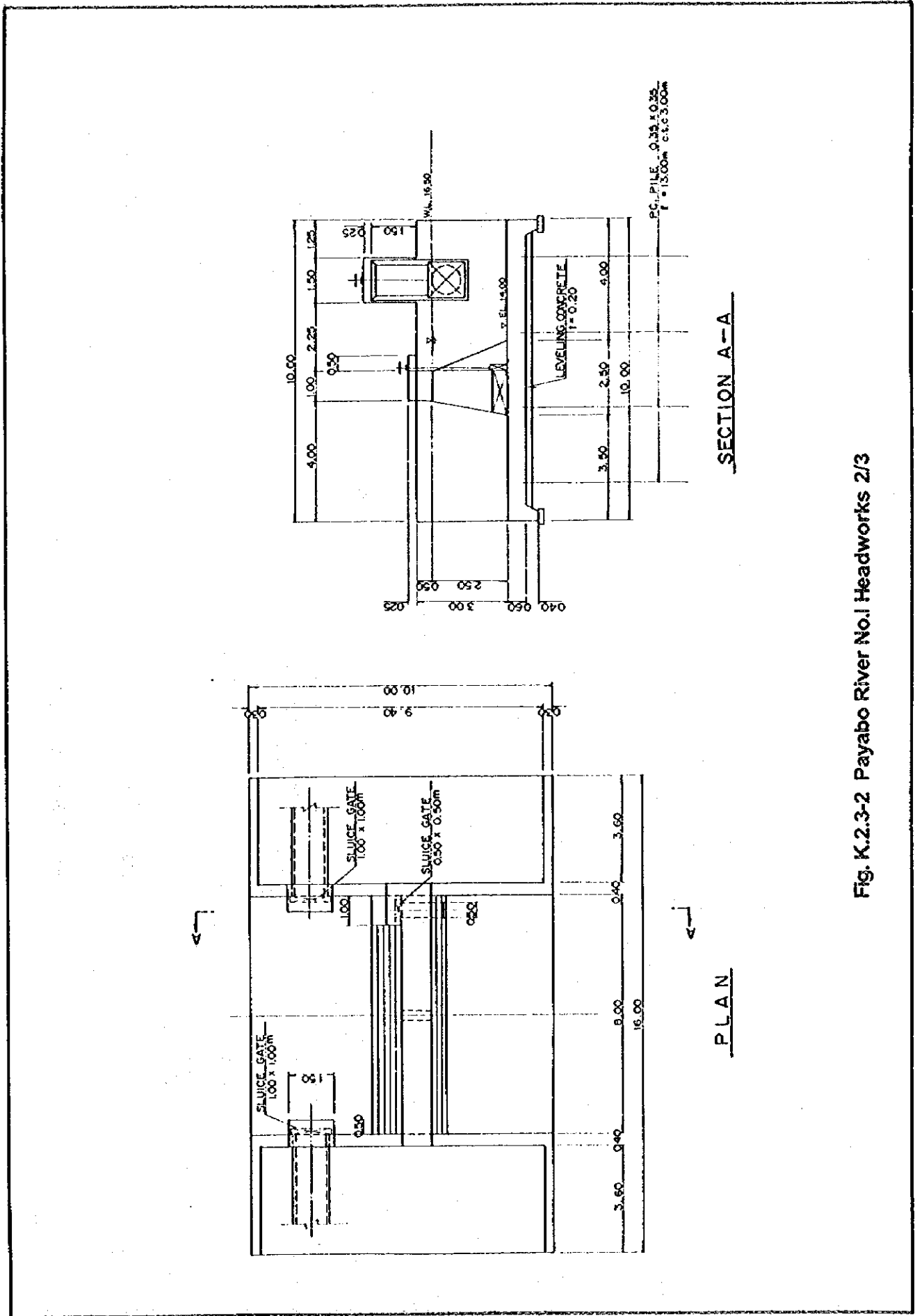


Fig. K.2.3-2 Payabo River No.1 Headworks 2/3



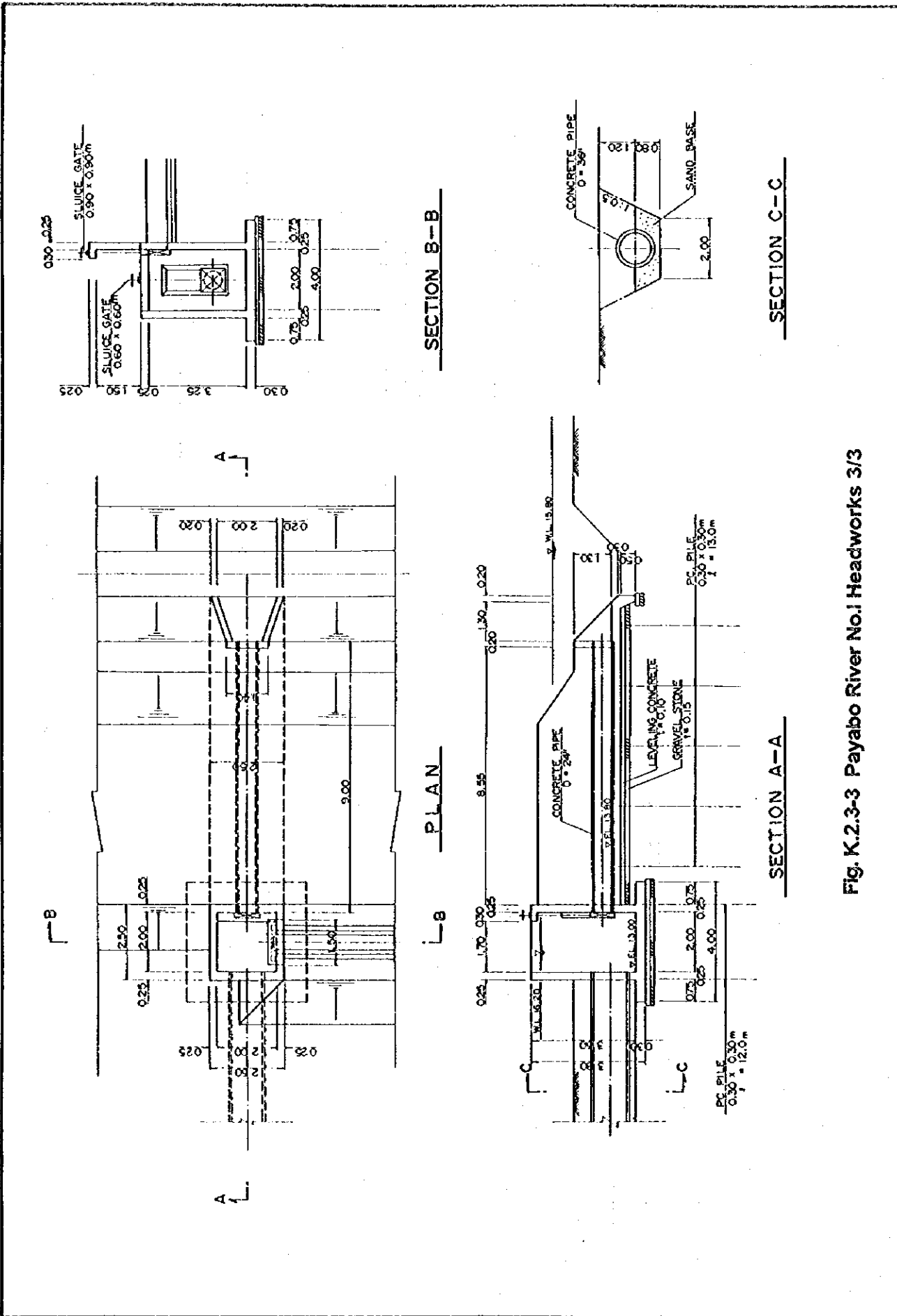
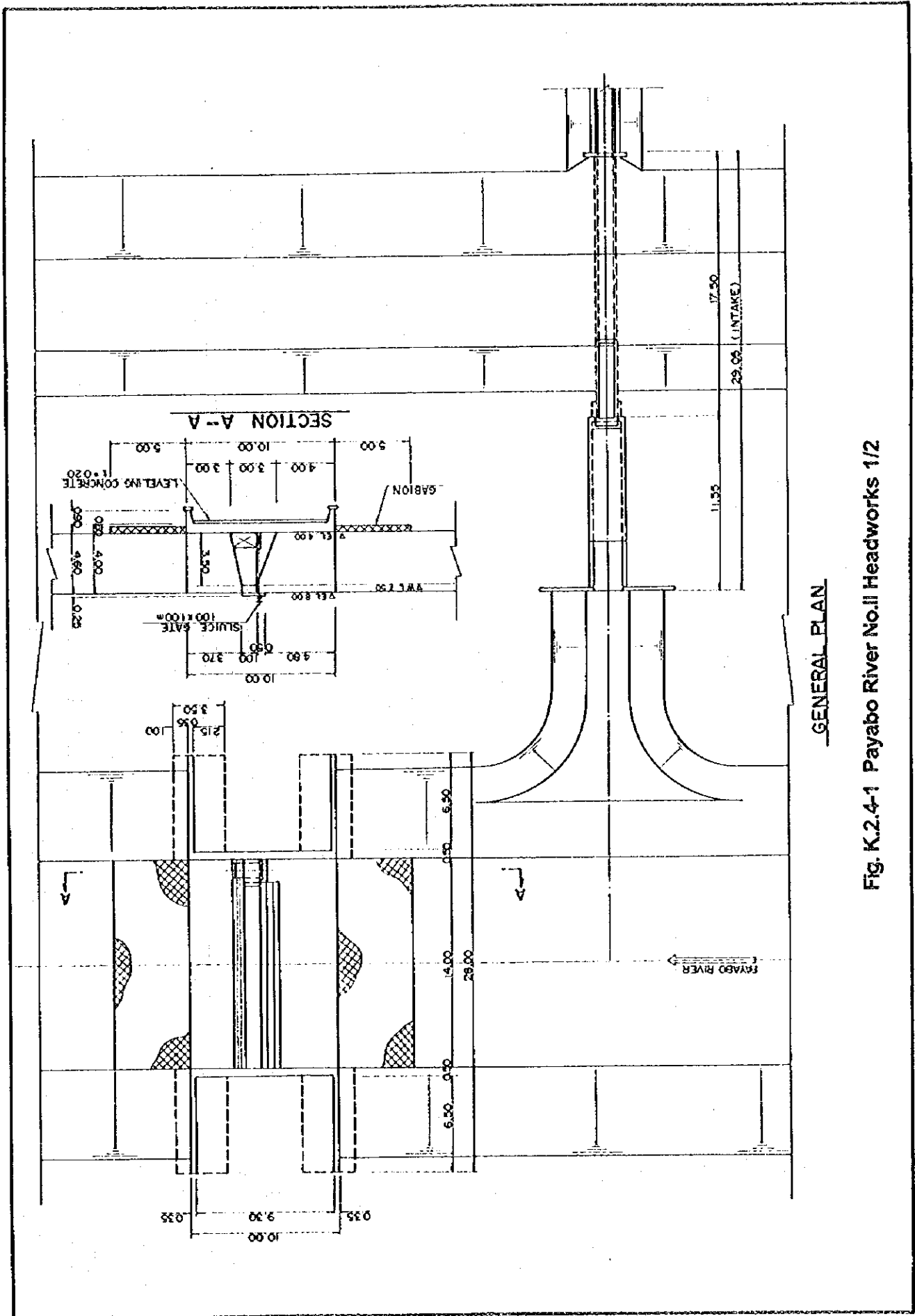


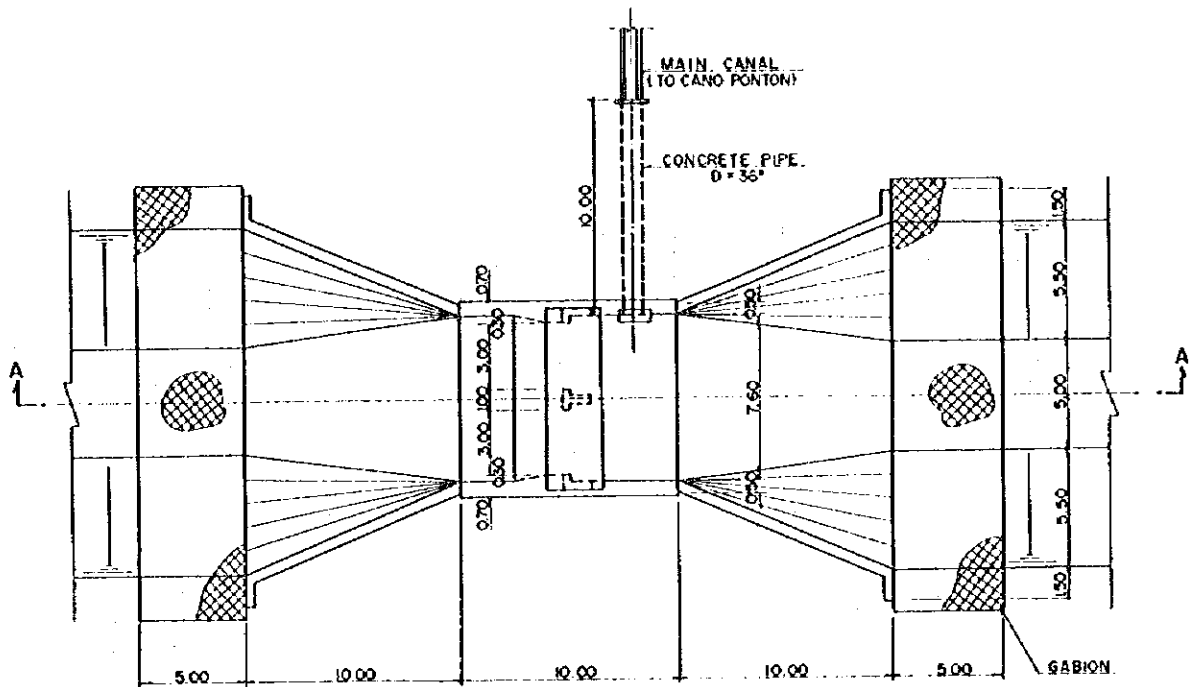
Fig. K.2.3-3 Payabo River No.1 Headworks 3/3



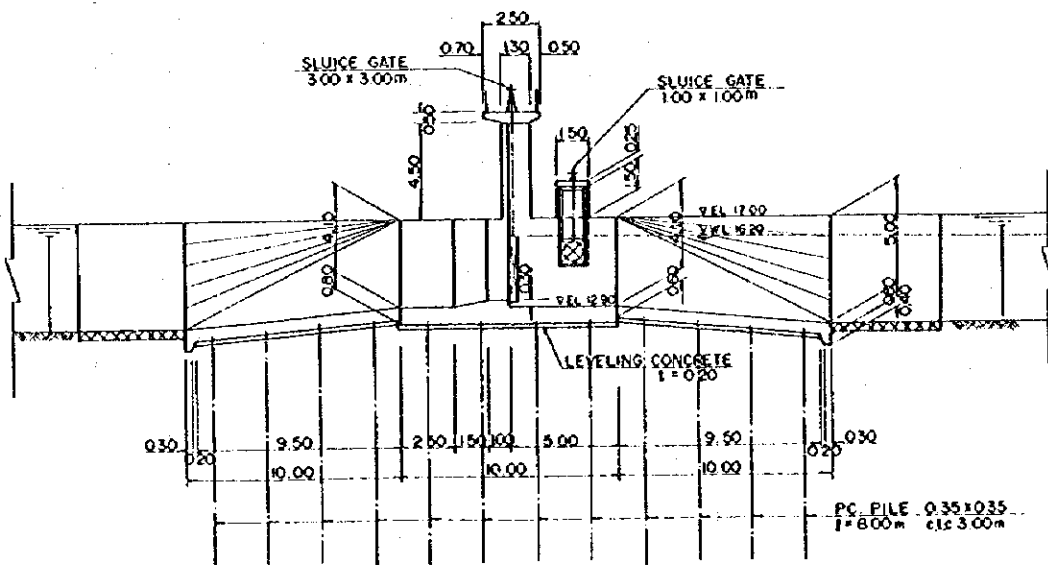
GENERAL PLAN

Fig. K.2.4-1 Payabo River No. II Headworks 1/2





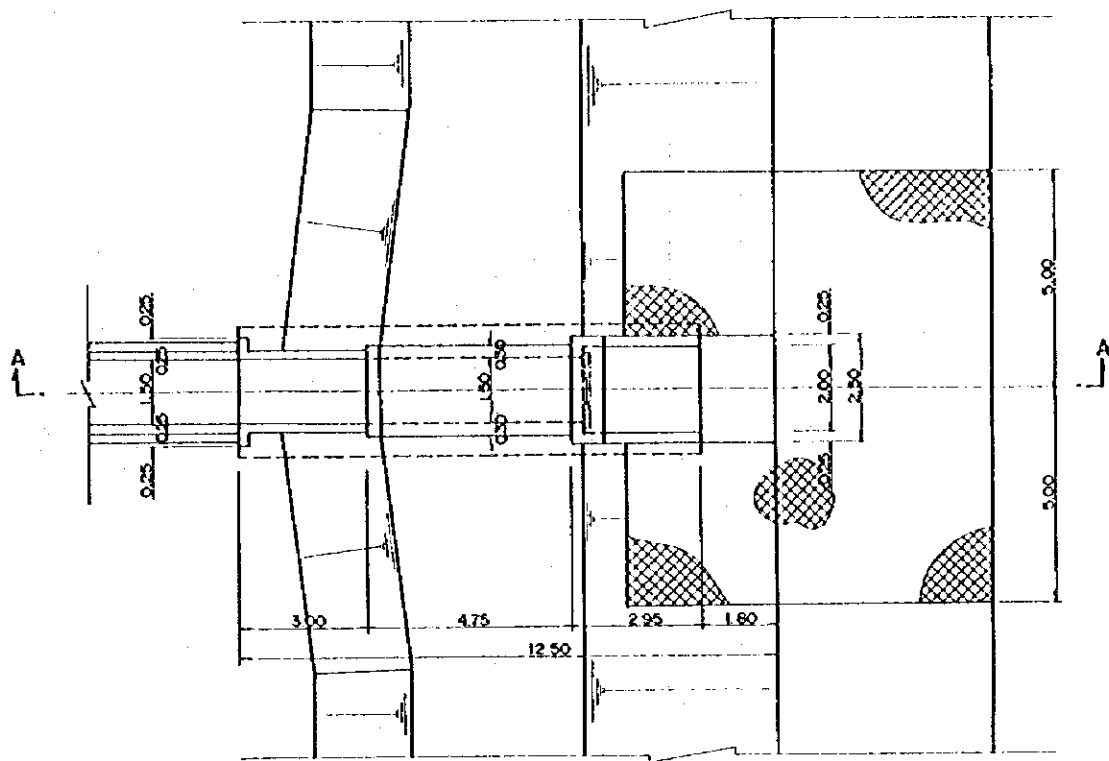
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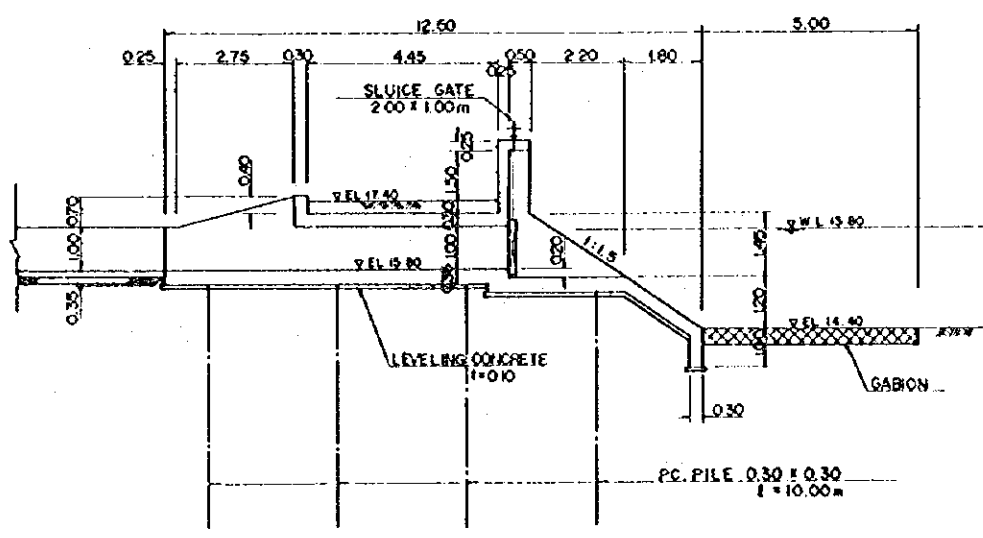
SECTION A-A

**Fig. K.2.5 Cevicos River Headworks**



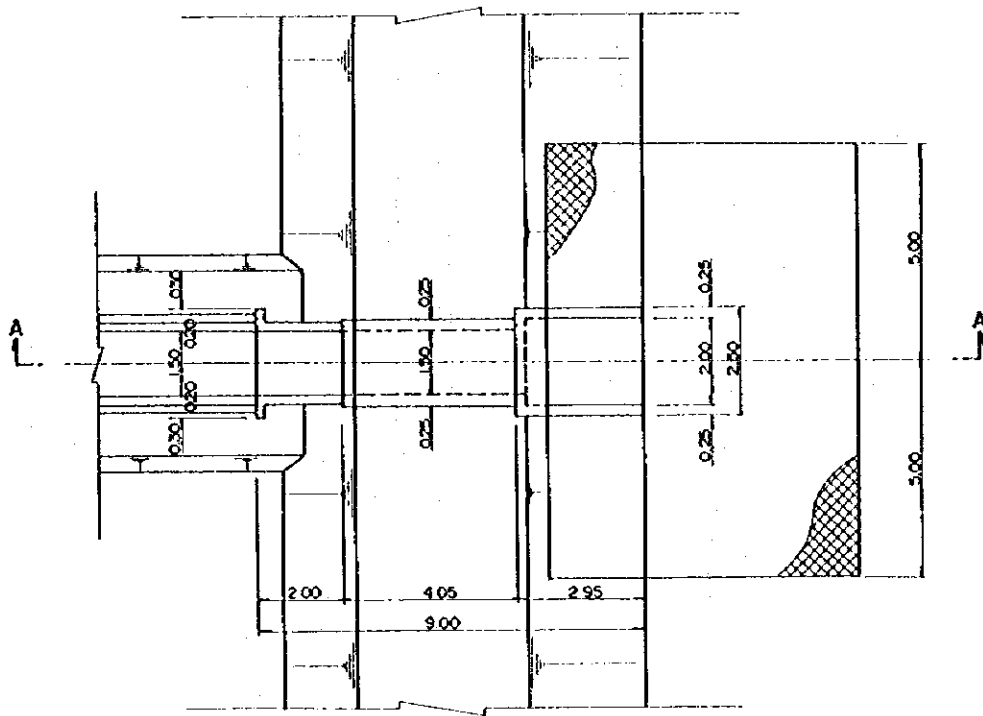


PLAN

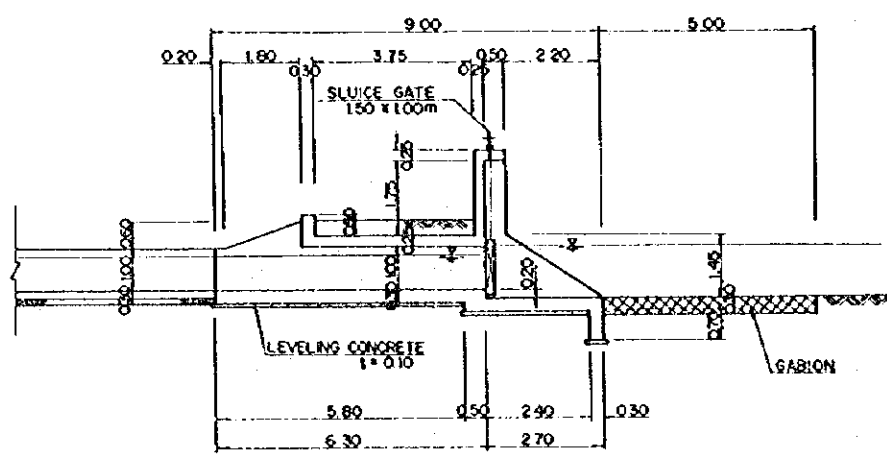


SECTION A - A

**Fig. K.2.7-1 Intake Works at Caño Ponton**

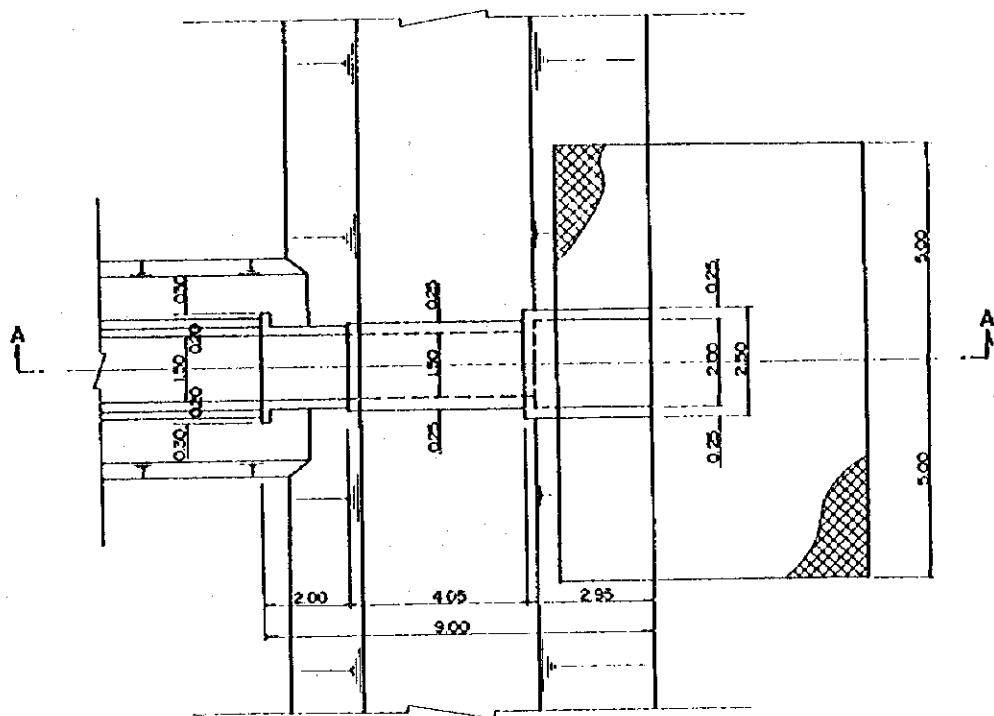


PLAN

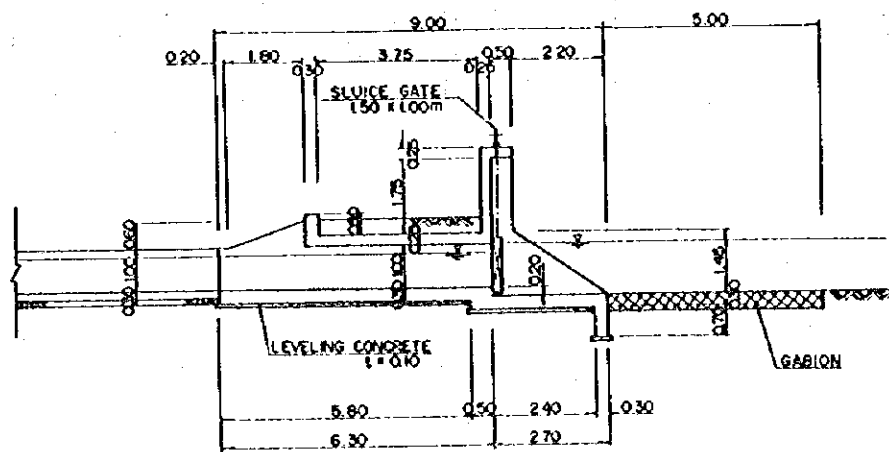


SECTION A-A

Fig. K.2.7-2 Intake Works at Guaragua Spring



PLAN



SECTION A-A

Fig. K.2.7-3 Intake Works at Lagunita Cristal



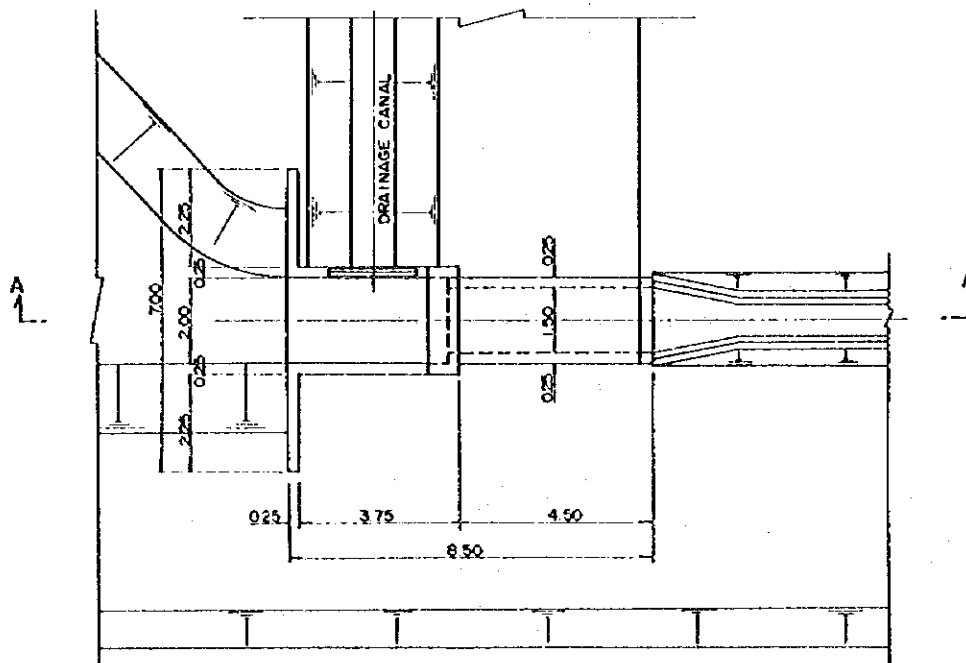
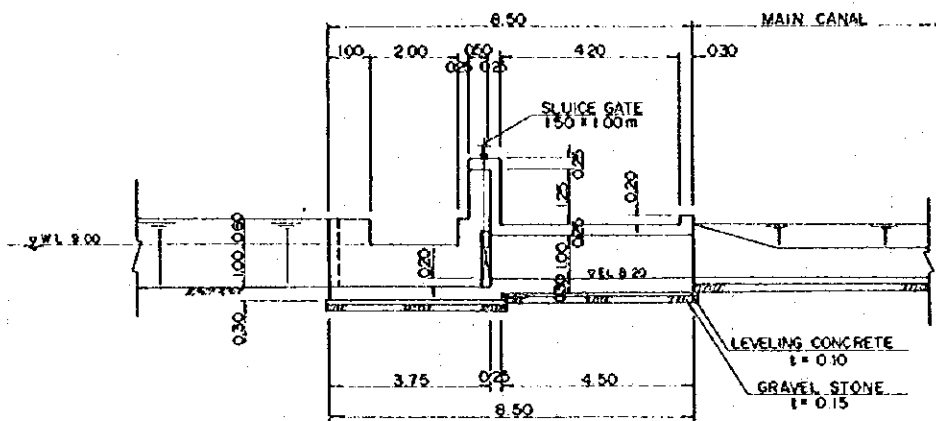
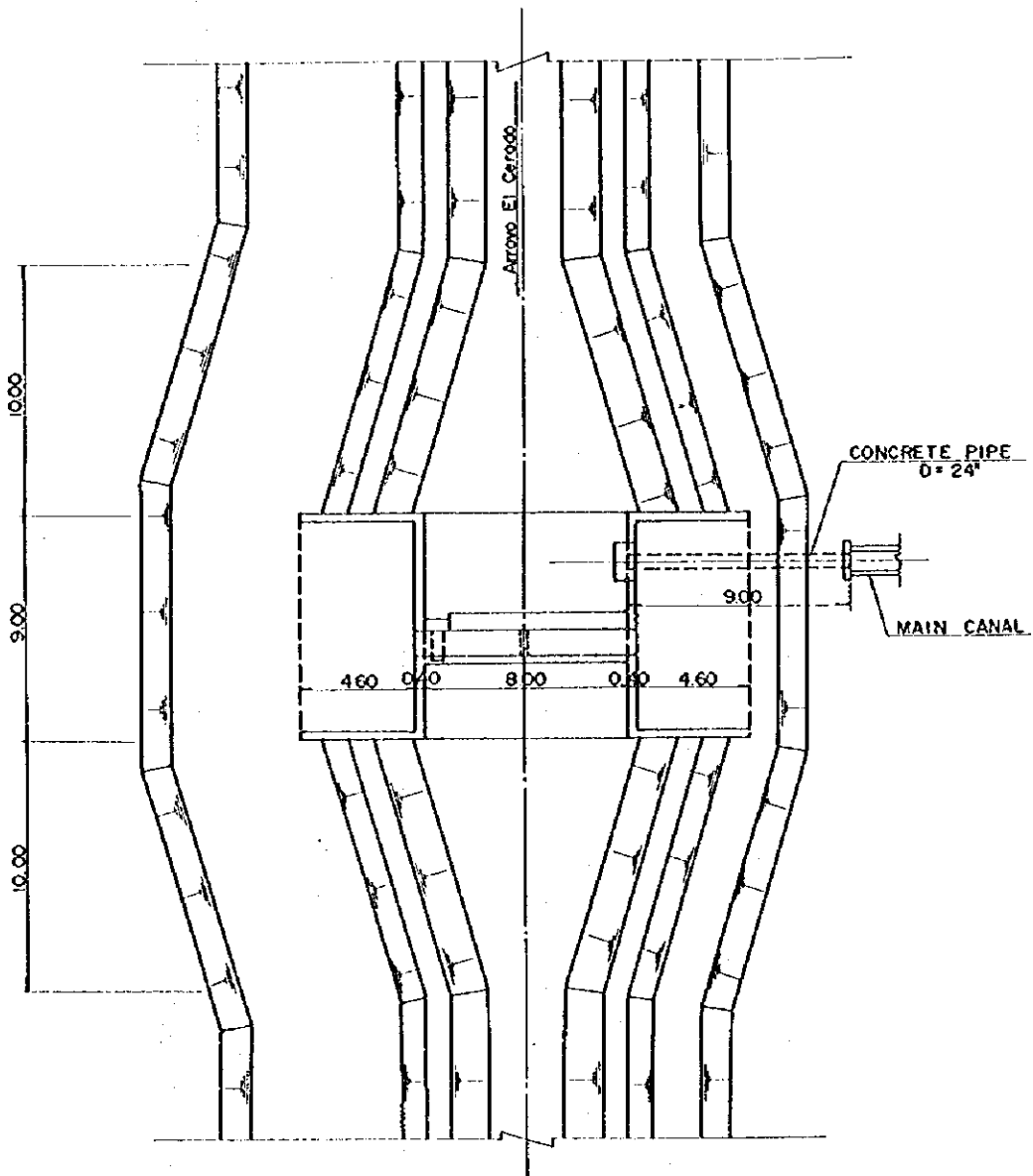
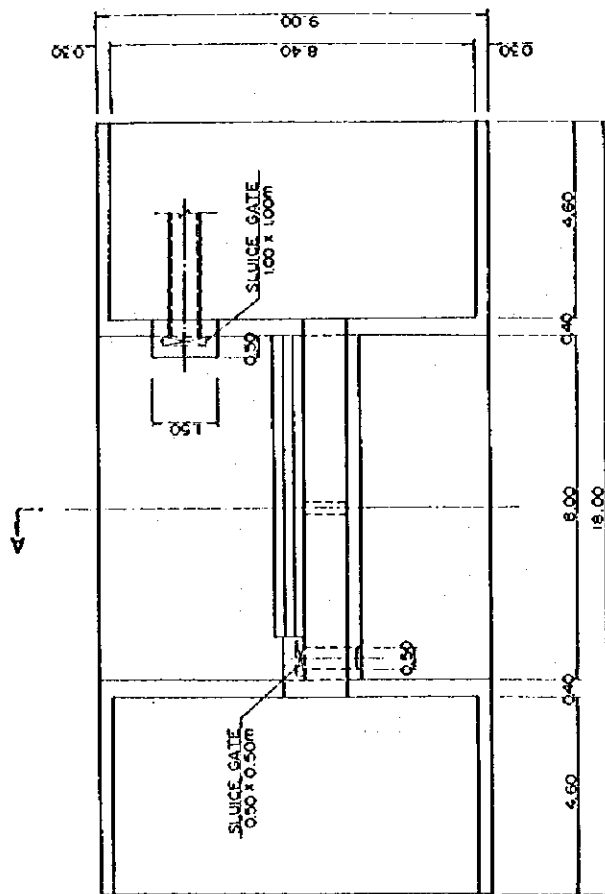


Fig. K.2.7-4 Intake Works at La Cueva Spring

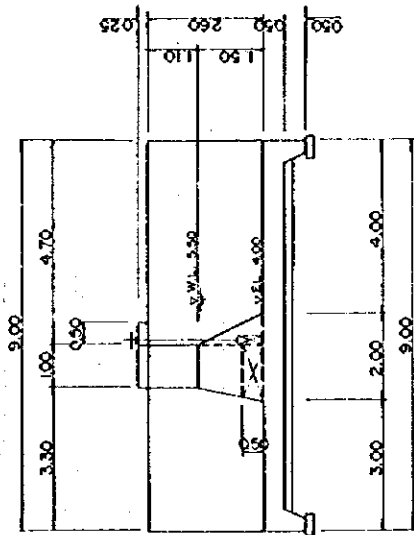


GENERAL PLAN

**Fig. K.2.7-5 Intake Works at El Cercado Spring 1/2**



PLAN



SECTION A--A

Fig. K.2.7-6 Intake Works at El Cercado Spring 2/2



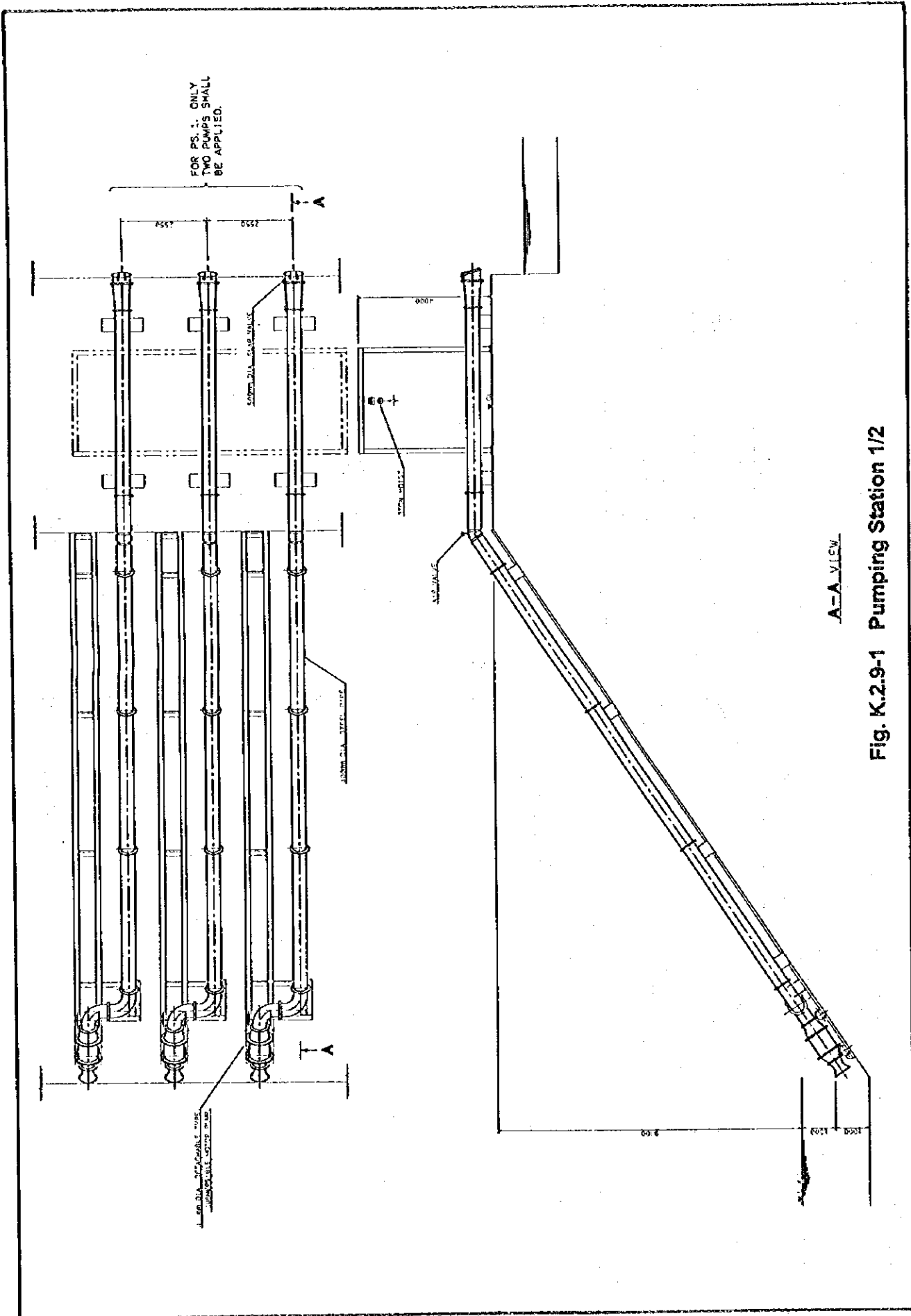
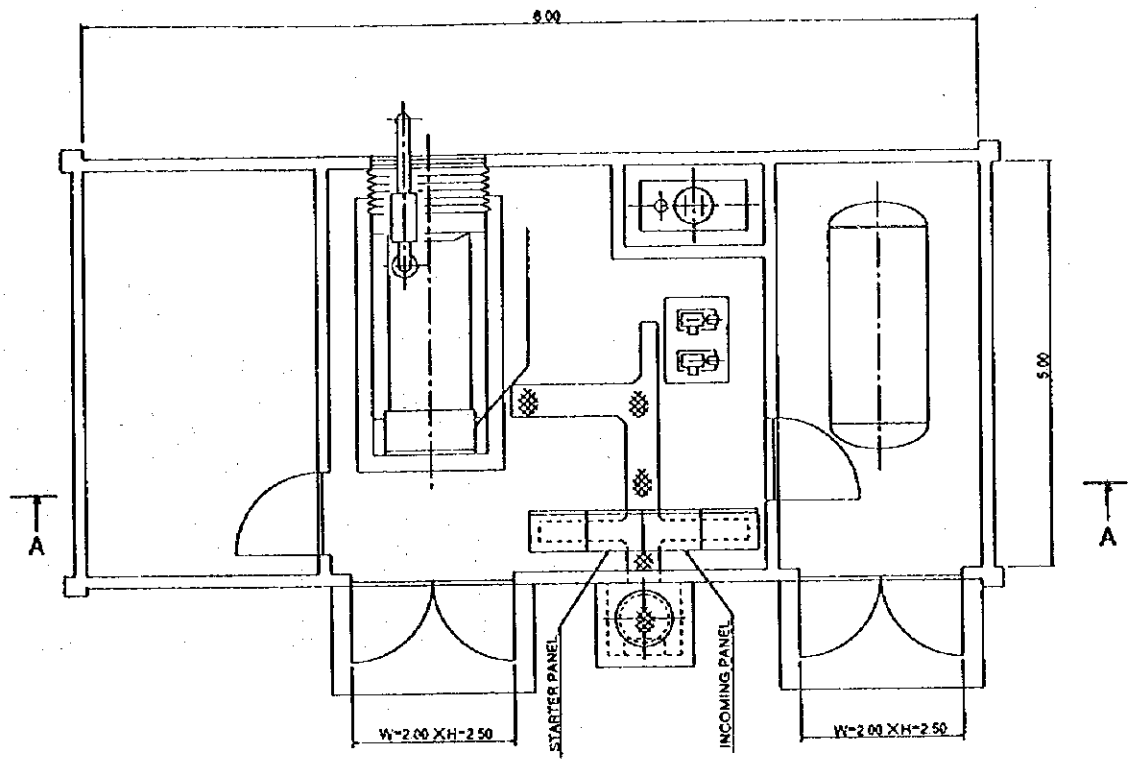
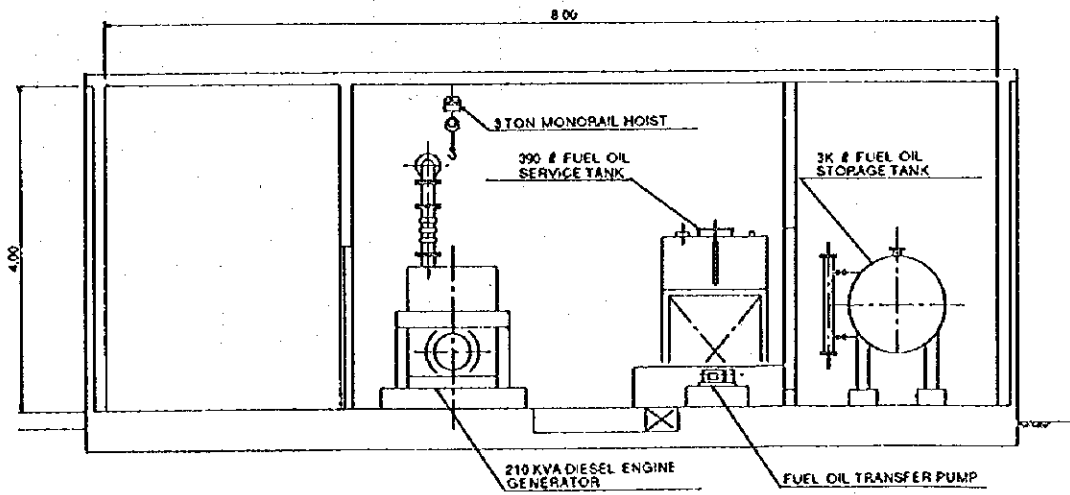


Fig. K.2.9-1 Pumping Station 1/2

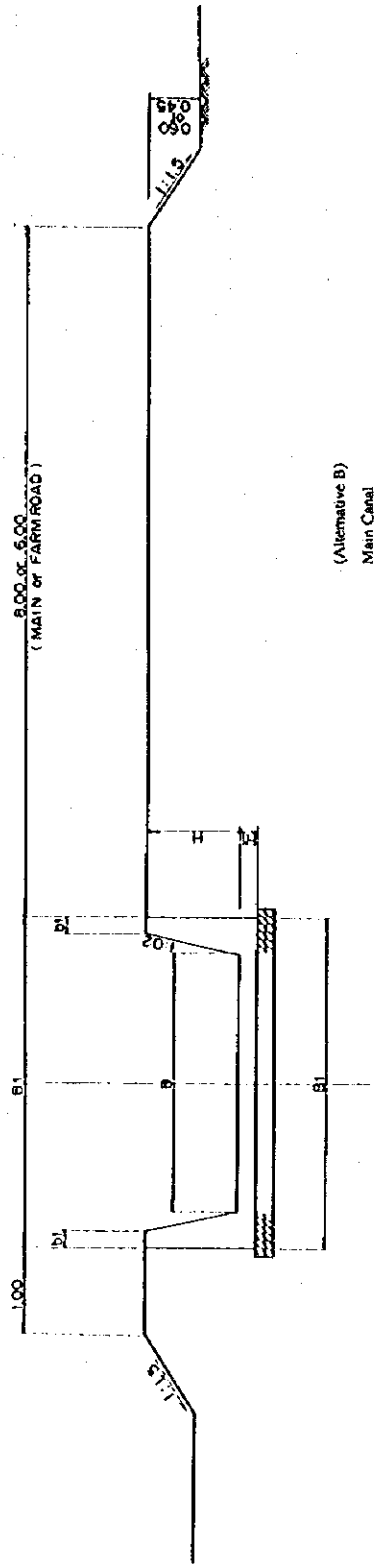


PLAN



SECTION A-A

Fig. K.2.9-2 Pumping Station 2/2



(Alternative B)

Canal Type	Dimension		
	B	H	B1
<b>Main Canal</b>			
Type A			
MC-A-1	4.25	1.00	5.05
MC-A-2	3.00	1.10	3.84
MC-A-3	2.50	1.05	3.32
MC-A-4	2.25	1.00	3.05
MC-A-5	2.00	1.00	2.86
MC-A-6	1.75	1.00	2.55
MC-A-7	1.50	1.00	2.30
MC-A-8	1.25	1.00	2.05
MC-A-9	1.00	1.00	1.80
<b>Type B</b>			
MC-B-1	1.50	0.65	2.06
MC-B-2	1.25	0.70	1.83
MC-B-3	1.00	0.70	1.58
MC-B-4	0.75	0.70	1.33
MC-B-5	0.50	0.70	1.08

Secondary Canal

Canal Type	Dimension		
	B	H	B1
<b>Secondary Canal</b>			
SC-A-1	1.50	0.65	2.06
SC-A-2	1.25	0.65	1.81
SC-A-3	1.00	0.65	1.56
SC-A-4	0.75	0.70	1.33
SC-A-5	0.50	0.70	1.08
SC-A-6	0.75	0.65	1.31
SC-A-7	0.50	0.70	1.08
SC-A-8	0.50	0.65	1.06

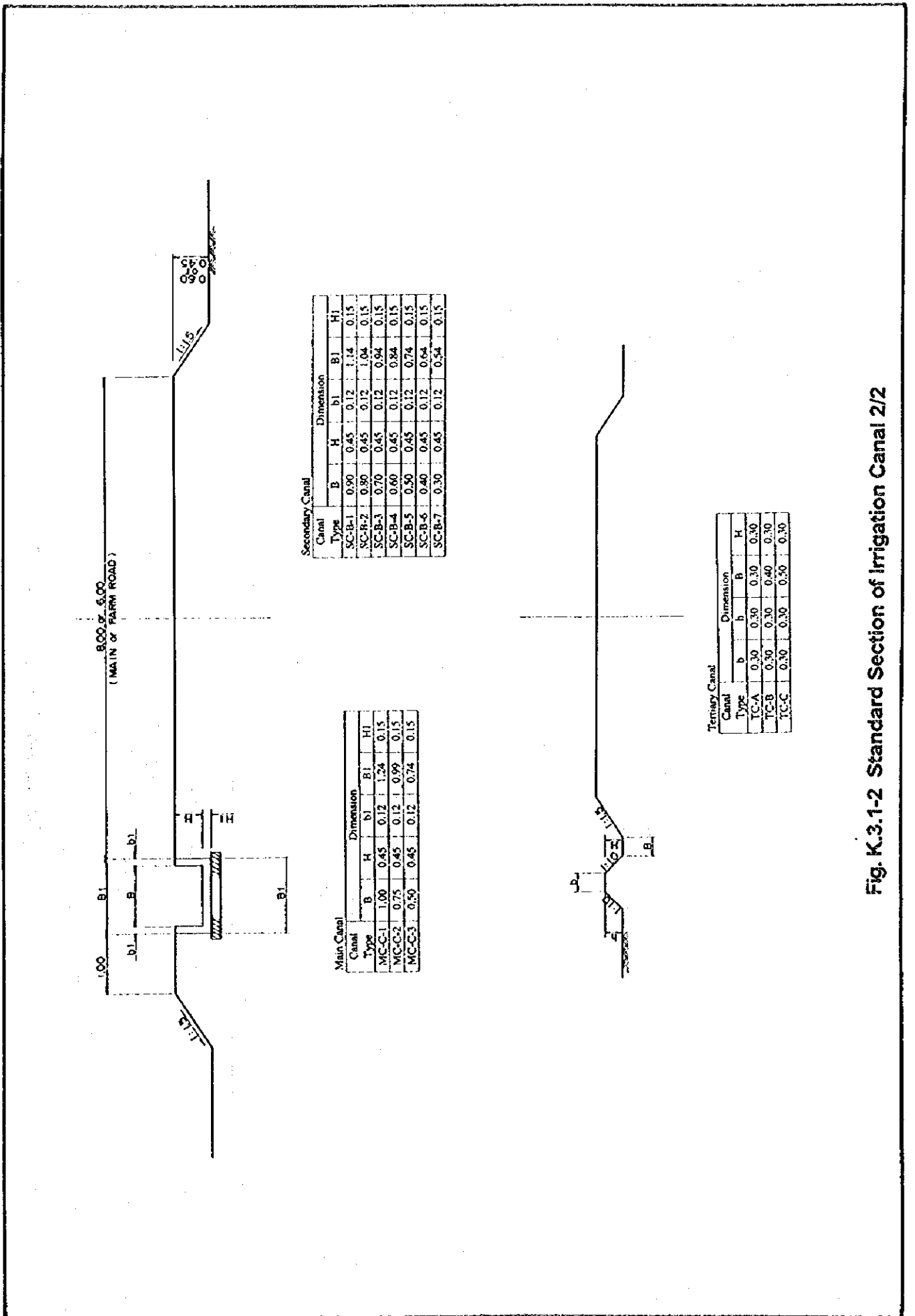
(Alternative A)

Canal Type	Dimension		
	B	H	B1
<b>Main Canal</b>			
Type A			
MC-A-1	3.00	1.10	3.84
MC-A-2	2.50	1.05	3.32
MC-A-3	2.25	1.00	3.05
MC-A-4	2.00	1.00	2.80
MC-A-5	1.75	1.00	2.55
MC-A-6	1.50	1.00	2.30
MC-A-7	1.25	1.00	2.05
MC-A-8	1.00	1.00	1.80
<b>Type B</b>			
MC-B-1	1.50	0.65	2.06
MC-B-2	1.25	0.70	1.83
MC-B-3	1.00	0.70	1.58
MC-B-4	0.75	0.70	1.33
MC-B-5	0.50	0.70	1.08

Secondary Canal

Canal Type	Dimension		
	B	H	B1
<b>Secondary Canal</b>			
SC-A-1	1.50	0.65	2.06
SC-A-2	1.25	0.65	1.81
SC-A-3	1.00	0.65	1.56
SC-A-4	0.75	0.70	1.33
SC-A-5	0.50	0.70	1.08
SC-A-6	0.75	0.65	1.31
SC-A-7	0.50	0.70	1.08
SC-A-8	0.50	0.65	1.06

Fig. K.3.1-1 Standard Section of Irrigation Canal 1/2



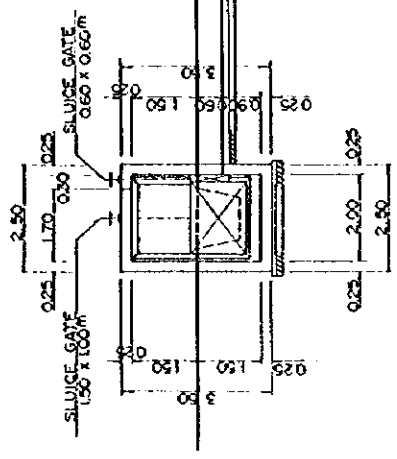
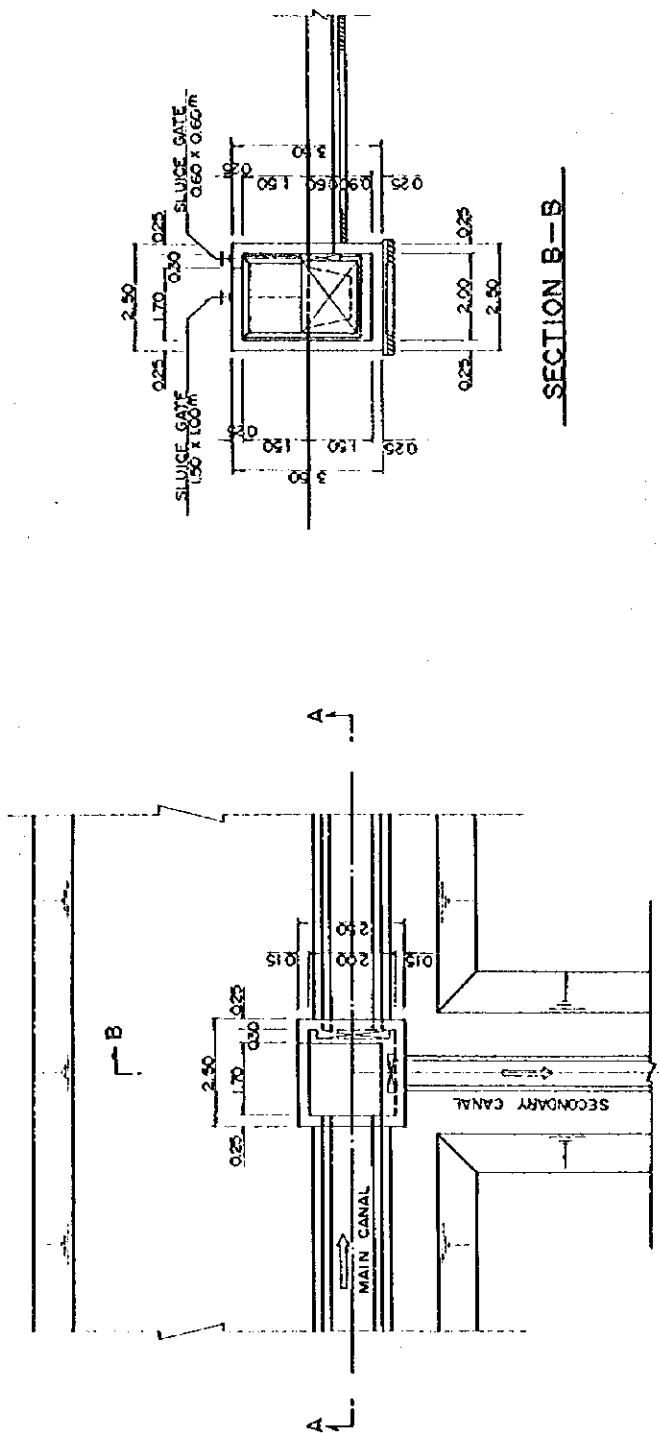
Canal Type	Dimension			
	B	H	b <sub>1</sub>	H <sub>1</sub>
MC-C-1	1.00	0.45	0.12	1.24
MC-C-2	0.75	0.45	0.12	0.99
MC-C-3	0.50	0.45	0.12	0.74

Canal Type	Dimension			
	B	H	b <sub>1</sub>	H <sub>1</sub>
SC-B-1	0.90	0.45	0.12	1.14
SC-B-2	0.80	0.45	0.12	1.04
SC-B-3	0.70	0.45	0.12	0.94
SC-B-4	0.60	0.45	0.12	0.84
SC-B-5	0.50	0.45	0.12	0.74
SC-B-6	0.40	0.45	0.12	0.64
SC-B-7	0.30	0.45	0.12	0.54

Canal Type	Dimension		
	b	B	H
TC-A	0.30	0.50	0.30
TC-B	0.30	0.30	0.40
TC-C	0.30	0.30	0.30

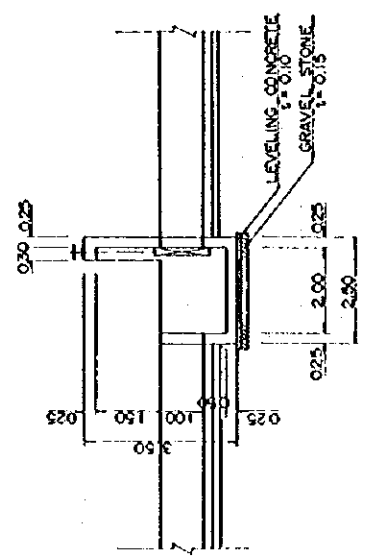
Fig. K.3.1-2 Standard Section of Irrigation Canal 2/2





SECTION B-B

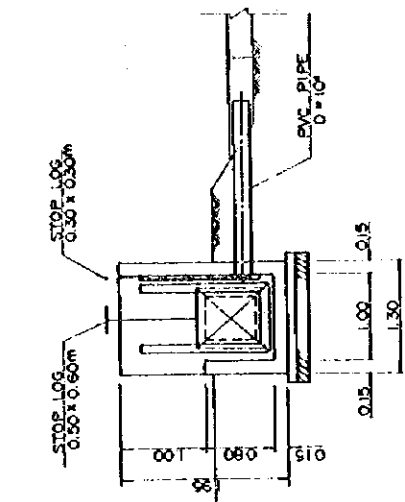
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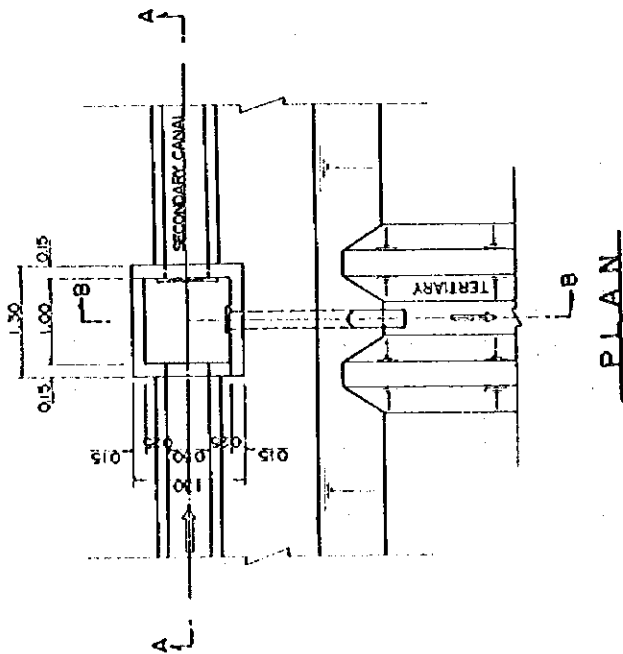
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Fig. K.3.2-1 Division Works (Type-I)

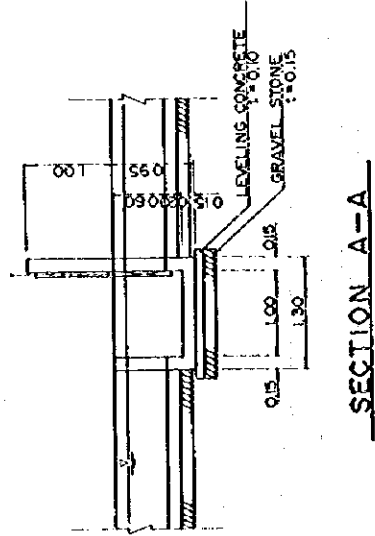




SECTION B-B



PLAN



SECTION A-A

Fig. K.3.2-3 Division Works (Type-II)

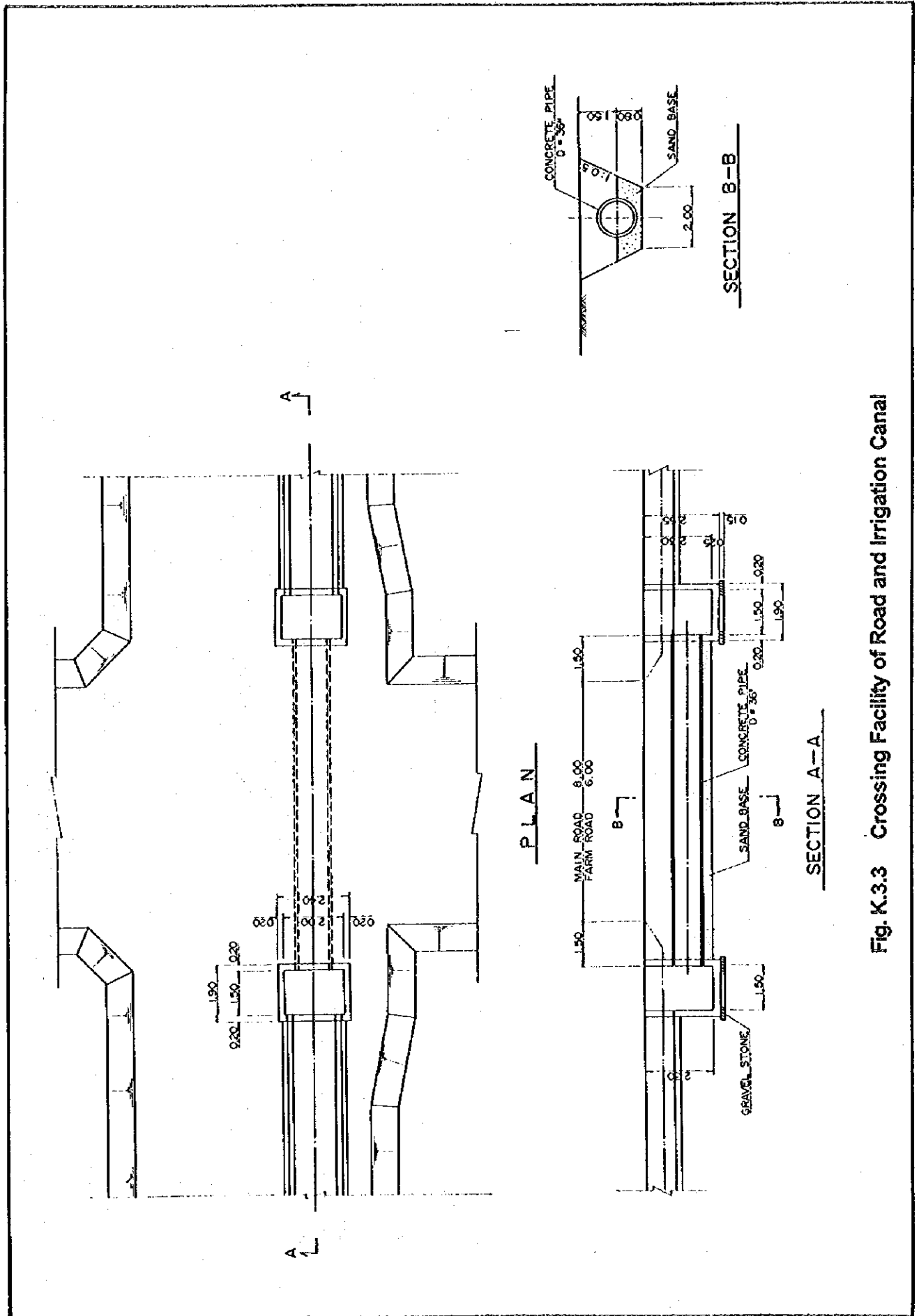


Fig. K.3.3 Crossing Facility of Road and Irrigation Canal

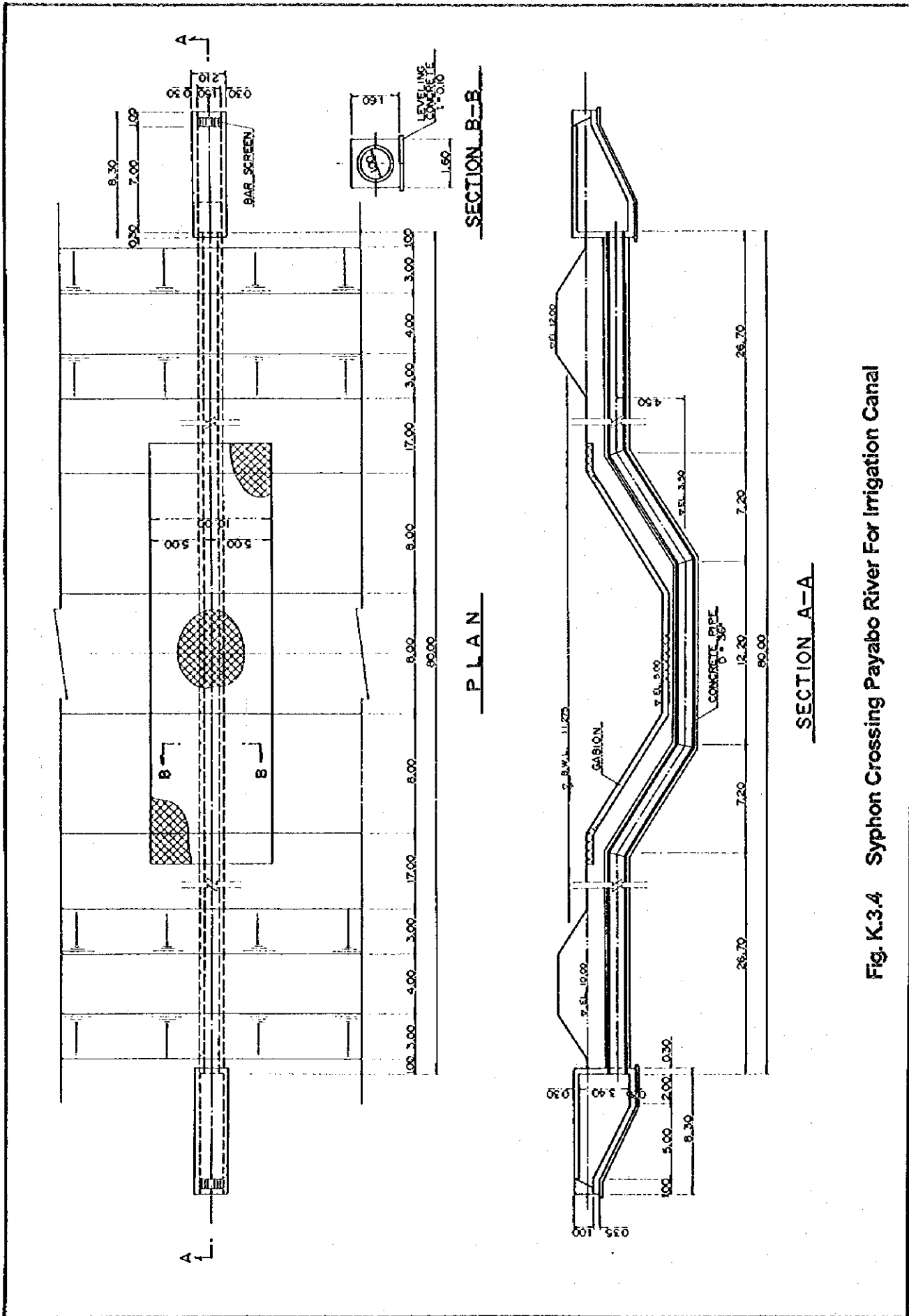


Fig. K.3.4 Siphon Crossing Payabo River For Irrigation Canal

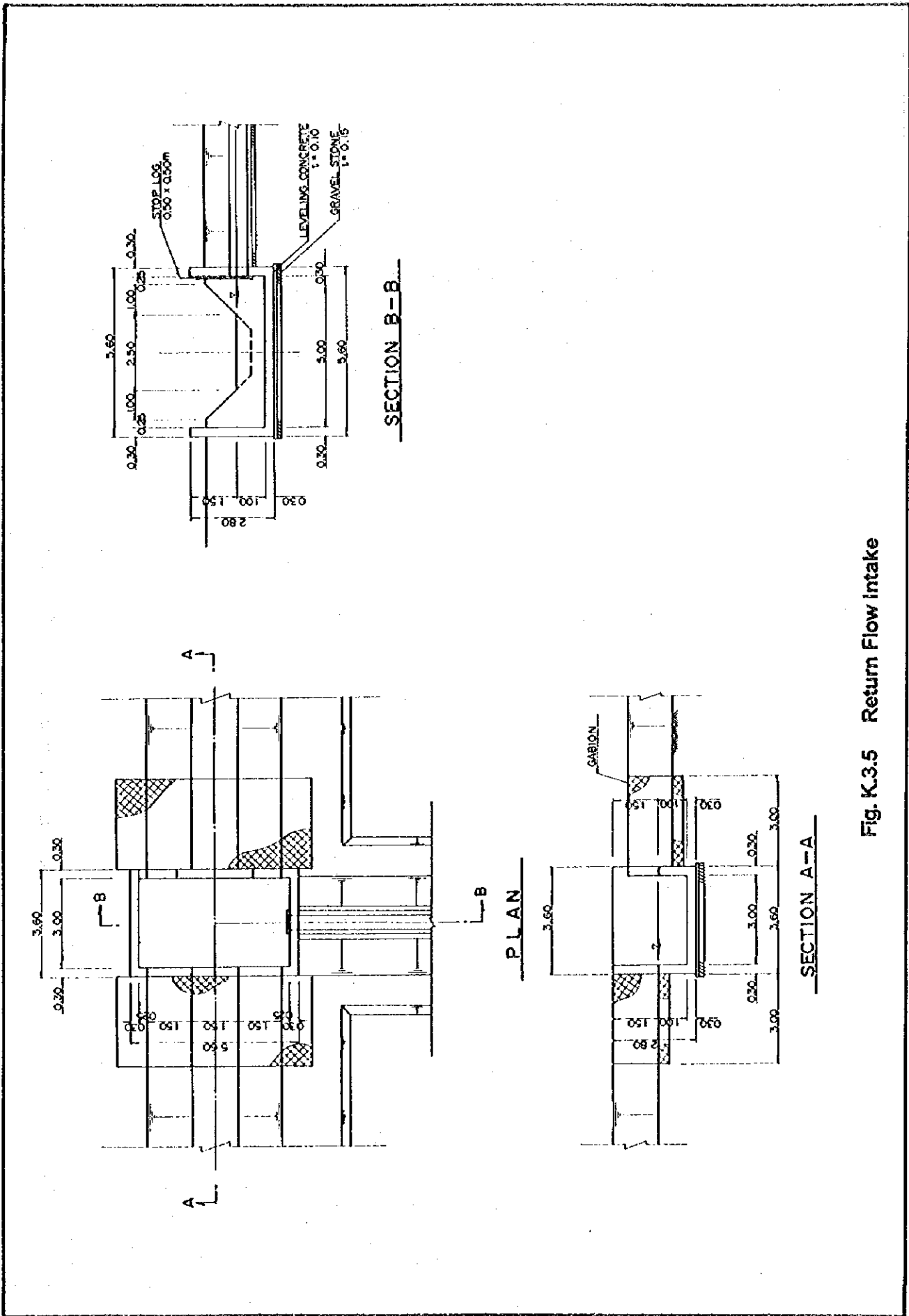
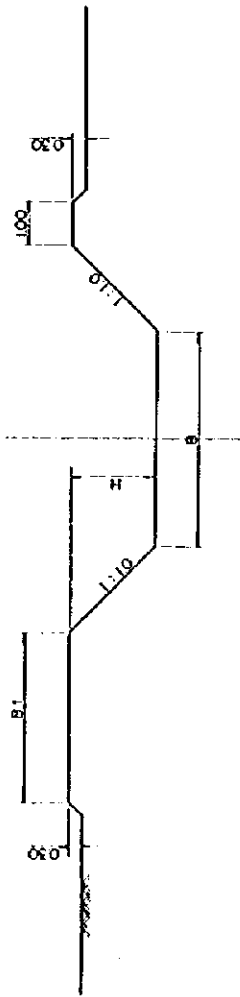
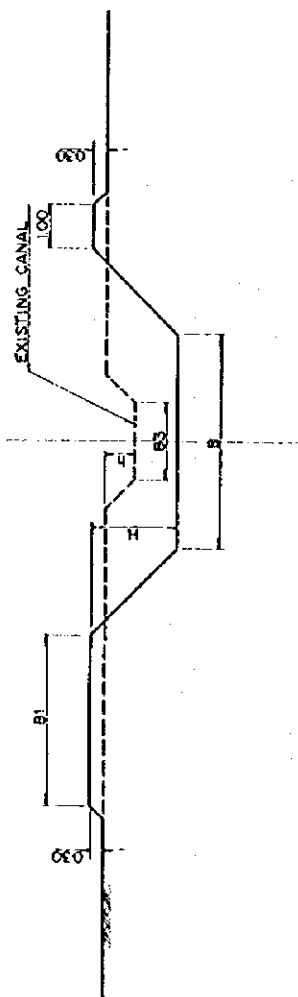


Fig. K.3.5 Return Flow Intake

TO BE CONSTRUCTED



TO BE REHABILITATION



Main Canal

Canal Type	Dimension		
	B	H	B1
MC-1	10.00	2.00	4.00
MC-2	5.00	2.00	4.00
MC-3	3.00	2.00	4.00
MC-4	1.50	2.00	4.00
MC-5	0.50	2.00	4.00

Secondary Canal

Canal Type	Dimension		
	B	H	B1
SC-1	3.00	1.50	4.00
SC-2	1.50	1.50	4.00
SC-3	1.00	1.50	4.00
SC-4	0.50	1.50	4.00

Tertiary Canal

Canal Type	Dimension		
	B	H	B1
TC-1	4.00	1.00	1.00
TC-2	2.50	1.00	1.00
TC-3	2.00	1.00	1.00
TC-4	1.50	1.00	1.00
TC-5	1.00	1.00	1.00
TC-6	0.50	1.00	1.00

Fig. K.4.1 Standard Section of Drainage Canal







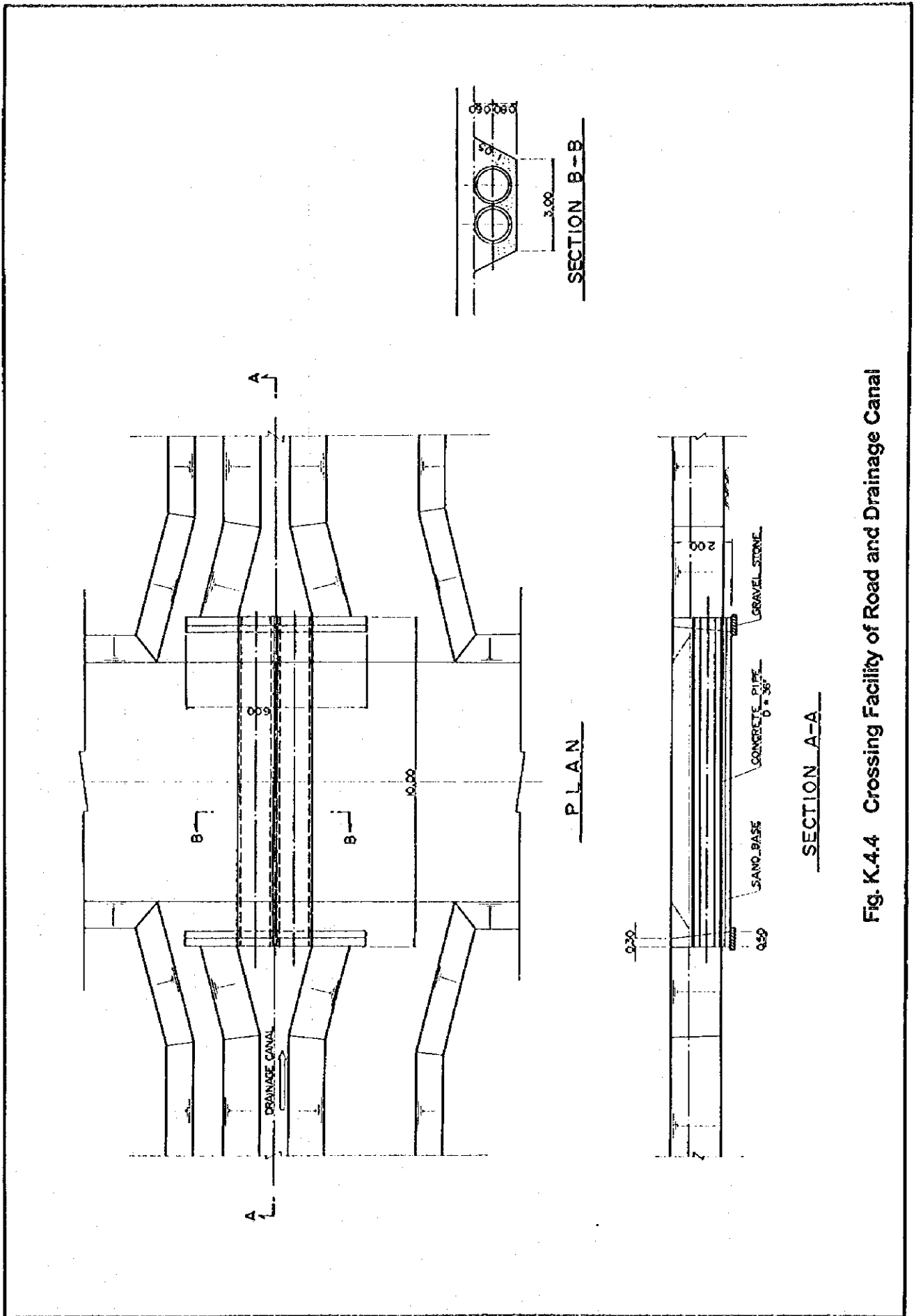
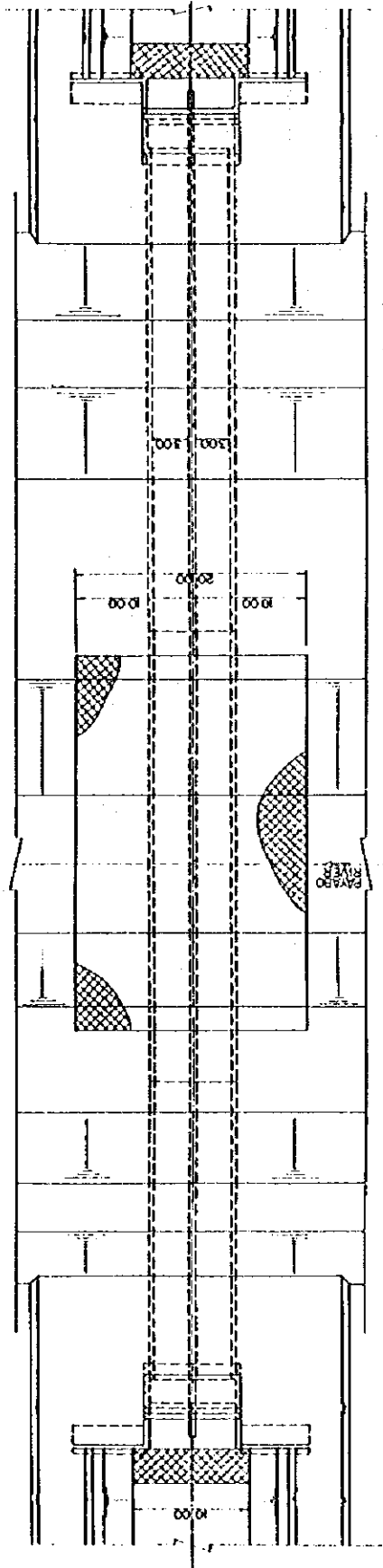
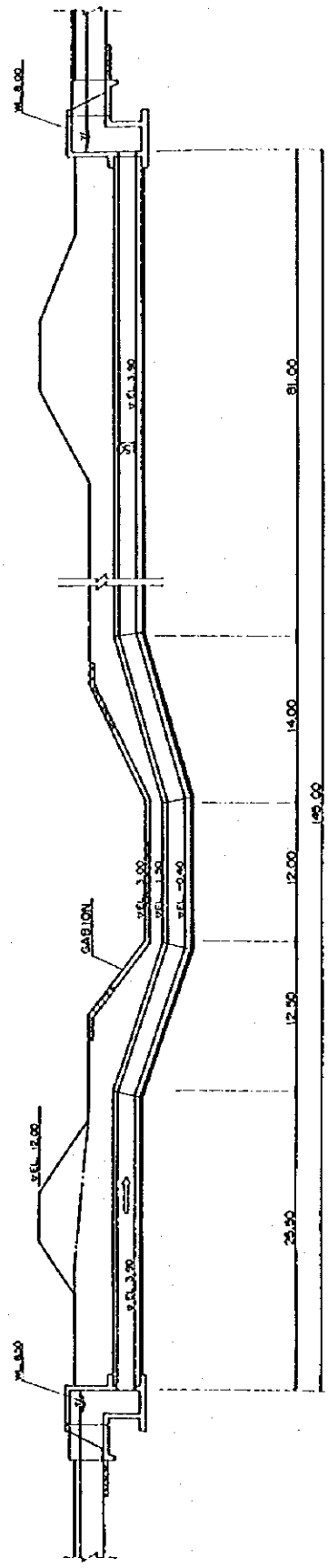


Fig. K.4.4 Crossing Facility of Road and Drainage Canal



PLAN



LONGITUDINAL PROFILE

Fig. K.4.5-1 Syphon Crossing Payabo River for Drainage Canal 1/2



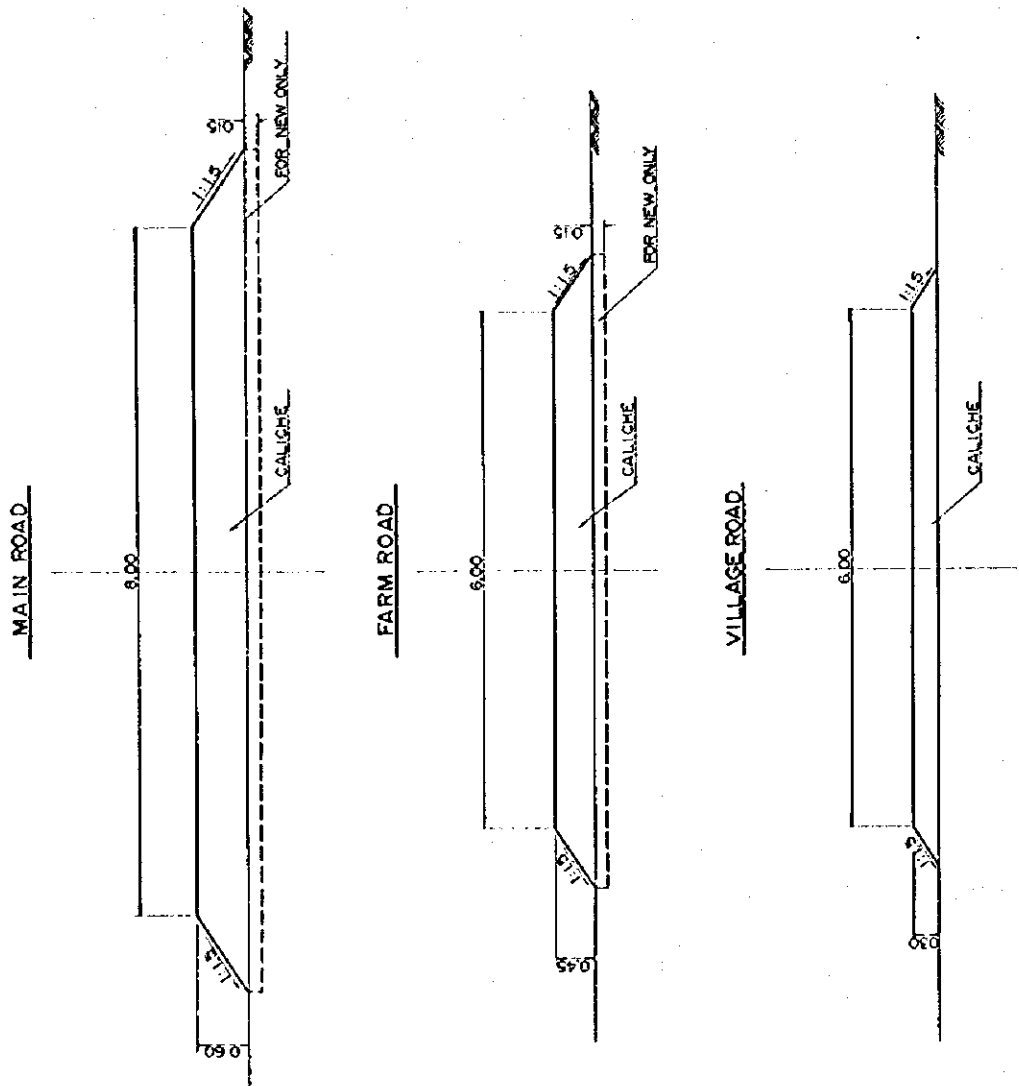
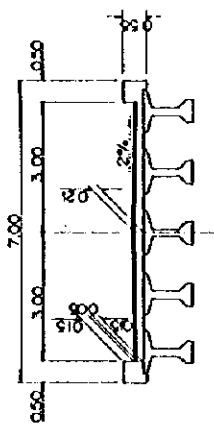
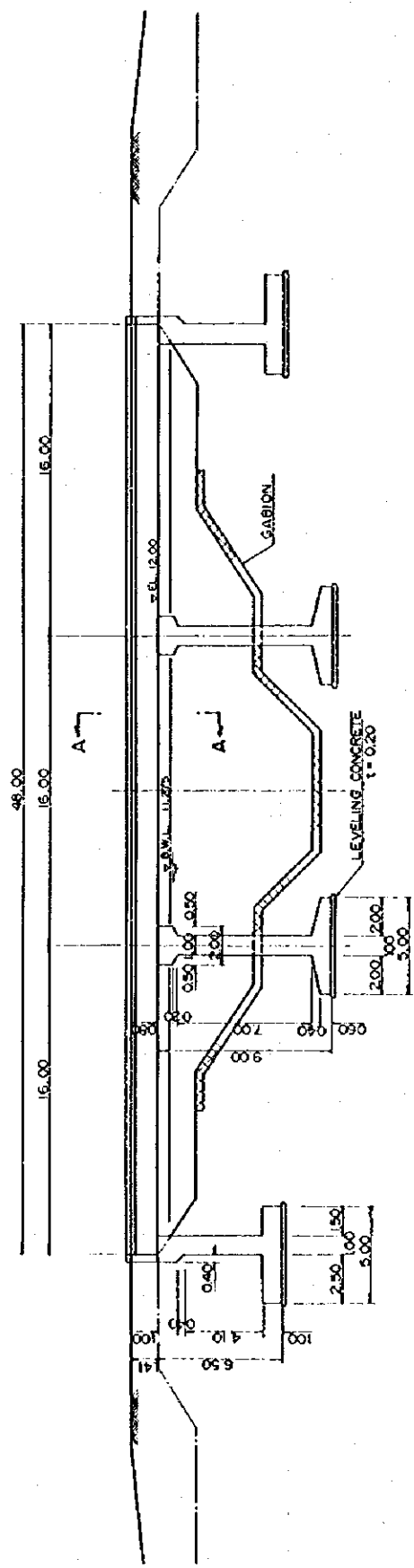


Fig. K.5.1 Standard Section of Road



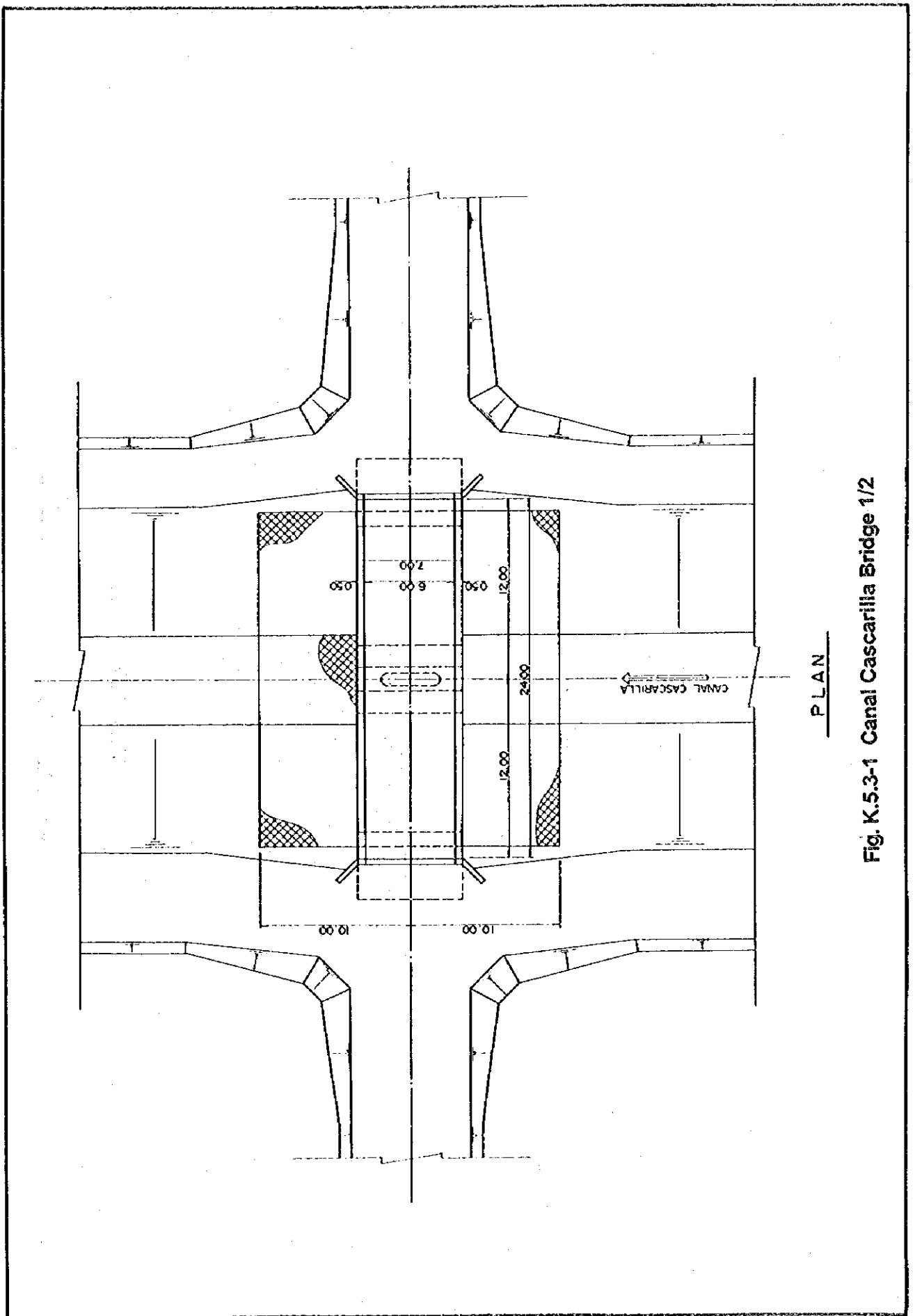


SECTION A-A



LONGITUDINAL PROFILE

Fig. K.5.2-2 Payabo River Bridge 2/2



PLAN

Fig. K.5.3-1 Canal Cascarilla Bridge 1/2





**ANNEX L : PROJECT  
EVALUATION**



## ANNEX L : PROJECT EVALUATION

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## ANNEX L: PROJECT EVALUATION

### L.1 Objective of Project Evaluation

The objective of the present project evaluation is to assess the viability for implementation of the Limon del Yuna Area Agricultural Development Project from the viewpoint of the national economy. Apart from this economic evaluation, financial analysis on the basis of profitability at farm level shall be realized in view of the fact that, even if the implementation of the present agricultural development project is proved to be justifiable from the standpoint of the national community taken as a whole, there is no guarantee for the project to be adopted unless it is attractive to farmers from financial point of view. The evaluation and analysis from economic and financial points of view shall be made in quantitative and, in addition to these quantified evaluation and analysis the indirect effects of the project shall be discussed.

### L.2 Project Evaluation Method

The present project evaluation has been conducted in compliance with the methodology that is commonly applied for evaluation of development projects in the Dominican Republic under finance of the World Bank, Inter-American Development Bank, etc. This methodology is, in sum, to identify and value the project costs and benefits that will arise "with" the project and to compare them with the situation as it would be "without" the project; at first, these costs and benefits are valued at market price and then they are converted into economic costs and benefits with adjustment of three components: 1) elimination of direct transfer items (tariffs and duties, interest on credit transaction, subsidiaries, water charges, etc.) and 2) adjustment for price distortions in traded commodities (to value them at border price), and 3) adjustment for price distortions in non-traded commodities. (to value them at "shadow price"). Once economic pricing has been established for both project costs and benefits, cash flow consisting of these economic costs and benefits will be prepared to cover the whole project life and on the basis of this cash flow the economic internal rate of return (EIRR) that set the discounted economic net benefit stream (discounted economic benefits minus discounted economic costs) equal to zero. This project is considered acceptable if the EIRR exceeds the opportunity cost of capital in the Dominican Republic.

The shadow prices used for converting market prices into economic prices together with the discount rate applied for calculating the net present value are based on the "Guia metodologica para la preparation y presentacion de proyectos agroindustriales, Fondo de Inversiones para el Desarrollo Economico (FIDE), 1989".

Costs and benefits of the project at the implementation phase are subject to increase/decrease due to fluctuation of in yield, prices and other parameters due to the change of project circumstances from the time of project evaluation for the feasibility study, so sensitivity test shall be conducted to find out what parameters shall have the strongest effect on the project for a given percentage variation (increase in construction and O/M cost, decrease in yield, extension of construction period and combination of these variations).

The financial analysis at farm level shall be made by comparing farm profitability under the situation between "with" and "without" project among selected some representative farms on the basis of land tenure, farm size, land use and cropping pattern. For this financial analysis market price for calculation of both income and expenditure shall be adopted. The purpose of this financial analysis is to assess if farmers can get higher return "With" project than that of "Without" project or not, even if they are imposed higher water charge to cover elevated O/M cost.

### **L.3 Component of the Costs and Benefits of the Project**

#### **L.3.1 Costs of the project**

The costs of the project which are subject to project evaluation shall consist of the initial investment and operation and maintenance cost.

##### **(1) Initial investment**

###### **1) Construction works**

- Preparatory works
- Irrigation and drainage system improvement works
- Flood mitigation works
- Land reclamation works
- Road improvement works including in-farm roads
- Construction of the office for O/M services

###### **2) Acquisition of machinery and equipment for O/M services for irrigation/drainage works**

###### **3) General administration cost of the project office**

###### **4) Consulting services**

###### **5) Physical contingency**

##### **(2) Operation and maintenance cost (Balance of cost between "With" project and "Without" project)**

###### **1) Annual operation cost of irrigation and drainage facilities**

###### **2) Replacement of structures and machinery according with their durable life.**

The project costs and benefits for economic evaluation is thus calculated at market price in the following manner.

Unit: RD\$ x 1000

Cost Items	Alternative A	Alternative B-1	Alternative B-2
Construction Works	300,120	364,167	353,484
Aquisition of Machinery	18,673	18,673	18,673
General Administration	5,000	5,000	5,000
Consulting Services	54,813	54,813	54,813
Physical Contingency	37,861	44,265	43,197
Total of Investment Cost	416,467	486,918	475,167
O/M Cost (Year)	2,511	2,625	2,625
Replacement of machinery	18,673	18,673	18,673
Replacement of structures	3,540	3,540	3,540

### L.3.2 Benefits of the project

The implementation of the project is expected to produce the following quantitative benefits.

- (1) Irrigation/drainage benefit (Incremental crop production attributable to expansion of irrigable area as well as to improvement of productivity)

Balance of the net return for the whole development area between "With" project situation and "Without" project situation

- (2) Flood mitigation damage (Avoidance of loss in agricultural production)

Estimated damage to be caused by flooding at "Without" project situation = Inundable area of paddy fields at return period of 1/2 x return period of flooding x proportion of loss for agricultural production x value of agricultural production per ha of inundable area

Annual benefits of the project composed of the above-mentioned two categories are calculated as summarized below (Refer to Table L.3.1).

Unit RD\$ x 1000

Items	Alternative A	Alternative B-1	Alternative B-2
Incremental Net Return of Agricultural Production	102,264	111,876	108,780
Avoidance of Loss in Agricultural Production	2,405	2,405	2,405
Total	104,669	114,281	111,185



## L.4 Valuation of the Economic Farm-gate Price and Production Cost

### L.4.1 Farm-gate price

For the purpose of valuing economic price, crops and livestock products which are contemplated in both "With" and "Without" project situation are divided into two categories: traded items and non-traded items; the economic farm-gate price (economic import/export parity price) for the former is valued at border prices and that for the latter is obtained multiplying financial (market) price by conversion factor for consumer goods (On the basis of information on value and tariff of exports and imports for consumer goods, this factor is set as 0.81).

Crops and livestock products which are produced in the Study area are classified between traded and non-traded items in the following manner:

<u>Traded Items</u>	<u>Non-traded Items</u>
Rice	Sweet potato
Maize	Cassava
Haricot bean	Vegetables
Milk	Cattle

And, economic farm-gate prices for these crops and livestock products are obtained as given below (See Table L.4.1 for basis of calculation).

**Farm-gate Price for Crops and Livestock Products**

Category	Crops	Unit (RDS/ton)	
		Financial	Economic
Traded Items	Rice	4,500	3,139
	Maize	1,938	2,362
	Haricot Bean	7,707	10,520
	Milk	3,730 *	1,907 *
Non-traded Items	Sweet potato	1,122	909
	Cassava	1,583	1,282
	Vegetables	4,323	3,502
	Cattle	3,474 **	2,814

Note: \* RDS/kiloliter, \*\* RDS/head

### L.4.2 Production cost

The financial production cost was converted to economic cost by means of the following adjustment.

- (1) To deduct such transfer items such as water charge and interest for agricultural credit.
- (2) To value fertilizer at border price based on price projection of the World Bank.

- (3) To adjust market price of agro-chemicals applying conversion factor for consumable good, subject to prior deduction tariff (3%).
- (4) To adjust market price for contractual machinery services applying conversion factor of 0.83, which was obtained taking cost component of the services (imported machinery, administration cost, skilled labor, etc.)
- (5) To adjust market price of non-traded goods applying conversion factor for capital goods (0.95) estimated by the Study Team.
- (6) To adjust market price of wage for skilled labor applying conversion factor for consumable goods (0.81) estimated by the Study Team.
- (7) To adjust market price of wage for unskilled labor applying shadow wage rate (0.44) established by FIDE.

As a consequence of the adjustment cited above, the production cost of crops and cattle farming expressed in economic term is obtained in the following manner (Refer to Table L.4.2).

#### Production Cost for Crop Production and Cattle Farming

Crops	Unit RDS/ha			
	Without Project		With Project	
	Financial	Economic	Financial	Economic
Rice	15,095	11,141	15,720	11,400
Maize	4,703	3,082	5,764	3,810
Haricot bean	10,592	7,535	13,210	9,506
Sweet potato	7,521	4,366	9,136	5,343
Cassava	6,201	3,435	7,624	4,273
Vegetables	12,756	9,008	15,886	11,345
Cattle farming	10,898	7,186	10,898	7,186

### L.5 Valuation of Project Benefits and Costs at Economic Price

#### L.5.1 Project Benefits

On the basis of the economic farm-gate price and production cost calculated above, the benefits of the project (incremental net return of agricultural production and avoidance of loss in agricultural production) at economic price is estimated in the following manner.

Unit RD\$ x 1000

Items	Alternative A	Alternative B-1	Alternative B-2
Incremental Net Return of Agricultural Production	66,597	74,517	73,443
Avoidance of Loss in Agricultural Production	1,678	1,678	1,678
Total	68,275	68,275	68,275

## L.5.2 Project Costs

### (1) Initial investment cost

The initial investment cost which is composed of initial construction works, operation and maintenance and consulting services is converted from financial price to economic price in accordance with the following adjustments.

- (1) Traded commodities: To adjust market price multiplying conversion factor for capital goods (0.95), subject to deduction of import tax for respective category of materials and machinery in advance
- (2) Non-traded commodities: To adjust market price multiplying conversion factor
- (3) Wage of foreign engineer: Market price is considered to be equal to economic price
- (4) Wage of local skilled labor: To adjust market price applying conversion factor for consumable goods (0.81)
- (5) Wage of local unskilled labor: To adjust market price applying shadow wage rate (0.44) estimated by FIDA
- (6) Indirect cost: To adjust market price applying standard conversion factor (0.87)

Subject to the adjustments cited above, the initial project cost estimated at economic price is obtained as given in the table below.

Unit:RD\$ x 1000

Cost Items	Alternative A	Alternative B-1	Alternative B-2
Construction Works	249,100	302,259	293,392
Aquisition of Machinery	17,179	17,179	17,179
General Administration	4,350	4,350	4,350
Consulting Services	53,168	53,168	53,168
Physical Contingency	32,380	37,696	36,809
Total of Investment Cost	356,177	414,652	404,898

## (2) Operation and Maintenance Cost

The operation and maintenance cost of the project is divided into (1) annual operation and maintenance cost for infrastructures as well as for project office and Junta de Regantes' office and (2) replacement cost of infrastructures and O/M machinery and equipment. The economic price for this cost is estimated following the same adjustment mentioned in above L.5.2 (1) in the following manner.

	Alternative A	Alternative B-1	Alternative B-2
O/M Cost (Year)	3,067	3,826	3,826
Replacement of machinery	17,179	17,179	17,179
Replacement of structures	3,256	3,256	3,256

## L.6 Economic Analysis

### L.6.1 Economic Internal Rate of Return (EIRR)

The annual inflow (benefits) and outflow (costs) at economic price have been determined as mentioned before and, as a consequence, the annual incremental net benefit (annual benefit minus annual cost) is incorporated to cover the whole project life, which is set as 50 years for the project under consideration. On the basis of annual flow (cash flow) of the incremental net benefits (Refer to Table L.6.1), the economic internal rate of return (EIRR) is estimated to be 14,7% for the Alternative Plan A, 14.1% for the Alternative Plan B-1, and 14.2 % for the Alternative Plan B-2. Any of these rates exceeds the discount rate of 12 % which was set by the Central Bank and considered as the opportunity cost of the capital in the Dominican Republic. Therefore, all of three Alternatives have been justified from economic point of view.

### L.6.2 Sensitivity Analysis

The objectives of the sensitivity analysis is to modify assumptions on key variables (benefits, costs and time for completion of the project), and to test how the project's economic internal rate of return, and hence its viability, is affected by these different scenarios. This analysis permits a judgment as to the riskiness of the project under alternative assumptions. The following assumptions on key factors were made for the present project:

- Unit yield of paddy is declined by 10% (Case 1)
- Project cost is escalated by 10% (Case 2)
- Combination of the Case 1 and the Case 2 (Case 3)
- Completion of construction works is delayed by 2 years (Case 4)

Project's EIRR was affected for respective assumption in the following manner:

Assumptions	EIRR (%)		
	Alternative 1	Alternative B-1	Alternative B-2
Case 1	13.3	12.7	12.9
Case 2	13.4	12.8	13.1
Case 3	12.1	11.9	11.7
Case 4	13.0	12.5	12.7

The above analysis disclosed that the profitability of the project is more sensible to the delay of completion of construction works than decline of unit yield and escalation of project cost.

## L.7 Financial Analysis

### L.7.1 Profit-and-loss analysis at model farms

At level of farmers, the implementation of the present project will bring both positive and negative effects; the former is represented by expansion of cultivated area and enhancement of land productivity and the latter is expressed in the form of rise in water charge and reduction of arable land. Under the circumstances, so as to quantify these effects profit-and-loss analysis at farm was made by establishment of various model farms in accordance with land tenure, farm size, crop, and, cultivated area. A total of 6 model farms have been established with following characteristics:

Model Farms	Land Tenure	Farm Size (ha)		Crops		Cultivated Area (ha)	
		Without	With	Without	With	Without <sup>1/</sup>	With <sup>2/</sup>
A	IAD	3.8	3.8	Paddy	Paddy	4.9	6.8
B	IAD	1.6	3.0 <sup>3/</sup>	Paddy	Paddy	2.1	5.4
C	IAD	9.0	9.0	Pasture	Paddy	9.0	16.2
D	Private	5.8	5.8	Upland	Paddy	2.0	6.8
E	Private	40.0	30.0 <sup>4/</sup>	Paddy	Paddy	47.0	51.0
F	Private	180.0	135.0 <sup>4/</sup>	Pasture	Paddy	180.0	243.0

Note: With - With Project, Without - Without Project

1/ - Farm size x 0.9 (proportion of net irrigable area) x 1.4 (actual cropping intensity)

2/ - Farm size x 0.85 (proportion of net irrigable area) x 2.0 (proposed cropping intensity)

3/ - With assumption that redistribution of land should be made

4/ - With assumption that one-quarter of land should be expropriated according with

"Quota Part" law

In relation with above model farms profit-and-loss analysis under both "With" and "Without" projects is made on the basis of market price and the result of the same is summarized in the table below (Refer to Table L.7.1). Water charges employed for this analysis is RD\$ 175.22/ha for the "Without" project case and RD\$ 394.00/ha for the "With" project case.

Net Return (RD\$/year)	Model Farm					
	A	B	C	D	E	F
Without Project	1,446	620	16,458	11,620	13,865	929,160
With Project	49,545	39,344	115,550	49,545	355,432	1,757,453
Increased Net Return	48,099	38,725	69,092	37,925	341,567	828,293

## L.7.2 Financing Plan

The project costs may be divided into foreign currency portion and local currency portion and their annual disbursement schedule (Alternative Plan B-1 - the highest cost among three alternatives) is as shown below.

Unit: RD\$ x 1000

Year	Foreign Currency	Local Currency	Total
1	19,935	5,283	25,218
2	27,649	12,327	39,976
3	149,795	70,643	220,438
4	130,053	68,914	198,967
5	44,148	13,409	57,557
Total	371,580	170,576	542,156

Of the said project cost, foreign currency portion will be procured by loan from international financing institution and local currency portion will be arranged by Dominican Government.

Provided that loan for the foreign currency portion should be provides on the condition that:

- Interest : 3% per annum
- Repayment term: 20 years (grace period: 10 years)

the maximum amount to be repaid shall be RD\$ 29,169,000, which falls on the year of amortization. (See Table L.7.2 ).

## L.8 Project's Indirect Benefits

As mentioned before, the implementation of the present project will produce such directs benefits as incremental agricultural production owing to improvement of irrigation and drainage conditions and avoidance in agricultural loss to be brought by flood mitigation. And, apart from these direct benefits, it is anticipated that the project would accompany indirect benefits to be explained hereinafter.

- (1) Contribution to development of agro-industry both within and out of the Study area and to encouragement of local economic activities

An annual production of paddy is expected to increase from 32,000 ton/year to 70,000-80,000 ton/year, and this incremental production will constitute incentive to promote development of rice processing industry as well as elevating operation efficiency of existing plants. Simultaneously, in parallel with expansion of cultivated area of paddy demand for fertilizers, agro-chemicals, and agricultural machinery services will be grown, which contributes to make local commercial activities prosperous. With development of these agro-industrial and commercial activities, activation of regional economy will come true.

(2) Promotion for strengthening rural organization

The present agricultural development plan proposes develop rice processing facilities to be administrated and operated by farmers' organization within the Study area. With realization of this proposal, the existing farmers' organization, which have no substantial function nor activity at present, will be provided opportunity for conducting fruitful economic activity. Furthermore, with achievement of successful administration of rice processing facilities, farmers' organizations will become capable of expanding their activities to such fields as sale of agricultural inputs, rent of agricultural machinery and credit services, benefits to be produced through farmers' organization will be returned to members of the organizations.

Besides above-mentioned cooperative organizations, improvement of irrigation/drainage system will facilitate formation of water users' association within the Study area. Thus, implementation of the present project is highly benefitable in terms of strengthening rural organization.

(3) Creation of opportunity for employment

Expansion of cultivated area of paddy also promises to provide more job opportunity of farm labor and development of agro-industry will tale local inhabitants into new employment. Furthermore, implementation of construction works will create wide variety of employment, although it is a short-term basis.

(4) Contribution to self-sufficiency of rice

In the Dominican Republic, rice has been imported for eight years of the last decade and it is forecaster that there will be deficit of 200 thousand tons of rice for the coming 2015 taking growth trend of population into account. The Limon del Yuna Agricultural Development Project envisages to increase rice output by 70,000 tons per year, so implementation of this project contributes to cover one-quarter of national deficit of rice.

(5) Saving of fuel

The prevailing poorly functioning irrigation system forces farmers to rely considerable amount of irrigation water on pumping system and farmers bear a cost of RD\$ 3,647,000 (total annual amount in the Study area) for operation and maintenance of pumping irrigation system in addition to water charge payable to INDRHI. Enhancement of gravity irrigation system discourages farmers to use pumps and, as a consequence, saving of fuel required for operation of pumps will be realized.

## **ANNEX L : TABLES**



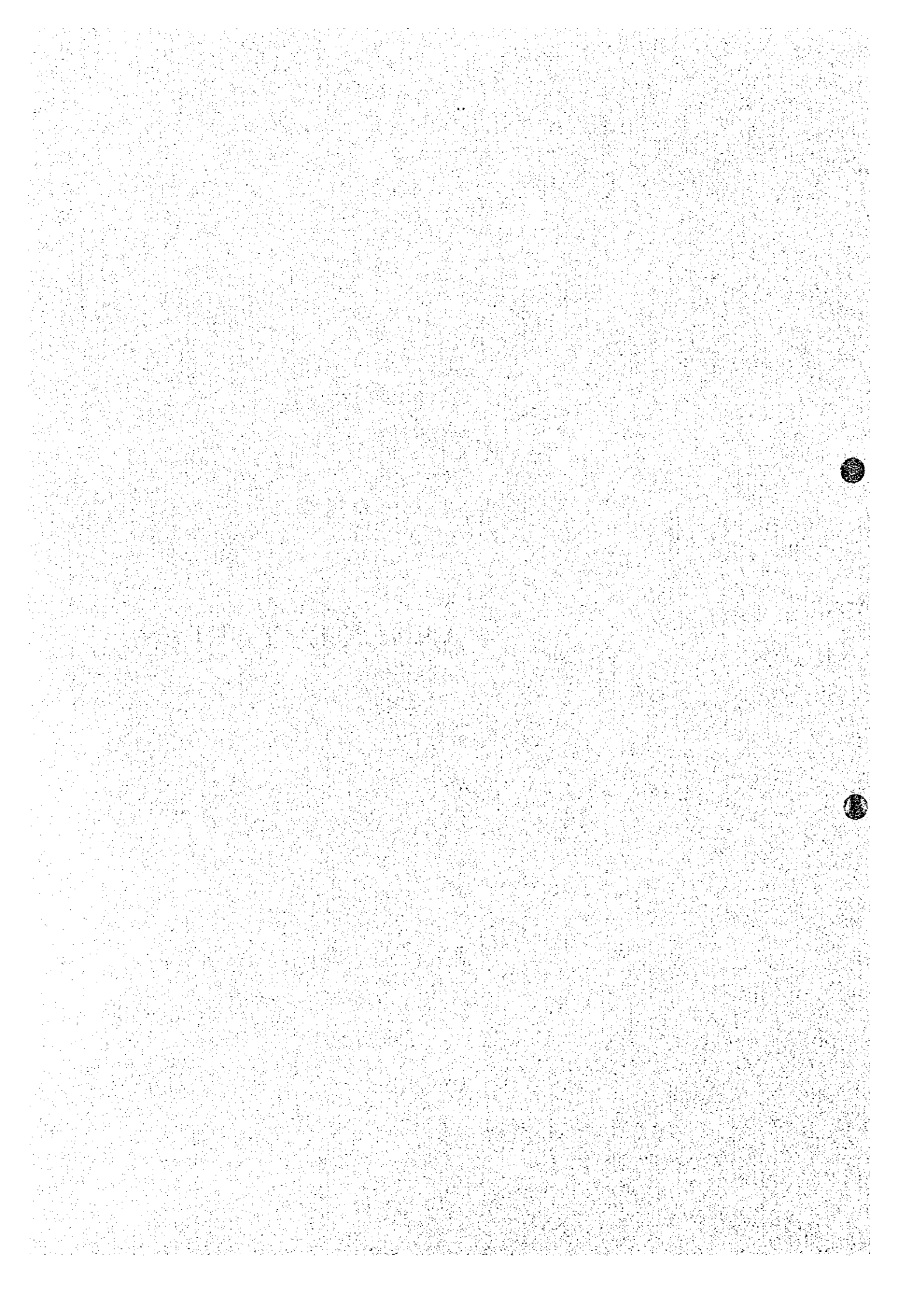


Table L.3.1 Annual Benefits of the Project at Market Price

(1) Irrigation/drainage benefit

Unit: RDS x 1000

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	146,250	143,403	2,847	312,368	209,076	103,292	100,445
	Upland Crops	1,642	1,503	139	9,307	4,716	4,591	4,452
	Livestock	29,552	20,052	9,500	21,361	14,494	6,867	-2,633
	Total	177,444	164,958	12,486	343,036	228,286	114,750	102,264
B - 1	Paddy	146,250	143,403	2,847	368,577	247,118	121,459	118,612
	Upland Crops	1,642	1,503	139	5,955	3,052	2,903	2,764
	Livestock	29,552	20,052	9,500	0	0	0	-9,500
	Total	177,444	164,958	12,486	374,532	250,170	124,362	111,876
B - 2	Paddy	146,250	143,403	2,847	354,222	238,001	116,221	113,374
	Upland Crops	1,642	1,503	139	5,955	3,052	2,903	2,764
	Livestock	29,552	20,052	9,500	6,065	3,923	2,142	-7,358
	Total	177,444	164,958	12,486	366,242	244,976	121,266	108,780

(2) Flood mitigation benefit

Flood mitigation benefit arises from avoiding the loss in agricultural production which will be expected "With" project situation, so avoided loss constitutes benefit of flood mitigation works

Loss in agricultural production caused by flooding =

Output of paddy in inundable fields x probability of inundation x percentage of damage in output x farm-gate price of paddy

$$= 675 \text{ ha} \times 1.5 \times 2.2 \text{ ton/ha} \times 0.8 \times 0.3 \times \text{RDS } 4,500 = \text{RDS } 2,405,700$$

**Table L.4.1 Calculation of Economic Import/Export Parity Price**

**(1) Paddy (Import Parity Price)**

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export <sup>1</sup>	255		
Freight and Insurance	72		
CIF at port of Santo Domingo	327		
Conversion into RD\$ at shadow exchange rate		5,598	
Port handling charge		140	RD\$ 140/mt.
Transport Wharf-Warehouse		90	RD\$ 90/mt.
Wholesale price in Santo Domingo		5,828	
Handling and transportation cost by wholesaler		291	at 5%
Ex-mill price		5,537	
Conversion of rice into paddy		3,599	at 65%
Milling cost		360	at 10%
Transport paddy field-rice mill		100	
Import parity price at farm-gate		3,139	

Note: Thai product, white, milled, 5% broken, Projection for the year of 2000  
prepared by the International Trade Division of the World Bank

**Table L.4.1 Calculation of Economic Import/Export Parity Price**

**(2) Cacao (Import Parity Price)**

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export	124		
Freight and Insurance	35		
CIF at port of Santo Domingo	159		
Conversion into RD\$ at shadow exchange rate		2,722	
Port handling charge		140	
Transport Wharf-Warehouse		90	
Wholesale price in Santo Domingo		2,952	
Handling and transportation cost by wholesaler		295	at 10%
Import parity price to farm-gate		2,657	

**(3) Maize (Import Parity Price)**

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export	105		
Freight and Insurance	35		
CIF at port of Santo Domingo	140		
Conversion into RD\$ at shadow exchange rate		2,397	
Port handling charge		140	
Transport Wharf-Warehouse		90	
Wholesale price in Santo Domingo		2,627	
Handling and transportation cost by wholesaler		263	at 10%
Import parity price to farm-gate		2,364	

**Table L.4.1 Calculation of Economic Import/Export Parity Price**

**(4) Haricot Bean (Import Parity Price)**

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export	565		
Freight and Insurance	35		
CIF at port of Santo Domingo	600		
Conversion into RD\$ at shadow exchange rate		10,272	
Port handling charge		140	
Transport Wharf-Warehouse		90	
Wholesale price in Santo Domingo		10,502	
Handling and transportation cost by wholesaler		1,050	at 10%
Import parity price to farm-gate		9,452	

Table L.4.1 Calculation of Economic Import/Export Parity Price

(5) Milk (Import Parity Price)

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export	1,200		Price in powder
Freight and Insurance	146		
CIF at port of Santo Domingo	1,346		
Conversion into RD\$ at shadow exchange rate		23,044	
Port handling charge		140	
Transport Wharf-Warehouse		60	
Wholesale price in Santo Domingo		23,244	
Handling and transportation cost by wholesaler		1,162	at 5%
Ex-plant price		22,081	
Conversion of powder into fresh milk		2,760	at 12.5%
Processing cost at plant		828	at 20%
Transport paddy field-rice mill		25	
Import parity price at farm-gate		1,907	

**Table L.4.1 Calculation of Economic Import/Export Parity Price**

**(6) Fertilizer (Import Parity Price)**

**1) Urea**

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export	140		Price in powder
Freight and Insurance	35		
CIF at port of Santo Domingo	175		
Conversion into RD\$ at shadow exchange rate		2,996	
Port handling charge		140	
Transport Wharf-Warehouse		60	
Wholesale price in Santo Domingo		3,196	
Handling and processing cost, margin and transportation cost Santo Domingo - Project area		959 at 30%	
Import parity price at farm-gate			
- RD\$/ton		4,155	
- RD\$/kg		4.15	

**2) TSP (Triple Superphosphate)**

Items	Price in US\$	Price in RD\$	Explanatory Note
FOB at port of export	132		Price in powder
Freight and Insurance	35		
CIF at port of Santo Domingo	167		
Conversion into RD\$ at shadow exchange rate		2,859	
Port handling charge		140	
Transport Wharf-Warehouse		60	
Wholesale price in Santo Domingo		3,059	
Handling and processing cost, margin and transportation cost Santo Domingo - Project area		918 at 10%	
Import parity price at farm-gate			
- RD\$/ton		3,977	
- RD\$/kg		3.98	

Table L.4.2 Economic Cost of Production (With Project)

## (1) Paddy

ITEMS	UNIT	QUANTITY	UNIT PRICE		AMOUNT	
			Financial	Economic	Financial	Economic
<b>1. Purchase of Seeds and Agro-chemicals</b>						
- Seed	kgr.	70.00	9.45	8.98	661.50	628.43
- Fertilizer (Simple)	kgr.	170.00	4.38	4.15	744.60	705.50
- Fertilizer (Compound)	kg.	400.00	3.75	3.98	1,500.00	1,592.00
- Insecticide (Nuvacron 60)	lt.	2.00	370.00	340.40	740.00	680.80
- Fungicide (Manzate)	lt.	0.90	200.00	184.00	180.00	165.60
- Rodenticide	kgr.	0.52	70.00	64.40	36.40	33.49
- Herbicide (2-4-D)	lt.	2.60	60.00	55.20	156.00	143.52
- Herbicide (Propanil)	lt.	6.40	100.00	92.00	640.00	588.80
Sub-total					4,658.50	4,538.13
<b>2. Preparation and Maintenance of Nursery</b>						
- Preparation of nursery (by animal)	ha.	1.00	127.00	377.63	127.00	377.63
- Maintenance of nursery	m-d	0.47	100.00	44.00	47.00	20.68
Sub-total					174.00	398.31
<b>3. Clearing of Canals</b>	m-d	1.59	100.00	44.00	159.00	69.96
<b>4. Land Preparation</b>						
- Plowing & bordering	ha	1.00	1525.00	1403.00	1,525.00	1,403.00
- Leveling (by animal)	ha	1.00	357.50	339.63	357.50	339.63
- Reconstruction of borders	m-d	1.00	100.00	44.00	100.00	44.00
Sub-total					1,982.50	1,786.63
<b>5. Transplant</b>	m-d	12.60	100.00	44.00	1,260.00	554.40
<b>6. Application of Fertilizer &amp; Agro-chemicals</b>						
- Application of fertilizer	m-d	1.70	100.00	44.00	170.00	74.80
- Application of agro-chemicals	m-d	4.80	100.00	44.00	480.00	211.20
- Aerial fumigation	ha	0.00	-	-	0.00	0.00
Sub-total					650.00	286.00
<b>7. Weeding</b>	m-d	13.30	100.00	44.00	1,330.00	585.20
<b>8. Irrigation</b>						
- Water control	m-d	5.70	100.00	44.00	570.00	250.80
- Water charge payable INDRHI	ha	1.00	398.00	0.00	398.00	0.00
Sub-total					968.00	250.80
<b>9. Harvest &amp; Transport</b>						
- Harvest by combine	bag	88.00	25.00	23.00	2,200.00	2,024.00
- Transport (by animal)	bag	88.00	10.00	9.50	880.00	836.00
- Supporting work	m-d	1.6	100.00	44.00	160.00	70.40
Sub-total					3,240.00	2,930.40
<b>Total of Direct Production Cost (Item 1 thru 9)</b>					<b>14,422.00</b>	<b>11,399.83</b>
<b>11. Agricultural credit (18% per annum)</b>					<b>1,297.98</b>	<b>0.00</b>
<b>TOTAL COST PER TAREA</b>					<b>15,720</b>	<b>11,400</b>



Table L.4.2 Economic Cost of Production (Without Project)

## (1) Paddy

ITEMS	UNIT	QUANTITY	UNIT PRICE		AMOUNT	
			Financial	Economic	Financial	Economic
<b>1. Purchase of Seeds and Agro-chemicals</b>						
- Seed	kgr.	106.00	9.45	8.98	1,001.70	951.62
- Fertilizer (Simple)	kgr.	109.00	4.38	4.15	477.42	452.35
- Fertilizer (Compound)	kg.	460.00	3.75	3.98	1,725.00	1,830.80
- Insecticide (Nuvacron 60)	lt.	2.80	370.00	340.40	1,036.00	953.12
- Fungicide (Manzate)	lt.	0.90	200.00	184.00	180.00	165.60
- Rodenticide	kgr.	0.52	70.00	64.40	36.40	33.49
- Herbicide (2-4-D)	lt.	2.15	60.00	55.20	129.00	118.68
- Herbicide (Propanil)	lt.	5.30	100.00	92.00	530.00	487.60
Sub-total					5,115.52	4,993.25
<b>2. Preparation and Maintenance of Nursery</b>						
- Preparation of nursery (by animal)	ha.	1.00	127.00	377.63	127.00	377.63
- Maintenance of nursery	m-d	0.47	100.00	44.00	47.00	20.68
Sub-total					174.00	398.31
<b>3. Clearing of Canals</b>						
	m-d	1.59	100.00	44.00	159.00	69.96
<b>4. Land Preparation</b>						
- Plowing & bordering	ha	1.00	1525.00	1403.00	1,525.00	1,403.00
- Leveling (by animal)	ha	1.00	357.50	339.63	357.50	339.63
- Reconstruction of borders	m-d	1.00	100.00	44.00	100.00	44.00
Sub-total					1,982.50	1,786.63
<b>5. Transplant</b>						
	m-d	15.74	100.00	44.00	1,574.00	692.56
<b>6. Application of Fertilizer &amp; Agro-chemicals</b>						
- Application of fertilizer	m-d	2.40	100.00	44.00	240.00	105.60
- Application of agro-chemicals	m-d	5.70	100.00	44.00	570.00	250.80
- Aerial fumigation	ha	1.00	143.10	131.65	143.10	131.65
Sub-total					953.10	488.05
<b>7. Weeding</b>						
	m-d	11.10	100.00	44.00	1,110.00	488.40
<b>8. Irrigation</b>						
- Water control	m-d	2.86	100.00	44.00	286.00	125.84
- Water charge payable INDRHI	ha	1.00	175.22	0.00	175.22	0.00
Sub-total					461.22	125.84
<b>9. Harvest &amp; Transport</b>						
- Harvest by combine	bag	63.00	25.00	23.00	1,575.00	1,449.00
- Transport (by animal)	bag	63.00	10.00	9.50	630.00	598.50
- Supporting work	m-d	1.14	100.00	44.00	114.00	50.16
Sub-total					2,319.00	2,097.66
<b>Total of Direct Production Cost (Item 1 thru 9)</b>					<b>13,848.34</b>	<b>11,140.66</b>
<b>11. Agricultural credit (18% per annum)</b>					<b>1,246.35</b>	<b>0.00</b>
<b>TOTAL COST PER TAREA</b>					<b>15,095</b>	<b>11,141</b>

Table L.4.2 Economic Cost of Production

(2) Crops Except for Paddy

Items	Maize				Haricot Bean			
	Without Project		With Project		Without Project		With Project	
	Financial	Economic	Financial	Economic	Financial	Economic	Financial	Economic
Seed <sup>1</sup>	60.4	57.4	78.5	74.6	1,431.0	1,359.5	1,860.3	1,767.3
Fertilizer <sup>2</sup>	763.2	702.1	992.2	912.8	841.6	774.3	1,094.1	1,006.6
Agro-chemicals <sup>2</sup>	381.6	351.1	496.0	456.3	2,720.0	2,502.4	3,536.0	3,253.1
Labor Force <sup>3</sup>	2,226.0	979.0	2,671.2	1,175.3	4,319.4	1,900.5	5,183.3	2,280.7
Mechanical Works <sup>4</sup>	1,272.0	992.2	1,526.4	1,190.6	1,280.0	998.4	1,536.0	1,198.1
Water Charge <sup>5</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub-total	4,703.2	3,081.8	5,764.3	3,809.6	10,592.0	7,535.1	13,209.7	9,505.7
Financial Cost <sup>6</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	4,703	3,082	5,764	3,810	10,592	7,535	13,210	9,506

Items	Sweet Potato				Cassava			
	Without Project		With Project		Without Project		With Project	
	Financial	Economic	Financial	Economic	Financial	Economic	Financial	Economic
Seed <sup>1</sup>	318.0	302.1	413.4	392.7	238.5	226.6	310.0	294.5
Fertilizer <sup>2</sup>	508.8	468.1	661.4	608.5	0.0	0.0	0.0	0.0
Agro-chemicals <sup>2</sup>	286.2	263.3	372.1	342.3	318.0	292.6	413.4	380.3
Labor Force <sup>3</sup>	4,897.2	2,154.8	5,876.6	2,585.7	4,372.5	1,923.9	5,247.0	2,308.7
Mechanical Works <sup>4</sup>	1,510.5	1,178.2	1,812.6	1,413.8	1,272.0	992.2	1,653.6	1,289.8
Water Charge <sup>5</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub-total	7,520.7	4,366.5	9,136.1	5,343.1	6,201.0	3,435.2	7,624.0	4,273.3
Financial Cost <sup>6</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	7,521	4,366	9,136	5,343	6,201	3,435	7,624	4,273

Items	Vegetables			
	Without Project		With Project	
	Financial	Economic	Financial	Economic
Seed <sup>1</sup>	1,000.4	950.4	1,300.5	1,235.5
Fertilizer <sup>2</sup>	2,920.1	2,686.5	3,796.1	3,492.4
Agro-chemicals <sup>2</sup>	1,865.6	1,716.4	2,425.3	2,231.3
Labor Force <sup>3</sup>	5,241.8	2,306.4	6,290.2	2,767.7
Mechanical Works <sup>4</sup>	1,728.0	1,347.8	2,074.0	1,617.7
Water Charge <sup>5</sup>	0.0	0.0	0.0	0.0
Sub-total	12,755.9	9,007.5	15,886.1	11,344.6
Financial Cost <sup>6</sup>	0.0	0.0	0.0	0.0
Total	12,756	9,008	15,886	11,345

- Note: 1 - Financial Cost x Conversion Factor for Capital Good (0.95)  
 2 - Financial Cost x Conversion Factor for Capital Goods (0.95)  
 subject to deduction of tariff and duties in advance  
 3 - Financial Cost x Shadow Wage Rate (0.44)  
 4 - Financial Cost x Conversion Factor for Consumable Goods (0.81)  
 subject to deduction of tariff and duties in advance  
 5 - Water Charge is not applicable because these crops are rain-fad  
 6 - Financial Cost is not considered because agricultural credit is not  
 provided for crops other than paddy in the Study area

**Table L.4.2 Economic Cost of Production**

**(3) Cattle Farming**

Unit: RD\$/ha/year

Items	Financial	Economic
Purchase of cattle	551	523
Machinery and equipmet	370	340
Fencing	290	235
Seed for pasture	260	247
Maintenance of pasture	1,207	1,147
Maintenance of fence	521	422
Fertilizers & Agro-chemicals	910	837
Medical Fee	931	857
Labor force	5,858	2,578
Total	10,898	7,186

Table L.5.1 Annual Benefits of the Project at Economic Price

(1) Irrigation/drainage benefit (1st year):  
 Cropping intensity of paddy fields: 150%

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	102,018	105,840	-3,822	163,446	113,715	49,731	53,553
	Upland Crops	1,721	953	768	6,550	3,024	3,526	2,758
	Livestock	23,938	13,222	10,716	14,016	9,557	4,459	-6,257
	Total	127,677	120,015	7,662	184,012	126,296	57,716	50,054
B - 1	Paddy	102,018	105,840	-3,822	192,816	134,406	58,410	62,232
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	0	0	0	-10,716
	Total	127,677	120,015	7,662	199,057	136,363	62,694	55,032
B - 2	Paddy	102,018	105,840	-3,822	185,345	129,447	55,898	59,720
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	4,913	2,586	2,327	-8,389
	Total	127,677	120,015	7,662	196,499	133,990	62,509	54,847

Table L.5.1 Annual Benefits of the Project at Economic Price

(1) Irrigation/drainage benefit (2nd year)  
 Cropping intensity of paddy fields: 160%

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	102,018	105,840	-3,822	174,343	121,296	53,047	56,869
	Upland Crops	1,721	953	768	6,550	3,024	3,526	2,758
	Livestock	23,938	13,222	10,716	14,016	9,557	4,459	-6,257
	Total	127,677	120,015	7,662	194,909	133,877	61,032	53,370
B - 1	Paddy	102,018	105,840	-3,822	205,670	143,367	62,303	66,125
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	0	0	0	-10,716
	Total	127,677	120,015	7,662	211,911	145,324	66,587	58,925
B - 2	Paddy	102,018	105,840	-3,822	197,702	138,077	59,625	63,447
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	4,913	2,586	2,327	-8,389
	Total	127,677	120,015	7,662	208,856	142,620	66,236	53,574

Table L.6.1 Annual Benefits of the Project at Economic Price

(1) Irrigation/drainage benefit (3rd year)  
 Cropping intensity of paddy fields: 170%

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	102,018	105,840	-3,822	185,239	128,877	56,362	60,184
	Upland Crops	1,721	953	768	6,550	3,024	3,526	2,758
	Livestock	23,938	13,222	10,716	14,016	9,557	4,459	-6,257
	Total	127,677	120,015	7,662	205,805	141,458	64,347	56,685
B - 1	Paddy	102,018	105,840	-3,822	218,525	152,327	66,198	70,020
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	0	0	0	-10,716
	Total	127,677	120,015	7,662	224,766	154,284	70,482	62,820
B - 2	Paddy	102,018	105,840	-3,822	210,058	146,707	63,351	67,173
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	4,913	2,586	2,327	-8,389
	Total	127,677	120,015	7,662	221,212	151,250	69,962	62,300

Table L.5.1 Annual Benefits of the Project at Economic Price

(1) Irrigation/drainage benefit (4th year)  
 Cropping Intensity of paddy field: 180%

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	102,018	105,840	-3,822	196,135	136,458	59,677	63,499
	Upland Crops	1,721	953	768	6,550	3,024	3,526	2,758
	Livestock	23,938	13,222	10,716	14,016	9,557	4,459	-6,257
	Total	127,677	120,015	7,662	216,701	149,039	67,662	60,000
B - 1	Paddy	102,018	105,840	-3,822	231,379	161,287	70,092	73,914
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	0	0	0	-10,716
	Total	127,677	120,015	7,662	237,620	163,244	74,376	66,714
B - 2	Paddy	102,018	105,840	-3,822	222,414	165,336	67,078	70,900
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	4,913	2,586	2,327	-8,389
	Total	127,677	120,015	7,662	233,568	169,879	73,689	66,027

Table L.5.1 Annual Benefits of the Project at Economic Price

(1) Irrigation/drainage benefit (5th year)  
 Cropping Intensity of paddy fields: 190%

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	102,018	105,840	-3,822	207,032	144,039	62,993	66,815
	Upland Crops	1,721	953	768	6,550	3,024	3,526	2,758
	Livestock	23,938	13,222	10,716	14,016	9,557	4,459	-6,257
	Total	127,677	120,015	7,662	227,598	156,620	70,978	63,316
B - 1	Paddy	102,018	105,840	-3,822	244,233	170,248	73,985	77,807
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	0	0	0	-10,716
	Total	127,677	120,015	7,662	250,474	172,205	78,269	70,607
B - 2	Paddy	102,018	105,840	-3,822	234,771	163,966	70,805	74,627
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	4,913	2,586	2,327	-8,389
	Total	127,677	120,015	7,662	245,925	168,509	77,416	69,754

Table L.5.1 Annual Benefits of the Project at Economic Price

(1) Irrigation/drainage benefit (6th and subsequent years)

Unit: RDS x 1000

Alternative Plan	Crops	Without Project			With Project			Net Incremental Return
		Gross Production Value	Production Cost	Net Return	Gross Production Value	Production Cost	Net Return	
A	Paddy	102,018	105,840	-3,822	217,894	151,620	66,274	70,096
	Upland Crops	1,721	953	768	6,550	3,024	3,526	2,758
	Livestock	23,938	13,222	10,716	14,016	9,557	4,459	-6,257
	Total	127,677	120,015	7,662	238,460	164,201	74,259	66,597
B - 1	Paddy	102,018	105,840	-3,822	257,103	179,208	77,895	81,717
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	0	0	0	-10,716
	Total	127,677	120,015	7,662	263,344	181,165	82,179	74,517
B - 2	Paddy	102,018	105,840	-3,822	247,090	172,596	74,494	78,316
	Upland Crops	1,721	953	768	6,241	1,957	4,284	3,516
	Livestock	23,938	13,222	10,716	4,913	2,586	2,327	-8,389
	Total	127,677	120,015	7,662	258,244	177,139	81,105	73,443

(2) Flood mitigation benefit

Flood mitigation benefit arises from avoiding the loss in agricultural production which will be expected "With" project situation, so avoided loss constitutes benefit of flood mitigation works

Loss in agricultural production caused by flooding =

Output of paddy in inundable fields x probability of inundation x percentage of damage in output x farm-gate price of paddy  
 = 675 ha x 1.5 x 2.2 ton/ha x 0.8 x 0.3 x RDS 3,139 = RDS 1,678,109

Table L.6.1 Project's Cash Flow for Economic Costs and Benefits

(1) Alternative A

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	20,302			20,302	0	0	0	-20,302
2	28,494			28,494	0	0	0	-28,494
3	146,033			146,033	0	0	0	-146,033
4	125,374			125,374	0	0	0	-125,374
5	35,974	3,067		39,041	50,054	1,007	51,061	12,020
6		3,067		3,067	53,370	1,175	54,545	51,478
7		3,067		3,067	56,685	1,342	58,027	54,960
8		3,067		3,067	60,000	1,510	61,510	58,443
9		3,067		3,067	63,316	1,678	64,994	61,927
10		3,067		3,067	66,597	1,678	68,275	65,208
11		3,067	17,179	20,246	66,597	1,678	68,275	48,029
12		3,067		3,067	66,597	1,678	68,275	65,208
13		3,067		3,067	66,597	1,678	68,275	65,208
14		3,067		3,067	66,597	1,678	68,275	65,208
15		3,067		3,067	66,597	1,678	68,275	65,208
16		3,067		3,067	66,597	1,678	68,275	65,208
17		3,067	17,179	20,246	66,597	1,678	68,275	48,029
18		3,067		3,067	66,597	1,678	68,275	65,208
19		3,067		3,067	66,597	1,678	68,275	65,208
20		3,067		3,067	66,597	1,678	68,275	65,208
21		3,067		3,067	66,597	1,678	68,275	65,208
22		3,067		3,067	66,597	1,678	68,275	65,208
23		3,067	17,179	20,246	66,597	1,678	68,275	48,029
24		3,067		3,067	66,597	1,678	68,275	65,208
25		3,067	3,256	6,323	66,597	1,678	68,275	61,952
26		3,067		3,067	66,597	1,678	68,275	65,208
27		3,067		3,067	66,597	1,678	68,275	65,208
28		3,067		3,067	66,597	1,678	68,275	65,208
29		3,067	17,179	20,246	66,597	1,678	68,275	48,029
30		3,067		3,067	66,597	1,678	68,275	65,208
31		3,067		3,067	66,597	1,678	68,275	65,208
32		3,067		3,067	66,597	1,678	68,275	65,208
33		3,067		3,067	66,597	1,678	68,275	65,208
34		3,067		3,067	66,597	1,678	68,275	65,208
35		3,067	17,179	20,246	66,597	1,678	68,275	48,029
36		3,067		3,067	66,597	1,678	68,275	65,208
37		3,067		3,067	66,597	1,678	68,275	65,208
38		3,067		3,067	66,597	1,678	68,275	65,208
39		3,067		3,067	66,597	1,678	68,275	65,208
40		3,067		3,067	66,597	1,678	68,275	65,208
41		3,067	17,179	20,246	66,597	1,678	68,275	48,029
42		3,067		3,067	66,597	1,678	68,275	65,208
43		3,067		3,067	66,597	1,678	68,275	65,208
44		3,067		3,067	66,597	1,678	68,275	65,208
45		3,067	3,256	6,323	66,597	1,678	68,275	61,952
46		3,067		3,067	66,597	1,678	68,275	65,208
47		3,067	17,179	20,246	66,597	1,678	68,275	48,029
48		3,067		3,067	66,597	1,678	68,275	65,208
49		3,067		3,067	66,597	1,678	68,275	65,208
50		3,067		3,067	66,597	1,678	68,275	65,208

EIRR= 14.72%

Table L.6.1 Project's Cash Flow for Economic Costs and Benefits

(2) Alternative B-1

Unit : RDS x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	21,147			21,147	0	0	0	-21,147
2	32,758			32,758	0	0	0	-32,758
3	171,251			171,251	0	0	0	-171,251
4	148,445			148,445	0	0	0	-148,445
5	41,051	3,826		44,877	55,032	1,007	56,039	11,162
6		3,826		3,826	58,926	1,175	60,101	56,275
7		3,826		3,826	62,820	1,342	64,162	60,336
8		3,826		3,826	66,714	1,510	68,224	64,398
9		3,826		3,826	70,607	1,678	72,285	68,459
10		3,826		3,826	74,517	1,678	76,195	72,369
11		3,826	17,179	21,005	74,517	1,678	76,195	55,190
12		3,826		3,826	74,517	1,678	76,195	72,369
13		3,826		3,826	74,517	1,678	76,195	72,369
14		3,826		3,826	74,517	1,678	76,195	72,369
15		3,826		3,826	74,517	1,678	76,195	72,369
16		3,826		3,826	74,517	1,678	76,195	72,369
17		3,826	17,179	21,005	74,517	1,678	76,195	55,190
18		3,826		3,826	74,517	1,678	76,195	72,369
19		3,826		3,826	74,517	1,678	76,195	72,369
20		3,826		3,826	74,517	1,678	76,195	72,369
21		3,826		3,826	74,517	1,678	76,195	72,369
22		3,826		3,826	74,517	1,678	76,195	72,369
23		3,826	17,179	21,005	74,517	1,678	76,195	55,190
24		3,826		3,826	74,517	1,678	76,195	72,369
25		3,826	18,253	22,079	74,517	1,678	76,195	54,116
26		3,826		3,826	74,517	1,678	76,195	72,369
27		3,826		3,826	74,517	1,678	76,195	72,369
28		3,826		3,826	74,517	1,678	76,195	72,369
29		3,826	17,179	21,005	74,517	1,678	76,195	55,190
30		3,826		3,826	74,517	1,678	76,195	72,369
31		3,826		3,826	74,517	1,678	76,195	72,369
32		3,826		3,826	74,517	1,678	76,195	72,369
33		3,826		3,826	74,517	1,678	76,195	72,369
34		3,826		3,826	74,517	1,678	76,195	72,369
35		3,826	17,179	21,005	74,517	1,678	76,195	55,190
36		3,826		3,826	74,517	1,678	76,195	72,369
37		3,826		3,826	74,517	1,678	76,195	72,369
38		3,826		3,826	74,517	1,678	76,195	72,369
39		3,826		3,826	74,517	1,678	76,195	72,369
40		3,826		3,826	74,517	1,678	76,195	72,369
41		3,826	17,179	21,005	74,517	1,678	76,195	55,190
42		3,826		3,826	74,517	1,678	76,195	72,369
43		3,826		3,826	74,517	1,678	76,195	72,369
44		3,826		3,826	74,517	1,678	76,195	72,369
45		3,826	18,253	22,079	74,517	1,678	76,195	54,116
46		3,826		3,826	74,517	1,678	76,195	72,369
47		3,826	17,179	21,005	74,517	1,678	76,195	55,190
48		3,826		3,826	74,517	1,678	76,195	72,369
49		3,826		3,826	74,517	1,678	76,195	72,369
50		3,826		3,826	74,517	1,678	76,195	72,369

EIRR= 14.09%



Table L.6.1 Project's Cash Flow for Economic Costs and Benefits

(3) Alternative B-2

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	20,650			20,650	0	0	0	-20,650
2	31,987			31,987	0	0	0	-31,987
3	167,223			167,223	0	0	0	-167,223
4	144,953			144,953	0	0	0	-144,953
5	40,085	3,826		43,911	54,847	1,007	55,854	11,943
6		3,826		3,826	58,574	1,175	59,749	55,923
7		3,826		3,826	62,300	1,342	63,642	59,816
8		3,826		3,826	66,027	1,510	67,537	63,711
9		3,826		3,826	69,754	1,678	71,432	67,606
10		3,826		3,826	73,443	1,678	75,121	71,295
11		3,826	17,179	21,005	73,443	1,678	75,121	54,116
12		3,826		3,826	73,443	1,678	75,121	71,295
13		3,826		3,826	73,443	1,678	75,121	71,295
14		3,826		3,826	73,443	1,678	75,121	71,295
15		3,826		3,826	73,443	1,678	75,121	71,295
16		3,826		3,826	73,443	1,678	75,121	71,295
17		3,826	17,179	21,005	73,443	1,678	75,121	54,116
18		3,826		3,826	73,443	1,678	75,121	71,295
19		3,826		3,826	73,443	1,678	75,121	71,295
20		3,826		3,826	73,443	1,678	75,121	71,295
21		3,826		3,826	73,443	1,678	75,121	71,295
22		3,826		3,826	73,443	1,678	75,121	71,295
23		3,826	17,179	21,005	73,443	1,678	75,121	54,116
24		3,826		3,826	73,443	1,678	75,121	71,295
25		3,826	18,253	22,079	73,443	1,678	75,121	53,042
26		3,826		3,826	73,443	1,678	75,121	71,295
27		3,826		3,826	73,443	1,678	75,121	71,295
28		3,826		3,826	73,443	1,678	75,121	71,295
29		3,826	17,179	21,005	73,443	1,678	75,121	54,116
30		3,826		3,826	73,443	1,678	75,121	71,295
31		3,826		3,826	73,443	1,678	75,121	71,295
32		3,826		3,826	73,443	1,678	75,121	71,295
33		3,826		3,826	73,443	1,678	75,121	71,295
34		3,826		3,826	73,443	1,678	75,121	71,295
35		3,826	17,179	21,005	73,443	1,678	75,121	54,116
36		3,826		3,826	73,443	1,678	75,121	71,295
37		3,826		3,826	73,443	1,678	75,121	71,295
38		3,826		3,826	73,443	1,678	75,121	71,295
39		3,826		3,826	73,443	1,678	75,121	71,295
40		3,826		3,826	73,443	1,678	75,121	71,295
41		3,826	17,179	21,005	73,443	1,678	75,121	54,116
42		3,826		3,826	73,443	1,678	75,121	71,295
43		3,826		3,826	73,443	1,678	75,121	71,295
44		3,826		3,826	73,443	1,678	75,121	71,295
45		3,826	18,253	22,079	73,443	1,678	75,121	53,042
46		3,826		3,826	73,443	1,678	75,121	71,295
47		3,826	17,179	21,005	73,443	1,678	75,121	54,116
48		3,826		3,826	73,443	1,678	75,121	71,295
49		3,826		3,826	73,443	1,678	75,121	71,295
50		3,826		3,826	73,443	1,678	75,121	71,295

EIRR= 14.24%

Table L.6.2 Sensitivity Analysis

(1) Case 1: Decline of Yield by 10%  
 1) Alternative A

Unit : RD\$ x 1000

Year In Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	20,302			20,302	0	0	0	-20,302
2	28,494			28,494	0	0	0	-28,494
3	146,033			146,033	0	0	0	-146,033
4	125,374			125,374	0	0	0	-125,374
5	35,974	3,067		39,041	45,049	1,007	46,056	7,015
6		3,067		3,067	48,033	1,175	49,208	46,141
7		3,067		3,067	51,017	1,342	52,359	49,292
8		3,067		3,067	54,000	1,510	55,510	52,443
9		3,067		3,067	56,984	1,678	58,662	55,595
10		3,067		3,067	59,937	1,678	61,615	58,548
11		3,067	17,179	20,246	59,937	1,678	61,615	41,369
12		3,067		3,067	59,937	1,678	61,615	58,548
13		3,067		3,067	59,937	1,678	61,615	58,548
14		3,067		3,067	59,937	1,678	61,615	58,548
15		3,067		3,067	59,937	1,678	61,615	58,548
16		3,067		3,067	59,937	1,678	61,615	58,548
17		3,067	17,179	20,246	59,937	1,678	61,615	41,369
18		3,067		3,067	59,937	1,678	61,615	58,548
19		3,067		3,067	59,937	1,678	61,615	58,548
20		3,067		3,067	59,937	1,678	61,615	58,548
21		3,067		3,067	59,937	1,678	61,615	58,548
22		3,067		3,067	59,937	1,678	61,615	58,548
23		3,067	17,179	20,246	59,937	1,678	61,615	41,369
24		3,067		3,067	59,937	1,678	61,615	58,548
25		3,067	3,256	6,323	59,937	1,678	61,615	55,292
26		3,067		3,067	59,937	1,678	61,615	58,548
27		3,067		3,067	59,937	1,678	61,615	58,548
28		3,067		3,067	59,937	1,678	61,615	58,548
29		3,067	17,179	20,246	59,937	1,678	61,615	41,369
30		3,067		3,067	59,937	1,678	61,615	58,548
31		3,067		3,067	59,937	1,678	61,615	58,548
32		3,067		3,067	59,937	1,678	61,615	58,548
33		3,067		3,067	59,937	1,678	61,615	58,548
34		3,067		3,067	59,937	1,678	61,615	58,548
35		3,067	17,179	20,246	59,937	1,678	61,615	41,369
36		3,067		3,067	59,937	1,678	61,615	58,548
37		3,067		3,067	59,937	1,678	61,615	58,548
38		3,067		3,067	59,937	1,678	61,615	58,548
39		3,067		3,067	59,937	1,678	61,615	58,548
40		3,067		3,067	59,937	1,678	61,615	58,548
41		3,067	17,179	20,246	59,937	1,678	61,615	41,369
42		3,067		3,067	59,937	1,678	61,615	58,548
43		3,067		3,067	59,937	1,678	61,615	58,548
44		3,067		3,067	59,937	1,678	61,615	58,548
45		3,067	3,256	6,323	59,937	1,678	61,615	55,292
46		3,067		3,067	59,937	1,678	61,615	58,548
47		3,067	17,179	20,246	59,937	1,678	61,615	41,369
48		3,067		3,067	59,937	1,678	61,615	58,548
49		3,067		3,067	59,937	1,678	61,615	58,548
50		3,067		3,067	59,937	1,678	61,615	58,548

EIRR= 13.34%

Table L.6.2 Sensitivity Analysis

(1) Decline of Yield by 10%  
 2) Alternative B-1

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	21,147			21,147	0	0	0	-21,147
2	32,758			32,758	0	0	0	-32,758
3	171,251			171,251	0	0	0	-171,251
4	148,445			148,445	0	0	0	-148,445
5	41,051	3,826		44,877	49,529	1,007	50,536	5,659
6		3,826		3,826	53,033	1,175	54,208	50,382
7		3,826		3,826	56,538	1,342	57,880	54,054
8		3,826		3,826	60,043	1,510	61,553	57,727
9		3,826		3,826	63,546	1,678	65,224	61,398
10		3,826		3,826	67,065	1,678	68,743	64,917
11		3,826	17,179	21,005	67,065	1,678	68,743	47,738
12		3,826		3,826	67,065	1,678	68,743	64,917
13		3,826		3,826	67,065	1,678	68,743	64,917
14		3,826		3,826	67,065	1,678	68,743	64,917
15		3,826		3,826	67,065	1,678	68,743	64,917
16		3,826		3,826	67,065	1,678	68,743	64,917
17		3,826	17,179	21,005	67,065	1,678	68,743	47,738
18		3,826		3,826	67,065	1,678	68,743	64,917
19		3,826		3,826	67,065	1,678	68,743	64,917
20		3,826		3,826	67,065	1,678	68,743	64,917
21		3,826		3,826	67,065	1,678	68,743	64,917
22		3,826		3,826	67,065	1,678	68,743	64,917
23		3,826	17,179	21,005	67,065	1,678	68,743	47,738
24		3,826		3,826	67,065	1,678	68,743	64,917
25		3,826	18,253	22,079	67,065	1,678	68,743	46,664
26		3,826		3,826	67,065	1,678	68,743	64,917
27		3,826		3,826	67,065	1,678	68,743	64,917
28		3,826		3,826	67,065	1,678	68,743	64,917
29		3,826	17,179	21,005	67,065	1,678	68,743	47,738
30		3,826		3,826	67,065	1,678	68,743	64,917
31		3,826		3,826	67,065	1,678	68,743	64,917
32		3,826		3,826	67,065	1,678	68,743	64,917
33		3,826		3,826	67,065	1,678	68,743	64,917
34		3,826		3,826	67,065	1,678	68,743	64,917
35		3,826	17,179	21,005	67,065	1,678	68,743	47,738
36		3,826		3,826	67,065	1,678	68,743	64,917
37		3,826		3,826	67,065	1,678	68,743	64,917
38		3,826		3,826	67,065	1,678	68,743	64,917
39		3,826		3,826	67,065	1,678	68,743	64,917
40		3,826		3,826	67,065	1,678	68,743	64,917
41		3,826	17,179	21,005	67,065	1,678	68,743	47,738
42		3,826		3,826	67,065	1,678	68,743	64,917
43		3,826		3,826	67,065	1,678	68,743	64,917
44		3,826		3,826	67,065	1,678	68,743	64,917
45		3,826	18,253	22,079	67,065	1,678	68,743	46,664
46		3,826		3,826	67,065	1,678	68,743	64,917
47		3,826	17,179	21,005	67,065	1,678	68,743	47,738
48		3,826		3,826	67,065	1,678	68,743	64,917
49		3,826		3,826	67,065	1,678	68,743	64,917
50		3,826		3,826	67,065	1,678	68,743	64,917

EIRR= 12.74%

Table L.6.2 Sensitivity Analysis

(1) Decline of Yield by 10%  
 3) Alternative B-2

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	20,650			20,650	0	0	0	-20,650
2	31,987			31,987	0	0	0	-31,987
3	167,223			167,223	0	0	0	-167,223
4	144,953			144,953	0	0	0	-144,953
5	40,085	3,826		43,911	49,362	1,007	50,369	6,458
6		3,826		3,826	52,717	1,175	53,892	50,066
7		3,826		3,826	56,070	1,342	57,412	53,586
8		3,826		3,826	59,424	1,510	60,934	57,108
9		3,826		3,826	62,779	1,678	64,457	60,631
10		3,826		3,826	66,099	1,678	67,777	63,951
11		3,826	17,179	21,005	66,099	1,678	67,777	46,772
12		3,826		3,826	66,099	1,678	67,777	63,951
13		3,826		3,826	66,099	1,678	67,777	63,951
14		3,826		3,826	66,099	1,678	67,777	63,951
15		3,826		3,826	66,099	1,678	67,777	63,951
16		3,826		3,826	66,099	1,678	67,777	63,951
17		3,826	17,179	21,005	66,099	1,678	67,777	46,772
18		3,826		3,826	66,099	1,678	67,777	63,951
19		3,826		3,826	66,099	1,678	67,777	63,951
20		3,826		3,826	66,099	1,678	67,777	63,951
21		3,826		3,826	66,099	1,678	67,777	63,951
22		3,826		3,826	66,099	1,678	67,777	63,951
23		3,826	17,179	21,005	66,099	1,678	67,777	46,772
24		3,826		3,826	66,099	1,678	67,777	63,951
25		3,826	18,253	22,079	66,099	1,678	67,777	45,698
26		3,826		3,826	66,099	1,678	67,777	63,951
27		3,826		3,826	66,099	1,678	67,777	63,951
28		3,826		3,826	66,099	1,678	67,777	63,951
29		3,826	17,179	21,005	66,099	1,678	67,777	46,772
30		3,826		3,826	66,099	1,678	67,777	63,951
31		3,826		3,826	66,099	1,678	67,777	63,951
32		3,826		3,826	66,099	1,678	67,777	63,951
33		3,826		3,826	66,099	1,678	67,777	63,951
34		3,826		3,826	66,099	1,678	67,777	63,951
35		3,826	17,179	21,005	66,099	1,678	67,777	46,772
36		3,826		3,826	66,099	1,678	67,777	63,951
37		3,826		3,826	66,099	1,678	67,777	63,951
38		3,826		3,826	66,099	1,678	67,777	63,951
39		3,826		3,826	66,099	1,678	67,777	63,951
40		3,826		3,826	66,099	1,678	67,777	63,951
41		3,826	17,179	21,005	66,099	1,678	67,777	46,772
42		3,826		3,826	66,099	1,678	67,777	63,951
43		3,826		3,826	66,099	1,678	67,777	63,951
44		3,826		3,826	66,099	1,678	67,777	63,951
45		3,826	18,253	22,079	66,099	1,678	67,777	45,698
46		3,826		3,826	66,099	1,678	67,777	63,951
47		3,826	17,179	21,005	66,099	1,678	67,777	46,772
48		3,826		3,826	66,099	1,678	67,777	63,951
49		3,826		3,826	66,099	1,678	67,777	63,951
50		3,826		3,826	66,099	1,678	67,777	63,951

EIRR= 12.87%

Table L.6.2 Sensitivity Analysis

(2) Case 2: Escalation of Cost by 10%

1) Alternative A

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	22,332			22,332	0	0	0	-22,332
2	31,343			31,343	0	0	0	-31,343
3	160,636			160,636	0	0	0	-160,636
4	137,911			137,911	0	0	0	-137,911
5	39,571	3,374		42,945	50,054	1,007	51,061	8,116
6		3,374		3,374	53,370	1,175	54,545	51,171
7		3,374		3,374	56,685	1,342	58,027	54,653
8		3,374		3,374	60,000	1,510	61,510	58,136
9		3,374		3,374	63,316	1,678	64,994	61,620
10		3,374		3,374	66,597	1,678	68,275	64,901
11		3,374	18,897	22,271	66,597	1,678	68,275	46,004
12		3,374		3,374	66,597	1,678	68,275	64,901
13		3,374		3,374	66,597	1,678	68,275	64,901
14		3,374		3,374	66,597	1,678	68,275	64,901
15		3,374		3,374	66,597	1,678	68,275	64,901
16		3,374		3,374	66,597	1,678	68,275	64,901
17		3,374	18,897	22,271	66,597	1,678	68,275	46,004
18		3,374		3,374	66,597	1,678	68,275	64,901
19		3,374		3,374	66,597	1,678	68,275	64,901
20		3,374		3,374	66,597	1,678	68,275	64,901
21		3,374		3,374	66,597	1,678	68,275	64,901
22		3,374		3,374	66,597	1,678	68,275	64,901
23		3,374	18,897	22,271	66,597	1,678	68,275	46,004
24		3,374		3,374	66,597	1,678	68,275	64,901
25		3,374	3,582	6,955	66,597	1,678	68,275	61,320
26		3,374		3,374	66,597	1,678	68,275	64,901
27		3,374		3,374	66,597	1,678	68,275	64,901
28		3,374		3,374	66,597	1,678	68,275	64,901
29		3,374	18,897	22,271	66,597	1,678	68,275	46,004
30		3,374		3,374	66,597	1,678	68,275	64,901
31		3,374		3,374	66,597	1,678	68,275	64,901
32		3,374		3,374	66,597	1,678	68,275	64,901
33		3,374		3,374	66,597	1,678	68,275	64,901
34		3,374		3,374	66,597	1,678	68,275	64,901
35		3,374	18,897	22,271	66,597	1,678	68,275	46,004
36		3,374		3,374	66,597	1,678	68,275	64,901
37		3,374		3,374	66,597	1,678	68,275	64,901
38		3,374		3,374	66,597	1,678	68,275	64,901
39		3,374		3,374	66,597	1,678	68,275	64,901
40		3,374		3,374	66,597	1,678	68,275	64,901
41		3,374	18,897	22,271	66,597	1,678	68,275	46,004
42		3,374		3,374	66,597	1,678	68,275	64,901
43		3,374		3,374	66,597	1,678	68,275	64,901
44		3,374		3,374	66,597	1,678	68,275	64,901
45		3,374	3,582	6,955	66,597	1,678	68,275	61,320
46		3,374		3,374	66,597	1,678	68,275	64,901
47		3,374	18,897	22,271	66,597	1,678	68,275	46,004
48		3,374		3,374	66,597	1,678	68,275	64,901
49		3,374		3,374	66,597	1,678	68,275	64,901
50		3,374		3,374	66,597	1,678	68,275	64,901

EIRR= 13.44%

Table L.6.2 Sensitivity Analysis

(2) Escalation of Cost by 10%  
2) Alternative B-1

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O.M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	23,262			23,262	0	0	0	-23,262
2	36,034			36,034	0	0	0	-36,034
3	188,376			188,376	0	0	0	-188,376
4	163,290			163,290	0	0	0	-163,290
5	45,156	4,209		49,365	55,032	1,007	56,039	6,674
6		4,209		4,209	58,926	1,175	60,101	55,892
7		4,209		4,209	62,820	1,342	64,162	59,953
8		4,209		4,209	66,714	1,510	68,224	64,015
9		4,209		4,209	70,607	1,678	72,285	68,076
10		4,209		4,209	74,517	1,678	76,195	71,986
11		4,209	18,897	23,106	74,517	1,678	76,195	53,090
12		4,209		4,209	74,517	1,678	76,195	71,986
13		4,209		4,209	74,517	1,678	76,195	71,986
14		4,209		4,209	74,517	1,678	76,195	71,986
15		4,209		4,209	74,517	1,678	76,195	71,986
16		4,209		4,209	74,517	1,678	76,195	71,986
17		4,209	18,897	23,106	74,517	1,678	76,195	53,090
18		4,209		4,209	74,517	1,678	76,195	71,986
19		4,209		4,209	74,517	1,678	76,195	71,986
20		4,209		4,209	74,517	1,678	76,195	71,986
21		4,209		4,209	74,517	1,678	76,195	71,986
22		4,209		4,209	74,517	1,678	76,195	71,986
23		4,209	18,897	23,106	74,517	1,678	76,195	53,090
24		4,209		4,209	74,517	1,678	76,195	71,986
25		4,209	20,078	24,287	74,517	1,678	76,195	51,908
26		4,209		4,209	74,517	1,678	76,195	71,986
27		4,209		4,209	74,517	1,678	76,195	71,986
28		4,209		4,209	74,517	1,678	76,195	71,986
29		4,209	18,897	23,106	74,517	1,678	76,195	53,090
30		4,209		4,209	74,517	1,678	76,195	71,986
31		4,209		4,209	74,517	1,678	76,195	71,986
32		4,209		4,209	74,517	1,678	76,195	71,986
33		4,209		4,209	74,517	1,678	76,195	71,986
34		4,209		4,209	74,517	1,678	76,195	71,986
35		4,209	18,897	23,106	74,517	1,678	76,195	53,090
36		4,209		4,209	74,517	1,678	76,195	71,986
37		4,209		4,209	74,517	1,678	76,195	71,986
38		4,209		4,209	74,517	1,678	76,195	71,986
39		4,209		4,209	74,517	1,678	76,195	71,986
40		4,209		4,209	74,517	1,678	76,195	71,986
41		4,209	18,897	23,106	74,517	1,678	76,195	53,090
42		4,209		4,209	74,517	1,678	76,195	71,986
43		4,209		4,209	74,517	1,678	76,195	71,986
44		4,209		4,209	74,517	1,678	76,195	71,986
45		4,209	20,078	24,287	74,517	1,678	76,195	51,908
46		4,209		4,209	74,517	1,678	76,195	71,986
47		4,209	18,897	23,106	74,517	1,678	76,195	53,090
48		4,209		4,209	74,517	1,678	76,195	71,986
49		4,209		4,209	74,517	1,678	76,195	71,986
50		4,209		4,209	74,517	1,678	76,195	71,986

EIRR= 12.84%

Table L.6.2 Sensitivity analysis

(2) Escalation of Cost by 10%  
 3) Alternative B-2

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	22,715			22,715	0	0	0	-22,715
2	35,186			35,186	0	0	0	-35,186
3	183,945			183,945	0	0	0	-183,945
4	159,448			159,448	0	0	0	-159,448
5	44,094	4,209		48,302	55,032	1,007	56,039	7,737
6		4,209		4,209	58,926	1,175	60,101	55,892
7		4,209		4,209	62,820	1,342	64,162	59,953
8		4,209		4,209	66,714	1,510	68,224	64,015
9		4,209		4,209	70,607	1,678	72,285	68,076
10		4,209		4,209	74,517	1,678	76,195	71,986
11		4,209	18,897	23,106	74,517	1,678	76,195	53,090
12		4,209		4,209	74,517	1,678	76,195	71,986
13		4,209		4,209	74,517	1,678	76,195	71,986
14		4,209		4,209	74,517	1,678	76,195	71,986
15		4,209		4,209	74,517	1,678	76,195	71,986
16		4,209		4,209	74,517	1,678	76,195	71,986
17		4,209	18,897	23,106	74,517	1,678	76,195	53,090
18		4,209		4,209	74,517	1,678	76,195	71,986
19		4,209		4,209	74,517	1,678	76,195	71,986
20		4,209		4,209	74,517	1,678	76,195	71,986
21		4,209		4,209	74,517	1,678	76,195	71,986
22		4,209		4,209	74,517	1,678	76,195	71,986
23		4,209	18,897	23,106	74,517	1,678	76,195	53,090
24		4,209		4,209	74,517	1,678	76,195	71,986
25		4,209	20,078	24,287	74,517	1,678	76,195	51,908
26		4,209		4,209	74,517	1,678	76,195	71,986
27		4,209		4,209	74,517	1,678	76,195	71,986
28		4,209		4,209	74,517	1,678	76,195	71,986
29		4,209	18,897	23,106	74,517	1,678	76,195	53,090
30		4,209		4,209	74,517	1,678	76,195	71,986
31		4,209		4,209	74,517	1,678	76,195	71,986
32		4,209		4,209	74,517	1,678	76,195	71,986
33		4,209		4,209	74,517	1,678	76,195	71,986
34		4,209		4,209	74,517	1,678	76,195	71,986
35		4,209	18,897	23,106	74,517	1,678	76,195	53,090
36		4,209		4,209	74,517	1,678	76,195	71,986
37		4,209		4,209	74,517	1,678	76,195	71,986
38		4,209		4,209	74,517	1,678	76,195	71,986
39		4,209		4,209	74,517	1,678	76,195	71,986
40		4,209		4,209	74,517	1,678	76,195	71,986
41		4,209	18,897	23,106	74,517	1,678	76,195	53,090
42		4,209		4,209	74,517	1,678	76,195	71,986
43		4,209		4,209	74,517	1,678	76,195	71,986
44		4,209		4,209	74,517	1,678	76,195	71,986
45		4,209	20,078	24,287	74,517	1,678	76,195	51,908
46		4,209		4,209	74,517	1,678	76,195	71,986
47		4,209	18,897	23,106	74,517	1,678	76,195	53,090
48		4,209		4,209	74,517	1,678	76,195	71,986
49		4,209		4,209	74,517	1,678	76,195	71,986
50		4,209		4,209	74,517	1,678	76,195	71,986

EIRR= 13.12%

Table L.6.2 Sensitivity Analysis

(3) Case 3: Simultaneous Case of Decline of Yield by 10% and Escalation of Cost by 10%

1) Alternative A

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	22,332			22,332	0	0	0	-22,332
2	31,343			31,343	0	0	0	-31,343
3	160,636			160,636	0	0	0	-160,636
4	137,911			137,911	0	0	0	-137,911
5	39,571	3,374		42,945	45,049	1,007	46,056	3,111
6		3,374		3,374	48,033	1,175	49,208	45,834
7		3,374		3,374	51,017	1,342	52,359	48,985
8		3,374		3,374	54,000	1,510	55,510	52,136
9		3,374		3,374	56,984	1,678	58,662	55,289
10		3,374		3,374	59,937	1,678	61,615	58,242
11		3,374	18,897	22,271	59,937	1,678	61,615	39,345
12		3,374		3,374	59,937	1,678	61,615	58,242
13		3,374		3,374	59,937	1,678	61,615	58,242
14		3,374		3,374	59,937	1,678	61,615	58,242
15		3,374		3,374	59,937	1,678	61,615	58,242
16		3,374		3,374	59,937	1,678	61,615	58,242
17		3,374	18,897	22,271	59,937	1,678	61,615	39,345
18		3,374		3,374	59,937	1,678	61,615	58,242
19		3,374		3,374	59,937	1,678	61,615	58,242
20		3,374		3,374	59,937	1,678	61,615	58,242
21		3,374		3,374	59,937	1,678	61,615	58,242
22		3,374		3,374	59,937	1,678	61,615	58,242
23		3,374	18,897	22,271	59,937	1,678	61,615	39,345
24		3,374		3,374	59,937	1,678	61,615	58,242
25		3,374	3,582	6,955	59,937	1,678	61,615	54,660
26		3,374		3,374	59,937	1,678	61,615	58,242
27		3,374		3,374	59,937	1,678	61,615	58,242
28		3,374		3,374	59,937	1,678	61,615	58,242
29		3,374	18,897	22,271	59,937	1,678	61,615	39,345
30		3,374		3,374	59,937	1,678	61,615	58,242
31		3,374		3,374	59,937	1,678	61,615	58,242
32		3,374		3,374	59,937	1,678	61,615	58,242
33		3,374		3,374	59,937	1,678	61,615	58,242
34		3,374		3,374	59,937	1,678	61,615	58,242
35		3,374	18,897	22,271	59,937	1,678	61,615	39,345
36		3,374		3,374	59,937	1,678	61,615	58,242
37		3,374		3,374	59,937	1,678	61,615	58,242
38		3,374		3,374	59,937	1,678	61,615	58,242
39		3,374		3,374	59,937	1,678	61,615	58,242
40		3,374		3,374	59,937	1,678	61,615	58,242
41		3,374	18,897	22,271	59,937	1,678	61,615	39,345
42		3,374		3,374	59,937	1,678	61,615	58,242
43		3,374		3,374	59,937	1,678	61,615	58,242
44		3,374		3,374	59,937	1,678	61,615	58,242
45		3,374	3,582	6,955	59,937	1,678	61,615	54,660
46		3,374		3,374	59,937	1,678	61,615	58,242
47		3,374	18,897	22,271	59,937	1,678	61,615	39,345
48		3,374		3,374	59,937	1,678	61,615	58,242
49		3,374		3,374	59,937	1,678	61,615	58,242
50		3,374		3,374	59,937	1,678	61,615	58,242

EIRR= 12.14%



Table L.6.2 Sensitivity Analysis

(3) Case 3: Simultaneous Case of Decline of Yield by 10% and Escalation of Cost by 10%  
 2) Alternative B-1

Unit: RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	23,262			23,262	0	0	0	-23,262
2	36,034			36,034	0	0	0	-36,034
3	188,376			188,376	0	0	0	-188,376
4	163,290			163,290	0	0	0	-163,290
5	45,156	4,209		49,365	49,529	1,007	50,536	1,171
6		4,209		4,209	53,033	1,175	54,208	50,000
7		4,209		4,209	56,538	1,342	57,880	53,671
8		4,209		4,209	60,043	1,510	61,553	57,344
9		4,209		4,209	63,546	1,678	65,224	61,016
10		4,209		4,209	67,065	1,678	68,743	64,535
11		4,209	18,897	23,106	67,065	1,678	68,743	45,638
12		4,209		4,209	67,065	1,678	68,743	64,535
13		4,209		4,209	67,065	1,678	68,743	64,535
14		4,209		4,209	67,065	1,678	68,743	64,535
15		4,209		4,209	67,065	1,678	68,743	64,535
16		4,209		4,209	67,065	1,678	68,743	64,535
17		4,209	18,897	23,106	67,065	1,678	68,743	45,638
18		4,209		4,209	67,065	1,678	68,743	64,535
19		4,209		4,209	67,065	1,678	68,743	64,535
20		4,209		4,209	67,065	1,678	68,743	64,535
21		4,209		4,209	67,065	1,678	68,743	64,535
22		4,209		4,209	67,065	1,678	68,743	64,535
23		4,209	18,897	23,106	67,065	1,678	68,743	45,638
24		4,209		4,209	67,065	1,678	68,743	64,535
25		4,209	20,078	24,287	67,065	1,678	68,743	44,456
26		4,209		4,209	67,065	1,678	68,743	64,535
27		4,209		4,209	67,065	1,678	68,743	64,535
28		4,209		4,209	67,065	1,678	68,743	64,535
29		4,209	18,897	23,106	67,065	1,678	68,743	45,638
30		4,209		4,209	67,065	1,678	68,743	64,535
31		4,209		4,209	67,065	1,678	68,743	64,535
32		4,209		4,209	67,065	1,678	68,743	64,535
33		4,209		4,209	67,065	1,678	68,743	64,535
34		4,209		4,209	67,065	1,678	68,743	64,535
35		4,209	18,897	23,106	67,065	1,678	68,743	45,638
36		4,209		4,209	67,065	1,678	68,743	64,535
37		4,209		4,209	67,065	1,678	68,743	64,535
38		4,209		4,209	67,065	1,678	68,743	64,535
39		4,209		4,209	67,065	1,678	68,743	64,535
40		4,209		4,209	67,065	1,678	68,743	64,535
41		4,209	18,897	23,106	67,065	1,678	68,743	45,638
42		4,209		4,209	67,065	1,678	68,743	64,535
43		4,209		4,209	67,065	1,678	68,743	64,535
44		4,209		4,209	67,065	1,678	68,743	64,535
45		4,209	20,078	24,287	67,065	1,678	68,743	44,456
46		4,209		4,209	67,065	1,678	68,743	64,535
47		4,209	18,897	23,106	67,065	1,678	68,743	45,638
48		4,209		4,209	67,065	1,678	68,743	64,535
49		4,209		4,209	67,065	1,678	68,743	64,535
50		4,209		4,209	67,065	1,678	68,743	64,535

EIRR= 11.58%

Table L.6.2 Sensitivity Analysis

(3) Case 3: Simultaneous Case of Decline of Yield by 10% and Escalation of Cost by 10%  
 3) Alternative B-2

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	22,715			22,715	0	0	0	-22,715
2	35,186			35,186	0	0	0	-35,186
3	183,945			183,945	0	0	0	-183,945
4	159,448			159,448	0	0	0	-159,448
5	44,094	4,209		48,302	49,362	1,007	50,369	2,067
6		4,209		4,209	52,717	1,175	53,892	49,683
7		4,209		4,209	56,070	1,342	57,412	53,203
8		4,209		4,209	59,424	1,510	60,934	56,726
9		4,209		4,209	62,779	1,678	64,457	60,248
10		4,209		4,209	66,099	1,678	67,777	63,568
11		4,209	18,897	23,106	66,099	1,678	67,777	44,671
12		4,209		4,209	66,099	1,678	67,777	63,568
13		4,209		4,209	66,099	1,678	67,777	63,568
14		4,209		4,209	66,099	1,678	67,777	63,568
15		4,209		4,209	66,099	1,678	67,777	63,568
16		4,209		4,209	66,099	1,678	67,777	63,568
17		4,209	18,897	23,106	66,099	1,678	67,777	44,671
18		4,209		4,209	66,099	1,678	67,777	63,568
19		4,209		4,209	66,099	1,678	67,777	63,568
20		4,209		4,209	66,099	1,678	67,777	63,568
21		4,209		4,209	66,099	1,678	67,777	63,568
22		4,209		4,209	66,099	1,678	67,777	63,568
23		4,209	18,897	23,106	66,099	1,678	67,777	44,671
24		4,209		4,209	66,099	1,678	67,777	63,568
25		4,209	20,078	24,287	66,099	1,678	67,777	43,490
26		4,209		4,209	66,099	1,678	67,777	63,568
27		4,209		4,209	66,099	1,678	67,777	63,568
28		4,209		4,209	66,099	1,678	67,777	63,568
29		4,209	18,897	23,106	66,099	1,678	67,777	44,671
30		4,209		4,209	66,099	1,678	67,777	63,568
31		4,209		4,209	66,099	1,678	67,777	63,568
32		4,209		4,209	66,099	1,678	67,777	63,568
33		4,209		4,209	66,099	1,678	67,777	63,568
34		4,209		4,209	66,099	1,678	67,777	63,568
35		4,209	18,897	23,106	66,099	1,678	67,777	44,671
36		4,209		4,209	66,099	1,678	67,777	63,568
37		4,209		4,209	66,099	1,678	67,777	63,568
38		4,209		4,209	66,099	1,678	67,777	63,568
39		4,209		4,209	66,099	1,678	67,777	63,568
40		4,209		4,209	66,099	1,678	67,777	63,568
41		4,209	18,897	23,106	66,099	1,678	67,777	44,671
42		4,209		4,209	66,099	1,678	67,777	63,568
43		4,209		4,209	66,099	1,678	67,777	63,568
44		4,209		4,209	66,099	1,678	67,777	63,568
45		4,209	20,078	24,287	66,099	1,678	67,777	43,490
46		4,209		4,209	66,099	1,678	67,777	63,568
47		4,209	18,897	23,106	66,099	1,678	67,777	44,671
48		4,209		4,209	66,099	1,678	67,777	63,568
49		4,209		4,209	66,099	1,678	67,777	63,568
50		4,209		4,209	66,099	1,678	67,777	63,568

EIRR= 11.69%

Table E.6.2 Sensitivity Analysis

(4) Case 4: Delay of Construction Works by 2 Years  
 (1) Alternative A

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	20,302			20,302	0	0	0	-20,302
2	28,494			28,494	0	0	0	-28,494
3	67,852			67,852	0	0	0	-67,852
4	67,852			67,852	0	0	0	-67,852
5	67,852			67,852			0	-67,852
6	67,851			67,851			0	-67,851
7	35,974	3,067		39,041	50,054	1,007	51,061	12,020
8		3,067		3,067	53,370	1,175	54,545	51,478
9		3,067		3,067	56,685	1,342	58,027	54,960
10		3,067		3,067	60,000	1,510	61,510	58,443
11		3,067		3,067	63,316	1,678	64,994	61,927
12		3,067		3,067	66,597	1,678	68,275	65,208
13		3,067	17,179	20,246	66,597	1,678	68,275	48,029
14		3,067		3,067	66,597	1,678	68,275	65,208
15		3,067		3,067	66,597	1,678	68,275	65,208
16		3,067		3,067	66,597	1,678	68,275	65,208
17		3,067		3,067	66,597	1,678	68,275	65,208
18		3,067		3,067	66,597	1,678	68,275	65,208
19		3,067	17,179	20,246	66,597	1,678	68,275	48,029
20		3,067		3,067	66,597	1,678	68,275	65,208
21		3,067		3,067	66,597	1,678	68,275	65,208
22		3,067		3,067	66,597	1,678	68,275	65,208
23		3,067		3,067	66,597	1,678	68,275	65,208
24		3,067		3,067	66,597	1,678	68,275	65,208
25		3,067	17,179	20,246	66,597	1,678	68,275	48,029
26		3,067		3,067	66,597	1,678	68,275	65,208
27		3,067	3,256	6,323	66,597	1,678	68,275	61,952
28		3,067		3,067	66,597	1,678	68,275	65,208
29		3,067		3,067	66,597	1,678	68,275	65,208
30		3,067		3,067	66,597	1,678	68,275	65,208
31		3,067	17,179	20,246	66,597	1,678	68,275	48,029
32		3,067		3,067	66,597	1,678	68,275	65,208
33		3,067		3,067	66,597	1,678	68,275	65,208
34		3,067		3,067	66,597	1,678	68,275	65,208
35		3,067		3,067	66,597	1,678	68,275	65,208
36		3,067		3,067	66,597	1,678	68,275	65,208
37		3,067	17,179	20,246	66,597	1,678	68,275	48,029
38		3,067		3,067	66,597	1,678	68,275	65,208
39		3,067		3,067	66,597	1,678	68,275	65,208
40		3,067		3,067	66,597	1,678	68,275	65,208
41		3,067		3,067	66,597	1,678	68,275	65,208
42		3,067		3,067	66,597	1,678	68,275	65,208
43		3,067	17,179	20,246	66,597	1,678	68,275	48,029
44		3,067		3,067	66,597	1,678	68,275	65,208
45		3,067		3,067	66,597	1,678	68,275	65,208
46		3,067		3,067	66,597	1,678	68,275	65,208
47		3,067	3,256	6,323	66,597	1,678	68,275	61,952
48		3,067		3,067	66,597	1,678	68,275	65,208
49		3,067	17,179	20,246	66,597	1,678	68,275	48,029
50		3,067		3,067	66,597	1,678	68,275	65,208

EIRR= 13.03%

Table L.6.2 Sensitivity Analysis

(4) Construction works delayed by 2 years  
2) Alternative B-1

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	21,147			21,147	0	0	0	-21,147
2	32,758			32,758	0	0	0	-32,758
3	79,924			79,924	0	0	0	-79,924
4	79,924			79,924	0	0	0	-79,924
5	79,924			79,924			0	-79,924
6	79,924			79,924			0	-79,924
7	41,051	3,826		44,877	55,032	1,007	56,039	11,162
8		3,826		3,826	58,926	1,175	60,101	56,275
9		3,826		3,826	62,820	1,342	64,162	60,336
10		3,826		3,826	66,714	1,510	68,224	64,398
11		3,826		3,826	70,607	1,678	72,285	68,459
12		3,826		3,826	74,517	1,678	76,195	72,369
13		3,826	17,179	21,005	74,517	1,678	76,195	55,190
14		3,826		3,826	74,517	1,678	76,195	72,369
15		3,826		3,826	74,517	1,678	76,195	72,369
16		3,826		3,826	74,517	1,678	76,195	72,369
17		3,826		3,826	74,517	1,678	76,195	72,369
18		3,826		3,826	74,517	1,678	76,195	72,369
19		3,826	17,179	21,005	74,517	1,678	76,195	55,190
20		3,826		3,826	74,517	1,678	76,195	72,369
21		3,826		3,826	74,517	1,678	76,195	72,369
22		3,826		3,826	74,517	1,678	76,195	72,369
23		3,826		3,826	74,517	1,678	76,195	72,369
24		3,826		3,826	74,517	1,678	76,195	72,369
25		3,826	17,179	21,005	74,517	1,678	76,195	55,190
26		3,826		3,826	74,517	1,678	76,195	72,369
27		3,826	18,253	22,079	74,517	1,678	76,195	54,116
28		3,826		3,826	74,517	1,678	76,195	72,369
29		3,826		3,826	74,517	1,678	76,195	72,369
30		3,826		3,826	74,517	1,678	76,195	72,369
31		3,826	17,179	21,005	74,517	1,678	76,195	55,190
32		3,826		3,826	74,517	1,678	76,195	72,369
33		3,826		3,826	74,517	1,678	76,195	72,369
34		3,826		3,826	74,517	1,678	76,195	72,369
35		3,826		3,826	74,517	1,678	76,195	72,369
36		3,826		3,826	74,517	1,678	76,195	72,369
37		3,826	17,179	21,005	74,517	1,678	76,195	55,190
38		3,826		3,826	74,517	1,678	76,195	72,369
39		3,826		3,826	74,517	1,678	76,195	72,369
40		3,826		3,826	74,517	1,678	76,195	72,369
41		3,826		3,826	74,517	1,678	76,195	72,369
42		3,826		3,826	74,517	1,678	76,195	72,369
43		3,826	17,179	21,005	74,517	1,678	76,195	55,190
44		3,826		3,826	74,517	1,678	76,195	72,369
45		3,826		3,826	74,517	1,678	76,195	72,369
46		3,826		3,826	74,517	1,678	76,195	72,369
47		3,826	18,253	22,079	74,517	1,678	76,195	54,116
48		3,826		3,826	74,517	1,678	76,195	72,369
49		3,826	17,179	21,005	74,517	1,678	76,195	55,190
50		3,826		3,826	74,517	1,678	76,195	72,369

EIRR= 12.52%

Table L.6.2 Sensitivity Analysis

(4) Construction works delayed by 2 years  
 3) Alternative B-2

Unit : RD\$ x 1000

Year in Order	Costs				Benefits			Net Incremental Benefits
	Initial Investment	O/M Services	Replacement Cost	Total	Agricultural Production	Flood Damage	Total	
1	20,650			20,650	0	0	0	-20,650
2	31,987			31,987	0	0	0	-31,987
3	78,044			78,044	0	0	0	-78,044
4	78,044			78,044	0	0	0	-78,044
5	78,044			78,044			0	-78,044
6	78,044			78,044			0	-78,044
7	40,085	3,826		43,911	54,847	1,007	55,854	11,943
8		3,826		3,826	58,574	1,175	59,749	55,923
9		3,826		3,826	62,300	1,342	63,642	59,816
10		3,826		3,826	66,027	1,510	67,537	63,711
11		3,826		3,826	73,443	1,678	75,121	71,295
12		3,826		3,826	73,443	1,678	75,121	71,295
13		3,826	17,179	21,005	73,443	1,678	75,121	54,116
14		3,826		3,826	73,443	1,678	75,121	71,295
15		3,826		3,826	73,443	1,678	75,121	71,295
16		3,826		3,826	73,443	1,678	75,121	71,295
17		3,826		3,826	73,443	1,678	75,121	71,295
18		3,826		3,826	73,443	1,678	75,121	71,295
19		3,826	17,179	21,005	73,443	1,678	75,121	54,116
20		3,826		3,826	73,443	1,678	75,121	71,295
21		3,826		3,826	73,443	1,678	75,121	71,295
22		3,826		3,826	73,443	1,678	75,121	71,295
23		3,826		3,826	73,443	1,678	75,121	71,295
24		3,826		3,826	73,443	1,678	75,121	71,295
25		3,826	17,179	21,005	73,443	1,678	75,121	54,116
26		3,826		3,826	73,443	1,678	75,121	71,295
27		3,826	18,253	22,079	73,443	1,678	75,121	53,042
28		3,826		3,826	73,443	1,678	75,121	71,295
29		3,826		3,826	73,443	1,678	75,121	71,295
30		3,826		3,826	73,443	1,678	75,121	71,295
31		3,826	17,179	21,005	73,443	1,678	75,121	54,116
32		3,826		3,826	73,443	1,678	75,121	71,295
33		3,826		3,826	73,443	1,678	75,121	71,295
34		3,826		3,826	73,443	1,678	75,121	71,295
35		3,826		3,826	73,443	1,678	75,121	71,295
36		3,826		3,826	73,443	1,678	75,121	71,295
37		3,826	17,179	21,005	73,443	1,678	75,121	54,116
38		3,826		3,826	73,443	1,678	75,121	71,295
39		3,826		3,826	73,443	1,678	75,121	71,295
40		3,826		3,826	73,443	1,678	75,121	71,295
41		3,826		3,826	73,443	1,678	75,121	71,295
42		3,826		3,826	73,443	1,678	75,121	71,295
43		3,826	17,179	21,005	73,443	1,678	75,121	54,116
44		3,826		3,826	73,443	1,678	75,121	71,295
45		3,826		3,826	73,443	1,678	75,121	71,295
46		3,826		3,826	73,443	1,678	75,121	71,295
47		3,826	18,253	22,079	73,443	1,678	75,121	53,042
48		3,826		3,826	73,443	1,678	75,121	71,295
49		3,826	17,179	21,005	73,443	1,678	75,121	54,116
50		3,826		3,826	73,443	1,678	75,121	71,295

EIRR= 12.68%

**Table L.7.1 Profit-and-Loss Analysis of Model Farm**

	MODEL FARM					
	A	B	C	D	E	F
<b>1. Without Project</b>						
- Farm Size (ha)	3.8	1.6	9	5.8	40	180
- Crops	Paddy	Paddy	Pasture	Upland	Paddy	Pasture
- Cultivated Area (ha)	4.9	2.1	9.0	2.0	47.0	180.0
- Gross Income (RD\$)	75,411	32,319	144,540	25,260	723,330	2,890,800
- Production Cost (RD\$)	73,108	31,332	98,082	13,640	701,240	1,961,640
- Water Charge (RD\$)	858	368	0	0	8,225	0
- Total Cost	73,966	31,700	98,082	13,640	709,465	1,961,640
- Net Return	1,446	620	46,458	11,620	13,865	929,160
<b>2. With Project</b>						
- Farm Size	3.8	3	9	5.8	30	135
- Crops	Paddy	Paddy	Paddy	Paddy	Paddy	Paddy
- Cultivated Area (ha)	6.8	5.4	16.2	6.8	51.0	243.0
- Gross Income	159,120	126,360	379,080	159,120	1,193,400	5,686,200
- Production Cost	106,896	84,888	254,664	106,896	801,720	3,819,960
- Water Charge	2,679	2,128	8,866	2,679	36,248	108,787
- Total Cost	109,575	87,016	263,530	109,575	837,968	3,928,747
- Net Return	49,545	39,344	115,550	49,545	355,432	1,757,453
<b>3. Net Incremental Return</b>	<b>48,099</b>	<b>38,725</b>	<b>69,092</b>	<b>37,925</b>	<b>341,567</b>	<b>828,293</b>

Table L.7.2 Amortization Schedule of Foreign Currency Loan

Unit: RD\$ x 1000

Year	Disbursement Schedule	Accumulated Principal	Repayment of Principal	Remaining Principal	Payment of Interest	Integrated Payment
1	19,935	19,935		19,935	598	598
2	27,649	47,584		47,584	1,428	1,428
3	149,795	197,379		197,379	5,921	5,921
4	130,053	327,432		327,432	9,823	9,823
5	44,148	371,580		371,580	11,147	11,147
6				371,580	11,147	11,147
7				371,580	11,147	11,147
8				371,580	11,147	11,147
9				371,580	11,147	11,147
10				371,580	11,147	11,147
11			18,579	353,001	10,590	29,169
12			18,579	334,422	10,033	28,612
13			18,579	315,843	9,475	28,054
14			18,579	297,264	8,918	27,497
15			18,579	278,685	8,361	26,940
16			18,579	260,106	7,803	26,382
17			18,579	241,527	7,246	25,825
18			18,579	222,948	6,688	25,267
19			18,579	204,369	6,131	24,710
20			18,579	185,790	5,574	24,153
21			18,579	167,211	5,016	23,595
22			18,579	148,632	4,459	23,038
23			18,579	130,053	3,902	22,481
24			18,579	111,474	3,344	21,923
25			18,579	92,895	2,787	21,366
26			18,579	74,316	2,229	20,808
27			18,579	55,737	1,672	20,251
28			18,579	37,158	1,115	19,694
29			18,579	18,579	557	19,136
30			18,579	0	0	18,579
Total	371,580		371,580		190,555	562,135