

Table 8.6.1 (1) Required Inputs for implementation of the project

<p>Compound Fertilizer : (15-15-15, 72 lbs per cuerda at Q.0.95/lbs)</p>
<p>Urea : 12 lbs per cuerda at Q.0.90/lbs</p>
<p>Compost : Mixing hen dropping and strained lees of sugar cane and fermented for three months. Price is Q. 20~25/qq and followings are application:</p> <p style="padding-left: 40px;">0.5 kg/m²、 4qq/crd 1kg/m²、 8qq/crd 2kg/m²、 16qq/crd 3kg/m²、 24qq/crd</p> <p>Raw materials of compost like hen dropping and strained lees of sugar cane is better bought in a large quantity by trucks. Price of strained lees is Q 1,200 and hen dropping is 3,500 per truck consignment. It takes about 3 months for making “earthworm compost” Composts are used 8qq/crd. for standard section, 16qq/crd. for IPM section and 24qq/crd. for compost section.</p>
<p>Agricultural chemicals: The late burning stick (<i>Tizon tardio</i>) is the main sickness in the potato crop. For its prevention or its control, you can apply poisons like: Dithane M-45, Antracol, Manzate, Trimilox forte, Fruvit or Ridomil MZ-58, in a dosage of three or four measurements BAYER (name of a chemical distributor, which includes measurement in its product), of any product with 4-galon pump. Most farmers in the area are using Antracol for economical reason.</p>
<p>Seeds: * Loman / most prevailed variety in Guatemalan highland * Diaz / cold resistant * Clean seeds are propagated by ICTA, but quantity of the propagation is very small at experimental stage and not insufficient to local demand. * Anti-virus varieties developed by ICTA/ Cucu, Alaska, Paqui, Acana however, generally farmers do not accept the varieties as effective ones * Generally, potato seeds which farmers store in their house are badly damaged by larva of “<i>Contra gallina ciega and gusano alano alanbre</i>”.</p>

Table 8.6.1 (2) Input materials and those costs on model farms

M/F	<u>Section I</u>	<u>Standard farming section</u> : 1/2 crd x 5 communities : Compost/ 8qq x Q 25 = Q 200/crd x 1/2 crd x 5 communities = Q500 : Compound fertilizer 15-15-15/ 72 lbs/crd x Q 0.95 = Q 72 x 1/2 x 5 = Q171 : Urea/ 12lbs/crd x Q0.90 = Q11x1/2 x 5 = Q27 : Fungicide (Antracol, etc.) / (25cc/gallon x 8times x 2.5crd)x1/2x5= Q425 : Seeds (Loman or Diaz) / 3qq x Q50 x1/2 crd x 5communities = Q375 : Labor/15.5 days x Q25 = Q387.5 x 1/2 crd x 5communities = Q969 : Total for Section I Q 2,467
M/F	<u>Section II</u>	<u>Compost Application Section</u> : 1/2 crd x 5communities : Compost/ 24qq x Q25 = Q300/crd x 1/2 crd x 5communities = Q1,500 : Compound fertilizer 15 • 15 • 15/ 72lbs/crd x Q0.95 = Q72x1/2x5 = Q171 : Urea/ 12lbs/crd x Q0.90 = Q11x1/2 x 5 = Q27 : Fungicide (Antracol, etc.) / (25cc/gallon x 8times x 2.5crd)x1/2x5= Q425 : Seeds (Loman or Diaz) / 3qq x Q50 x1/2 crd x 5communities = Q375 : Labor/15.5 days x Q25 = Q387.5 x 1/2 crd x 5communities = Q969 : Total for Section II Q 3,462
M/F	<u>Section III</u>	<u>IPM Section</u> : 1/2 crd x 5communities : Compost/ 16qq x Q25 = Q250/crd x 1/2 crd x 5communities = Q1,000 : Compound fertilizer 15 • 15 • 15/ 72lbs/crd x Q0.95 = Q72x1/2x5 = Q171 : Urea/ 12lbs/crd x Q0.90 = Q11x1/2 x 5 = Q27 : Fungicide (Antracol, etc.) / (25cc/gallon x 4times x 2.5crd)x1/2x5= Q212.5 : Seeds (varieties recom. By ICTA) / 3qq x Q100 x1/2 crd x 5communities = Q750 : Labor/15.5 days x Q25 = Q387.5 x 1/2 crd x 5communities = Q969 : Total for Section III Q 3,129.5
M/F	<u>Section IV</u>	<u>Clean Seeds Section</u> : 1/2 crd x 5communities : Compost/ 8qq x Q25 = Q200/crd x 1/2 crd x 5communities = Q500 : Compound fertilizer 15 • 15 • 15/ 72lbs/crd x Q0.95 = Q72x1/2x5 = Q171 : Urea/ 12lbs/crd x Q0.90 = Q11x1/2 x 5 = Q27 : Fungicide (Antracol, etc.) / (25cc/gallon x 4times x 2.5crd)x1/2x5= Q425 : Seeds (propagated by ICTA)) / 3qq x Q200 x1/2 crd x 5communities = Q1,500 : Labor/15.5 days x Q25 = Q387.5 x 1/2 crd x 5communities = Q969 : Total for Section III Q 3,592

Table 8.6.1 (3) Inputs and Cost by Section of Potato Model Farms

A. Farming Input

Item	Unit	Unit Price (Quetzal)	Section I		Section II	
			Quantity (Quetzal/Section)	Cost	Quantity (Quetzal/Section)	Cost
Cost				2,467		3,467
1) Farm Inputs						
- Seeds	qq.	50	7.5	375.0	7.5	375.0
- Fertilizers						
Urea	pound	0.90	30	27.0	30	27.0
15-15-15	pound	0.95	180	171.0	180	171.0
Compost	qq.	25.0	20	500.0	60	1,500.0
- Fungicides	pound	53	8	425.0	4	425.0
2) Labor	man-day	25	38.76	969.0	38.76	969.0

Item	Unit	Unit Price (Quetzal)	Section III		Section IV		
			Quantity (Quetzal/Section)	Cost	Unit Price (Quetzal)	Quantity (Quetzal/Section)	Cost
Cost				3,129.5			3,592.0
1) Farm Inputs							
- Seeds	qq.	100	7.5	750.0	200.0	7.5	1,500.0
- Fertilizers							
Urea	pound	0.90	30	27.0		30	27.0
15-15-15	pound	0.95	180	171.0		180	171.0
Compost	qq.	25.0	40	1,000.0		20	500.0
- Fungicides	pound	53	4	212.5		8	425.0
2) Labor	man-day	25	38.76	969		38.76	969.0
Total of Farming Inputs							12,655.5

Notes: Each Section has an area of 0.5 cuerdas and are replicated in 5 Communities, for a total are of 2.5 cuerdas per Section.

The labor cost is born by the farmer that provides the land for Demonstration Farm.

8.6.1 (4) Project Cost Estimation for Model Farm Project

Palestina de Los Altos, Quetzaltenango

Providing Model Farms for demonstration of improved potato farming

Item	Specification	Q'ty	Mdg.	Unit Price	Cost (Q.)	Remarks
Chemical fertilizer	15x15x15	720	lbs	0.95	684.00	72 lbs/crd. recommended by ICTA
	Urea	120	lbs	0.90	108.00	12 lbs/crd. recommended by ICTA
Compost	made of hen manure	140	qq	25.00	3,500.00	8qq/crd or 1kg/m2
Fungicides	Dithane M-45, Antracol, Manzate,	28	unit	53.13	1,487.50	mainly Antracol
	Trimiltox forte, Ridomil MZ-58					
Seeds	Loman (3qq x 5.0crd)	15	qq	50.00	750.00	
	Resistant varieties(3qq x 2.5crd)	7.5	qq	100.00	750.00	recommended by ICTA
	Clean seed (3qq x 2.5crd)	7.5	qq	200.00	1,500.00	propagated by ICTA
	sub-total(materials)				8,779.5	
Technical training	Training(4), Field-Day(3)	7	time	500.00	3,500.00	experts from ICTA/INTECAP/NGOs
Contingency	5% of total products	1	unit	875.00	875.00	project signboard etc.
Labors for farming	15.5 days/crd x Q25	10	unit	387.50	3,875.00	
TOTAL					17,029.50	

Table 8.6.1 (5) Implementation Schedule on the Project of Model Farm

<p>Project No Name of Plan Target Area Implementation Agency Project Purpose</p>	<p>8.6.1 Model Farm Plan for Potato Production Palestina, Quetzaltenango Potato Growers' Association ①To provide a Model-Farm to demonstrate improved farming practice, ②To show modern techniques on potato production, and ③Target of potato productivity is 25 to 35qq /crd.</p>																																																																																														
<p>Description</p>	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="6" style="text-align: center;">2001</th> <th colspan="6" style="text-align: center;">2002</th> </tr> <tr> <th style="width: 20px;"></th> <th style="width: 20px;">8</th> <th style="width: 20px;">9</th> <th style="width: 20px;">10</th> <th style="width: 20px;">11</th> <th style="width: 20px;">12</th> <th style="width: 20px;">1</th> <th style="width: 20px;">2</th> <th style="width: 20px;">3</th> <th style="width: 20px;">4</th> <th style="width: 20px;">5</th> <th style="width: 20px;">6</th> <th style="width: 20px;">7</th> <th style="width: 20px;">8</th> <th style="width: 20px;">9</th> <th style="width: 20px;">10</th> <th style="width: 20px;">11</th> <th style="width: 20px;">12</th> <th style="width: 20px;">1</th> <th style="width: 20px;">2</th> <th style="width: 20px;">3</th> </tr> <tr> <th></th> <th colspan="6" style="text-align: center;">DRY</th> <th colspan="6" style="text-align: center;">SEASON</th> <th colspan="6" style="text-align: center;">RAINY</th> <th colspan="6" style="text-align: center;">SEASON</th> <th colspan="6" style="text-align: center;">DRY</th> <th colspan="6" style="text-align: center;">SEASON</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p>1) Preparation i) Selection of ICTA/INTECAP/NGOs ii) Selection sites for Model Farm iii) Duration of field works 2) Implementation of Model Farms i) Model farm I (Standard farming section) ii) Model farm II(Compost section) iii) Model farm III(IPM section) iv)Model Farm IV(Clean seeds section) 3) Technical Training i) Programming of training activities ii) Field day 4) Monitoring i) Establishment of monitoring indicator ii) Schedule iii) Reporting</p> </td> <td colspan="12" style="text-align: center; vertical-align: middle;"> <p>— — 2nd crop of 2001 plan proposed</p> </td> </tr> </tbody> </table>												2001						2002							8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		DRY						SEASON						RAINY						SEASON						DRY						SEASON						<p>1) Preparation i) Selection of ICTA/INTECAP/NGOs ii) Selection sites for Model Farm iii) Duration of field works 2) Implementation of Model Farms i) Model farm I (Standard farming section) ii) Model farm II(Compost section) iii) Model farm III(IPM section) iv)Model Farm IV(Clean seeds section) 3) Technical Training i) Programming of training activities ii) Field day 4) Monitoring i) Establishment of monitoring indicator ii) Schedule iii) Reporting</p>	<p>— — 2nd crop of 2001 plan proposed</p>											
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Items of training * : (1) Removal of virus diseases by applying clean seed, (2) Soil improvement by applying compost (3) Curtailment of applying pesticides by IPM, (4) Improving cropping system .

Field Day # : Discussion between farmers and potato experts at fields. 3 times in each crop, 6times 12 months.

Table 8.6.2. (1) Project Cost (1/2)

Palestina de Los Altos, Quetzaltenango

Item	Specification	O'tv	Mdg.	Unit Price	Cost (Q.)	Remarks
1. Cost for construction of Warehouse						
Foundation 1.25 x 1.25 x 0.15m						
Cement	gray 5000	30	bolsa	34.50	1,035.00	
Sand	from river	3	m3	85.00	255.00	
Gravel		3	m3	125.00	375.00	
Iron rod	de media	60	Lb	25.00	1,500.00	
Meters of continuous rafter						
Iron rod	3/8" original	30	Lb	15.00	450.00	
Sand	from river	5	m3	85.00	425.00	
Blue gravel		5	m3	125.00	625.00	
Cement	gray 5000	48	bag	34.50	1,656.00	
Filled blocks for foundation						
		650	ps	3.10	2,015.00	
Sand	from river	1	m3	85.00	85.00	
Blue gravel		10	m3	34.50	345.00	
Straight meters of humid "SOLERA"						
	0.15x0.20					
Iron rods	3/8" original	40	Lb	15.00	600.00	
Sand	from river	2	m3	85.00	170.00	
Blue gravel		2	m3	125.00	250.00	
Cement	gray 5000	18	bag	34.50	621.00	
Metros linea de solera intermedia						
Iron rods	3/8" original%	20	Lb	15.00	300.00	
Sand	de rio	1	m3	85.00	85.00	
Blue gravel		1	m3	125.00	125.00	
Cement	gris 5000	9	bag	34.50	310.50	
Metros lineales de solela final o corona						
Iron rods	3/8" original%	40	Lb	15.00	600.00	
Sand	de rio	2	m3	85.00	170.00	
Blue gravel		2	m3	125.00	250.00	
Cement	gray 5000	18	bag	34.50	621.00	
Mooring wire		100	Lb	4.00	400.00	
Columns(type A 0.20x0.20)						
Iron rods	1/2" original	48	Lb	22.50	1,080.00	
Iron rods	1/4" original	30	Lb	6.83	204.90	
Sand	from river	3	m3	85.00	255.00	
Blue gravel		3	m3	125.00	375.00	
Cement	gray 5000	30	bag	34.50	1,035.00	
Columns(type B 0.20x0.20)						
Iron rods	3/8" original	24	Lb	15.00	360.00	
Iron rods	1/4" original	15	Lb	6.83	102.45	
Sand	from river	1	m3	85.00	85.00	
Blue Gravel		1	m3	125.00	125.00	
Cement	gris 5000	8	bolsa	34.50	276.00	
Lifting						
Empty blocks of 15 x 20 x 40	15*20*40	2,550	pc.	3.10	7,905.00	
Cement	gris 5000	50	bag	34.50	1,725.00	
Sand	de rio	6	m3	85.00	510.00	
Workmanship for lifting						
<i>Square meters of wall</i>		225		90.00	20,250.00	
Others						
Board		5	dozen	280.00	1,400.00	
Paral		5	dozen	150.00	750.00	
Mixing machine		1	unit	700.00	700.00	

Table 8.6.2. (1) Project Cost (2/2)

Palestina de Los Altos, Quetzaltenango

Item	Specification	O'tv	Mdg.	Unit Price	Cost (Q.)	Remarks
Compression of cold storage floor						
Round stone		30	m3	75.00	2,250.00	
Blue gravel		25	m3	125.00	3,125.00	
Select sand material		50	m3	100.00	5,000.00	
Tubos de cemento	4inches	40	pc.	20.00	800.00	
Foundry of 10cm cold storage floor						
Cement	de gris	110	bolsa	34.50	3,795.00	
Sand		12	m3	85.00	1,020.00	
Blue Gravel		12	m3	125.00	1,500.00	
Iron rods	1/4"original	190	lb	6.83	1,297.70	
Entrance room						
Rubble		115	m3	25.00	2,875.00	
<i>Excavation</i>	<i>workmanship</i>	<i>115</i>	<i>m3</i>	<i>20.00</i>	<i>2,300.00</i>	
<i>Material filling</i>		<i>115</i>	<i>m3</i>	<i>20.00</i>	<i>2,300.00</i>	
<i>Foundry</i>		<i>18</i>	<i>m3</i>	<i>165.00</i>	<i>2,970.00</i>	
<i>Placing of cement tubes</i>	<i>workmanship</i>	<i>40</i>	<i>pc.</i>	<i>12.50</i>	<i>500.00</i>	
Cost for construction of refrigerated room					350,299.68	
Cost for Installation of Transformer e.t.c					80,000.00	
Transportation cost (10% of material and Labor Cost)					51,043.92	
Training Cost (7% of construction Cost. Including Consultant fee for Construction work)					301,307.46	
Sub-Total					561,483.15	
Contingency (10% of construction cost)					56,148.32	
Total Cost for Construction of Warehouse					617,631.47	
2. Cost for Installation of Cellar						
Cost for installation of Cellar					600.00	
Cost for Initial Consuming Input					1,280.00	
Cost for Training					14,200.00	
Total Cost for Installation of Cellar					16,080.00	
Total Cost Project Cost (1+2)					<u>633,711.47</u>	

8.6.2(2) Estimation of Operational Cost for Potato Storage

Items	Unit	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1. Electricity														
1) Basic Charge	Q	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2) Compressor	Q	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6
a. Basic Charge	Q/kwh	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
b. Unit Price	kwh	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
c. Consumption	hours	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
d. Hour per day	days	31	28	28	28	28	28	28	28	28	28	28	28	31
e. Days	Q	1,679.00	1,518.80	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	1,625.60	1,679.00	6,691.20
f. Cost for Electricity														
3) Fan	Q	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
a. Basic Charge	Q/kwh	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
b. Unit Price	kwh	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
c. Consumption	hours	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
d. Hour per day	days	31	28	28	28	28	28	28	28	28	28	28	28	31
e. Days	Q	927.02	837.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	897.12	927.02	3,588.48
f. Cost for Electricity	Q	2,606.02	2,356.11	23.60	23.60	23.60	23.60	23.60	23.60	23.60	23.60	2,522.72	2,606.02	10,279.68
2. Labor Cost														
1) Technical Staff														
a. Number	persons	2	2	2	2	2	2	2	2	2	2	2	2	2
b. Days	days	31	28	28	28	28	28	28	28	28	28	28	28	31
c. Man-days	md	62	56	56	56	56	56	56	56	56	56	60	62	240.0
d. Unit Cost	Q/md	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
e. Cost for Tech. Staff	Q	2,480.00	2,240.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,400.00	2,480.00	9,600.00
2) Unskilled Labor														
a. Number	persons	0	10	0	0	0	0	0	0	0	0	10	0	0
b. Days	days	0	15	0	0	0	0	0	0	0	0	15	0	0
c. Man-days	md	0	150	0	0	0	0	0	0	0	0	150	0	300.0
d. Unit Cost	Q/md	28.85	28.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.85	0.00	0.00
e. Cost for Tech. Staff	Q	0.00	4,327.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4,327.50	0.00	8,655.00
3) Watchman														
a. Number	persons	1	1	0	0	0	0	0	0	0	0	1	1	1
b. Days	days	31	28	28	28	28	28	28	28	28	28	28	28	31
c. Man-days	md	31	28	28	28	28	28	28	28	28	28	28	28	31
d. Unit Cost	Q/md	28.85	28.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.85	28.85	120.0
e. Cost for Tech. Staff	Q	894.35	807.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	865.50	894.35	3,462.0
4) Total Labor Cost	Q	3,374.4	7,375.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7,593.0	3,374.4	21,717.0
3. Water Charge														
1) Basic required volume	lit/qq	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2) Amount of potato for washing	qq	0.0	2,000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3) Required volume for washing	m3	0.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4) Basic water charge	Q/m3	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5) Total water charge	Q	0.0	1,600.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,600.0
4. Other Cost														
1) Maintenance*1	Q	412.8	412.8	412.8	412.8	412.8	412.8	412.8	412.8	412.8	412.8	412.8	412.8	4,953.6
2) Miscellaneous*2	Q	299.0	566.6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	299.0	566.6	1,679.8
3) Sub-total	Q	711.8	979.4	414.0	414.0	414.0	414.0	414.0	414.0	414.0	414.0	711.8	979.4	6,633.4
5. Total Cost	Q	6,692.2	12,310.8	437.6	437.6	437.6	437.6	437.6	437.6	437.6	437.6	11,034.3	6,692.2	40,230.1
														Cost for Iqq
														20.12

*1: Maintenance cost for a year is assumed to be 1% of construction cost of the Storage. Q495,328.00 x 0.01 / 12 months = Q412.8

*2: Miscellaneous cost is calculated as 5% of the total labor, electricity, and water cost.

Table 8.6.2 (3) Implemenmentation schedule for Potato Storage Project

Project No	b-3																			
Name of Plan	Potato Storage Plan																			
Target Area	Palestina, Quetzaltenango																			
Implementation Agency	Potato Growers' Association																			
Project Purpose	① To conduct corroborative experiment for totato storage both at farmers level and farmers' association level, ② To diffuse the practices among farmers in target area, ③ To increase farmers' income																			
Project execution	2002																			
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	RAINY SEASON						DRY SEASON						RAINY SEASON							
	1st crop			2nd crop						1st crop			2nd crop							
1)Preparation																				
i)Technical and financial tenders for cold staorage																				
ii)Selection of Contractor																				
iii) Starting foundation works																				
2) Study on formation of Association																				
i) Formation og Dev. Committee, Poteto Section																				
ii)Regulation of Association																				
iii)Association management and operation activities																				
3)Storage facilities																				
i) Storage at farmer level																				
ii)Storage at Ass. Leve(Low temp. warehouse)																				
4) Corroborative test*																				
i) On farmers level storage																				
ii) On Low Temp. Warehouse																				
5) Technical training																				
i) Technical guidance for farmer																				
ii) Technical training on low Temp. Warehouse**																				
4)Monitoring and evaluation																				
i) Set up indicators for monitoring works																				
ii)Monitoring and schedule																				
iii)Reporting																				

* Test items: Weight, quality, change of temperature and humidity, change of sugar content and condition of texture and skin

** Training items: ①Condition of Temperature and humidities for potato storage, ② Storage know-how on other vegetables like onion, snow bean and others.

③Technical training on operation and maintenance on Low Temperature Warehouse

Table 8.6.3 (1) Basic Concept of Mini-Irrigation Project in Palestina de Los Altos (1/2)

(1) Ownership

Facilities and others	Ownership	
	Initial stage	Further stage
Main facilities (Pump, pump house, conduction pipeline, tank, distributary pipelines)	Municipality	Municipality or Water Users' Association (In case the water users' association is incorporated)
On-farm facilities (0.01 ha of vinyl houses)	Municipality (The beneficiaries should pay an annual rental charge to the Municipality) Annual Rental Charge : Q.2,000 / plot / year Rental Period : 3 years	Municipality or Individual farmers (In case that the beneficial farmer pays the annual rental charge for 3 years without being in arrears, he can obtain the ownership of the on-farm facilities)
Spring water	Municipality (The beneficiaries should pay an certain amount of fee to the Municipality for utilizing the municipality's water. Out of the water charge (Q.2.0 / m ³), about Q. 0.1-0.2/m ³ is counted as the fee to be used for some overall welfare programs in Palestina area.)	

(2) Funds for construction

Main facilities (Pump, pump house, conduction pipeline, tank, distributary pipelines)	The project will pay.
On-farm facilities (Vinyl house)	The project will pay.: vinyl house = 0.01 ha on farm water delivery system for 0.02 ha (0.01 ha with vinyl house and 0.01 ha without vinyl house) By the beneficiaries' own fund : vinyl house = 0.01 ha max. (If farmer wants to expand his vinyl house area, he has right to expand it. It is not compulsory. It depends on the farmers' intention in future)

Table 8.6.3 (1) Basic Concept of Mini-Irrigation Project in Palestina de Los Altos (2/2)

(3) Further Extension of the Mini-Irrigation System

Items	Descriptions	
Capital / funds for the extension	The revolving fund (the rental charge of the on-farm facilities which will be paid by the beneficiaries annually)	
Allocation of the Capital	All the revolving fund collected from the beneficiaries should be used only for the construction of on-farm facilities. The number of new on-farm system should be finalized in annual meeting among the municipality and water users' association.	
Beneficiaries	(Initial stage)	(Final Number of Beneficiaries)
	75 persons If the number of the applicants are more than 75, a waiting list will be made.	150 persons New on-farm facilities should be provided in sequence of a waiting list of the Mini-irrigation project with same condition of the initial beneficiaries.
Further expansion of the vinyl house from 0.01ha to 0.02 ha by farmers themselves	Initially 0.01 ha of vinyl house will be provided by the project fund. The beneficiaries have right to expand his vinyl house irrigation system by their own funds in future.	

(4) Beneficiaries' Participation and Obligations

Stages	Activities/Items	Remarks
Construction stage*	Voluntary service as a un-skilled labor of the construction works	The project facilities; the tanks, pipelines and related structures.
Operation period	Daily maintenance works	All the beneficiaries are obliged to attend the maintenance works if required.
Cultivation Period	Cost to be paid by the beneficiaries 1) All the agriculture farm input 2) Rental charge of a vinyl house and drip system	1) Fertilizer, seed, pesticide, water charge and so on. 2) Farmers should pay to the municipality for rental charge of vinyl house and drip system.

*: The beneficiaries should provide the voluntary works as the unskilled labors, about 2,550 man-days, i.e. 5-6 man-days per month for each beneficiary in average. (See [Table 8.6.3 \(7\)](#))

Table 8.6.3(2) Proposed Farming Practices for Irrigated Crops Under Vinyl house
in Palestina de los Altos

	Proposed Farming Practices
Cultivo: Tomato	
Varedades de Tomate	Hibridos Daniela, Menroe, Big Beef, Alboran RZ
Densidad de Siembra y Material usado	3 plantas por m2. Sembrar plantitas de "pilones" desarrollados por los mismos agricultores en pequeños envases plasticos de 3 pulgadas de ancho.
Fertilización (lib/100 m2)	N=5; P=4; y K=8
Mano de Obra (Jornales/ 100 m2)	Toda la actividad realizadas por el propietario; familiar = 85 jornales.
Riego	La programación del riego se realizará en base a requerimientos del cultivo.
Control de Insectos & Enfermedades	El invernadero se diseñará de forma tal que ayude a reducir al minimo la penetración de insectos. Aplicar importantes y económicas prácticas de Manejo Integrado de Cultivos (MIC) que han sido validadas por el ICTA, tal como la "Solarización del Suelo" que consiste en cubrir el suelo con plastico por un período de 6 semanas; Aplicar criterios de Umbral Economico de daños para el control de plagas. Hacer aplicaciones para control de insectos y nematodos aplicando pesticidas solo cuando se compruebe su necesidad. Usar insecticidas y fungicida de baja dosis letal para humanos.

Cultivo: Chile Pimiento	
Varedades	Hibrido Zirconio RZ, Nataly, Macabi, Magali
Densidad de Siembra y Material usado	3 plantas por m2. Sembrar plantitas de "pilones" desarrollados por los mismos agricultores en pequeños envases plasticos de 3 pulgadas de ancho.
Fertilización (lib/100 m2)	N=5; P=4; y K=8
Mano de Obra (Jornales/ 100 m2)	Toda la actividad realizadas por el propietario; familiar = 85 jornales.
Riego	La programación del riego se realizará en base a requerimientos del cultivo.
Control de Insectos & Enfermedades	El invernadero se diseñará de forma tal que ayude a reducir al minimo la penetración de insectos. Aplicar importantes y económicas prácticas de Manejo Integrado de Cultivos (MIC) que han sido validadas por el ICTA, tal como la "Solarización del Suelo" que consiste en cubrir el suelo con plastico por un período de 6 semanas; Aplicar criterios de Umbral Economico de daños para el control de plagas. Hacer aplicaciones para control de insectos y nematodos aplicando pesticidas solo cuando se compruebe su necesidad. Usar insecticidas y fungicida de baja dosis letal para humanos.

Table 8.6.3 (3) Financial Crop Budget for Irrigated Crops Under Greenhouse in Palestina de los Altos

Tomato (per 100 m2 of greenhouse)

Item	Units	Unit Price (Quetzal)	Quantity	Sub-total (Quetzal/100 m2.)
A) Gross Income				
Production	qq.	250	26	6,500
B) Production Cost				
Inputs				
- Seeds (Pilon seedlings)	seedlings	0.15	225	34
- Fertilizers				
N	lib.	2.00	5	10
P	lib.	1.7	4	7
K	lib.	1.6	8	13
- Compost	qq.	25	5	125
- Insecticides	lib.	125	1	125
- Fungicidas	lib.	200	1	200
- Adherente	lit.	50	1	50
- Rope	PA			100
- Labor (Family)	days		85	0
- Costo de Riego	Per harvest in 100 m2 of greenhouse			118
C) Net Income	(Quetzal/m2.)			5,720

Chile Pimiento (per 100 m2 of greenhouse)

Item	Units	Unit Price (Quetzal)	Quantity	Sub-total (Quetzal/100 m2.)
A) Gross Income				
Production	qq.	250	10	2,500
B) Production Cost				
Inputs				
- Seeds (Pilon seedlings)	seedlings	0.1	225	23
- Fertilizers				
N	lib.	2.00	5	10
P	lib.	1.7	4	7
K	lib.	1.6	8	13
- Compost	qq.	20	3	60
- Insecticides		125	0.5	63
- Fungicidas	lib.	200	0.3	60
- Adherente	lit.	50	1	50
- Rope	PA			100
- Labor (Family)	Jornales		65	0
- Costo de Riego	Per harvest in 100 m2 of greenhouse			118
C) Net Income	(Quetzal/100 m2)			2,000

Table 8.6.3 (5) Maximum Available Water and Irrigation Water Requirement in the Mini Irrigation System in Palestina de Los Altos, Quetzaltenango

(1) Maximum Available Water

Maximum Available Water for the project : 10.7 lit/s (43% of the spring discharge)

- Name of spring : Los Molinos Spring
- Present discharge of the spring : 25.0 lit/s
- Annual increase rate of population : 3 % per year^{*1}
- Number of families 930 families
- Period to be considered 15 years
- The number of family member 6.7 persons/family^{*2}
- Assumed water consumption per capita in 15 years later
96 lit/person/day^{*3}
- Safety Factor in consideration of Dry Year 0.75

(Note: *1: National population increasing rate based on the census '73 and '94 is 2.3%, 2: Based on the household survey. *3: 120 % of the present max consumption)

(2) Irrigation Water Requirement

The calculated irrigation water requirement : **5.7 mm/day, 0.66 liters/sec/ha.**

Irrigation water requirements for each crop are calculated by the following formula :

$$WR_g = WR_n / I_e * C_{loss}$$

$WR_n = ET_{crop} - E_{rain}$ here is, WR_g : Gross Water Requirement (mm/day)
 WR_n : Net Water Requirement (mm/day)
 ET_{crop} : Crop Evapotranspiration (mm/day)
 I_e : Irrigation Efficiency
 E_{rain} : Effective Rain (mm/day)
 (in greenhouse : $E_{rain} = 0$ mm)
 C_{loss} : Conveyance Loss Factor

$ET_{crop} = ET_o * K_c$ here is, ET_o : Potential Evapotranspiration (mm/day)
 K_c : Crop coefficient

NOTE > ET_o : Calculated by the Modified Penman Method based on the meteorological data at Labor Ovalle Station in Quetzaltenango

Table 8.6.3 (6) Calculation of Irrigation Water Requirement : Palestina

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
ETo (mm/mon.)	103	110	134	133	124	102	121	113	92	96	95	96	103	110	134
Ave. Kc	0.00	0.64	0.83	1.05	0.68	0.30	0.75	0.94	0.90	0.30	0.64	0.83	1.05	0.68	0.00
E _T crop (mm/mon.)	0.0	61.4	96.6	121.9	73.4	26.8	79.1	92.6	72.5	25.2	53.0	69.2	94.9	65.0	0.0
E _T crop (mm/day)	0.0	2.2	3.1	4.1	2.4	0.9	2.6	3.0	2.4	0.8	1.8	2.2	3.1	2.3	0.0
Rainfall (mm/mon.)	0.5	8	11.9	31.6	118.6	150.7	98.4	128	198.3	74.2	18.5	3.8	0.5	8	11.9
Effective rain(mm/mon)*1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Water Requirement(mm/mon)	0.0	61.4	96.6	121.9	73.4	26.8	79.1	92.6	72.5	25.2	53.0	69.2	94.9	65.0	0.0
Net Water Requirement(mm/day)	0.0	2.2	3.1	4.1	2.4	0.9	2.6	3.0	2.4	0.8	1.8	2.2	3.1	2.3	0.0
Gross Water Requirement (mm/day)	0.0	3.1	4.4	5.7	3.3	1.3	3.6	4.2	3.4	1.1	2.5	3.2	4.3	3.3	0.0
Gross Water Requirement (lit/s/ha)	0.00	0.36	0.51	0.66	0.39	0.15	0.42	0.49	0.39	0.13	0.29	0.36	0.50	0.38	0.00

E_TO : Calculated by the Modified Penman Method based on the meteorological data at Labor Ovalle Station in Quetzaltenango

* 1 : Effective Rainfall is 0 mm, because of cultivation in a vinyl house.

Calculation condition

- 1) Cultivation :
: Vinyl house cultivation with drip irrigation
- 2) Irrigation efficiency : 85% for drip irrigation
 - Drip irrigation : more than 85-90%, say 85%
 - Sprinkler irrigation : 70-85% say, 70%
 - Surface irrigation : 50%
- 3) Conveyance loss factor : 1.2

Crops	Total	cropping period (days)				Kc			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th
Broccoli	80	20	30	20	10	0.5-0.6	0.78	0.95	0.80
Cabbage	90	25	30	25	10	0.5-0.6	0.78	0.95	0.80
Carrot	90	15	25	30	20	0.5-0.6	0.80	1.00	0.70
Chile	120	25	35	40	20	0.5-0.6	0.78	0.95	0.80
Cole Brussels	90	25	30	25	10	0.5-0.6	0.78	0.95	0.80
Cauliflower	80	20	30	20	10	0.5-0.6	0.78	0.95	0.80
French bean	70	10	25	25	10	0.5-0.6	0.78	0.95	0.85
Lettuce	75	20	30	15	10	0.5-0.6	0.78	0.95	0.90
Snow pea	80	15	20	30	15	0.5-0.6	0.83	1.05	0.95
Tomato	120	25	35	35	25	0.5-0.6	0.83	1.05	0.60

NOTE> 1th : Initial period, 2nd : crop development period, 3 : mid-season, 4th : last season

Kc : Derived from FAO technical book, Condition: 4days interval irrigation, climate RH>70% & Wind0-5m/s

Table 8.6.3 (7) Required Unskilled Labor of the Beneficiaries
Mini-Irrigation in Palestina de Los Altos, Quetzaltenango
1) Calculation of Man-Powers

Items	Excavation Volume [m3]	Backfilling Volume [m3]	Pipe Placement [m]	Man-power [man-day]	Man-power [men/day]	2001					2002		
						Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Construction Stage													
Pump House and Suction Pit	30		0	26	1								
Pump Installation and Miscellaneous Works													
Upper Tank	240	72	0	231	5								
Conduction Pipes	600	480	1,320	776	17								
Distributary Pipes	580	464	12,000	1,393	10								
Valves / Filters / Regulator Installation etc.													
Miscellaneous Works 5%	LS			121.3									
Total				2,547									

Number of Beneficiaries : 75 - 150

2) Labor Productivity for Civil Works*

Work Items	Productivity	Unit
Excavation	0.84	man-day/m3
PVC Pipe Placement	0.06	man-day/m
Backfilling	0.40	man-day/m3

* : Derived from a Japanese Labor Productivities with modified factor Fm (=2.0) .

3) Participation of the Beneficiaries in the Construction Period

566.1 man-day/month in total
5.7 man-day/month/family
1.4 times/week/family

Table 8.6.3 (8) Proposed Concept of Organization for Mini-irrigation Project (Palestina) (1/2)

1. Beneficiaries	<ul style="list-style-type: none"> • The beneficiaries of the project will be residents of 5 communities (Los Perez, Los Diaz, Los Morales, Los Cabrera, Sector I) who are willing to participate in this project and satisfy the requirements stated below. (75 persons are tentatively planned to be the beneficiaries for the 1st year.) • The requirements for being beneficiaries are those who, <ul style="list-style-type: none"> - can secure land area of 0.02 ha in the project area for at least one year - can afford initial investment for farm input (water charge, fertilizer, seeds, etc.) - agree with the concept of the project (lease contract for vinyl house, etc.) - be a member of water users' association formed by the beneficiaries in 5 communities. To be a member, it is required to provide hand labor in constructing irrigation system or for certain days that is decided among the association.
2. Water Users' Association	<ul style="list-style-type: none"> • Water users' association will be established by the beneficiaries of the irrigation system. Each community selects their representatives and form an executive committee. • The structure of the executive committee is tentatively proposed as follows: <ul style="list-style-type: none"> 1) President 1 person 2) Vice-President 1 person 3) Secretary 1 person 4) Treasurer 1 person 5) Vocales 5 persons (1 person from each community) • It is recommended to register the association as civil association so that the organization has legal personality and, hence, legal power to negotiate. • At the establishment of association, bank account will be open under the name of water users' association. It is proposed that counter signature of municipality and president of water users' association be necessary for withdrawal of deposit in order to avoid misuse of the deposited money.
3. Support System	
a) JICA Study Team	<ul style="list-style-type: none"> • Overall supervision of the project (construction of irrigation facility, establishment of organization, etc.) • Provision of equipment and facility • Monitoring and evaluation of the project
b) Municipality	<ul style="list-style-type: none"> • Establishment of irrigation section in the municipality and assignment of 1~2 personnel for its administration. Room for portable water association might be shared with this section for actual operation. • Management and payment of collected charge for electricity and water use. • Arrangement of local company for repair and maintenance of the system (The cost will be borne by water users' association.)
c) MAGA	<ul style="list-style-type: none"> • Assignment of at least one personnel for the liaison officer of the Project • Overall supervision and data collection for monitoring. • Mediation in case any problem arises especially between municipality and water users' association. • Provision of technical consultancy for the case irrigation system is broken down.
c) Consultant or NGO	<ul style="list-style-type: none"> • Technical assistant for vinyl house production • Assistance in marketing

Table 8.6.3 (8) Proposed Concept of Organization for Mini-irrigation Project (Palestina) (2/2)

<p>4. Contract between Municipality and Water Users' Association</p>	<ul style="list-style-type: none"> • To demarcate the role of municipality and water users' association and to avoid any conflict regarding ownership of the facility, it is necessary to make contract between them (It would be better to make contract after the association is legally registered, which would take approximately 2 month). • The contents of the contract should cover, at least, following items. <ol style="list-style-type: none"> a) Parties of the contract (Municipality and Water Users Association) b) Rights of each party (Ownership of irrigation system, Users' right of the facility, Lease contract of vinyl house, etc.) c) Obligation of each party (Collection and Payment of water charge, Compensation for the case facility is broken, etc.) d) Effective period of the contract e) Revision and cancellation of contract f) Nonfulfillment of contract and penalty
<p>5. Land for Cultivation</p>	<ul style="list-style-type: none"> • Beneficiaries will provide land for cultivation. Presently, it is planned to construct irrigation system in Los Morares and Los Diaz (See Figure 8.6.3 (1)). For this reason, rental of cultivation land among community people, especially for the people from Los Perez, will be necessary and, therefore, consensus among them will be necessary. • The beneficiary should cultivate his own (or rented land) by himself. Tenant farming with other person cannot be accepted.
<p>6. Ownership of Irrigation Facility</p>	<ul style="list-style-type: none"> • Ownership of the irrigation system will belong to the municipality. However, users' rights have to be protected by making contract between the municipality and the association so that neither party can change users' rights without agreement of both parties.
<p>7. Water charge</p>	<ul style="list-style-type: none"> • Beneficiaries have to pay water charge that consists of electricity fee, maintenance and repair cost, a fee to be paid to the municipality and miscellaneous cost. • Representative of each community will collect water charge and deposit collected money into the account through treasurer of the association. • Necessary payment such as cost for electricity or repair will be paid from this account as the needs arise.
<p>8. Ownership and Use of Tertiary System and Vinyl House</p>	<ul style="list-style-type: none"> • Ownership of vinyl house and tertiary system belongs to the municipality and beneficiaries can use them for certain period (one year) on the basis of lease contract. • Those who paid lease charge for the year without any delay will have a right to continue the lease contract for next year. (In case he would like to stop the contract, he can cancel it by his own will.) • In case he or she paid lease fee for 3 years without delay, he or she can have the ownership of the vinyl house. • For those who cannot pay the fee, he cannot continue the lease and the facility will be transferred to other applicants. • In case vinyl house was broken at the time of return because of his fault, he has to either buy the equipment with the full amount or to pay full repair cost. • In case payment is impossible, municipality will pay temporarily, and collect money from the person based on the interest rate of Ban Rural. • In case of natural disaster (earthquake, large scale of hurricane, etc.), however, he can evade his duty of payment.

Table 8.6.3 (9) Project Facilities of Mini-Irrigation Project in Palestina de Los Altos

1) Pump House	<p><u>Pump</u> Design discharge of pump: 4 liters/sec = 64GPM Driving power and energy: Electric engine 35HP Suction pipe: 3 inches Pump-up Elevation: 250m (from pump station to the top storage tank)</p> <p><u>Pump House</u> Size : 2*3m Made by : Concrete blocks Electric supply : 1 no. of 100V transformer from the existing pump Existing suction tank for portable water system will be utilized for the irrigation system simultaneously.</p>
2) Water Conveyance System	<p><u>Conduction pipe system</u> Closed type pipeline Length : 1.6 km in total Pipe type : GI pipe, PVC-250PSI and PVC-160PSI pipe Diameter : ϕ 3"</p> <p><u>Distributary pipe system</u> Semi-closed type pipelines with float valve systems Length : 3.2 km in total approximately Pipe type : PVC-250PSI and PVC-160PSI pipe Diameter : ϕ 1-1.5"</p> <p><u>Aqueduct</u> Length : 24 m Pipe diameter : ϕ 3" Wire cable : main cable : 5/8" & supporting cable 1/2"</p>
3) Tank	<p><u>Top storage tank</u></p> <ul style="list-style-type: none"> - Capacity : 180 m³ (for 12hrs storage capacity of 4 lit/s) - Materials : reinforced concrete - Size : 2.8*8.0*8.0 m - Function : 12 hrs night storage of pumped water in order to irrigate the plots in daytime
4) On farm facilities	<p>Vinyl houses for 0.01ha each will be prepared by the Project. Vinyl house : 7m * 15m with 3/4" PVC pipes and vinyl sheets Water supply : One tap at each plot for manual watering</p>

Table 8.6.3 (10) Project Cost of Mini-Irrigation Project in Palestina

Items		Q'ty	unit	Cost (Q)	Cost (Yen)
Conduction pipe				94,000	1,457,000
	PVC pipe 3" 160PSI	790.00	m		
	PVC pipe 3" 250PSI	180.00	m		
	Galvanized Iron pipe 3"	630.00	m		
Distributary pipe -Cabrera				13,000	201,500
	PVC pipe 1.5" 160PSI	1,500.00	m		
Distributary pipe -Diaz				18,000	279,000
	PVC pipe 1.5" 160PSI	2,000.00	m		
Pipe Miscellaneous			LS	59,000	914,500
	Sub-total			184,000	2,852,000
Pump & Pump House			LS	183,000	2,836,500
	Pump (4 lit/s) including valve etc.				
	Pump House (3*4m)				
	Pumping Pit				
Upper Tank (180m3)			LS	162,000	2,511,000
	Sub-total			345,000	5,347,500
Vinyl House			LS	368,000	5,704,000
	Vinyl house: material & supervision	76.00	no		
	Sub-total			368,000	5,704,000
Construction Supervision (incl. Control Survey)			LS	33,000	511,500
Miscellaneous Works			LS	57,000	883,500
	concrete meter box (0.3*0.3*0.2m)	76.00	nos		
	Small Valve	76.00	nos		
	Water Meter	76.00	nos		
	Aqueduct (L=24m) beside Pump house	1.00	LS		
	Sub-total			57,000	883,500
	Total			983,000	15,236,500
	Price Escalation and Contingency 20%			197,000	3,053,500
	Total-(1)			1,180,000	18,290,000

(2) Cost for training

Items		Q'ty	unit	Cost (Q)	Cost (\)
	Personnel charge	45.00	days		
	Fuel and other expenditures		LS		
	Organization training		LS		
	Others		LS		
	Total-(2)			48,000	744,000
	Total (1+2)			1,228,000	19,034,000

(3) Cost for initial agriculture input

	Seeds, pesticide and fertilizer	3.00	ha		
	Water charge	3.00	ha		
	Total-(3)			143,000	2,216,500

Exchange Rate Q.1.0 = Yen 15.5

Table 8.6.3 (11) Implementation Schedule : Mini-Irrigation in Palestina de Los Altos

Items	2001			2002												2003					
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
a. Selection of Contractor for the implementation																					
Contractor Selection and Contracting Works																					
Contract with Contractor (Commencement of the		★																			
b. Preparatory Works																					
Plots Survey and Plots Registration																					
Checking Survey Works																					
Definitive Design Works																					
c. Construction Stage																					
Preparation and Delivery of the Materials																					
Pump House and Suction Pit																					
Pump Installation and Miscellaneous Works																					
Upper Tank																					
Conduction Pipes																					
Distributary Pipes																					
Valves / Filters / Regulator Installation etc.																					
On-farm facilities (Vinyl house and drip system)																					
d. Monitoring and Evaluation																					
Capacity and Lecture for O&M																					
Initial Condition Survey																					
Interim Survey																					
Monitoring and Evaluation Survey																					
e. Cultivation																					
Ordering Seedlings																					
Transplanting																					
Crop Growing Management																					
Harvesting																					
f. Agricultural Technical Assistance																					
Decide on Marketing channel (negotiate and make agreement with company)																					
Make arrangements for agricultural loan (BanRural or Contract growing)																					
Make arrangements for technical transfer (INTECAP, ICTA, MAGA)																					
Technical Transfer on Crop Management																					
Technical Transfer on Irrigation Water Management																					

Table 8.6.3 (12) Cost and Benefit Flow : Mini-Irrigation in Palestina de Los Altos

(unit : Q.)

Year	Cost				Benefit	Net Cash Flow
	Capital Cost *1	O&M Cost*2	Replacement Cost*3	Total Cost		
1	1,303,850	80,070		1,383,920	362,813	-1,021,107
2		80,070		80,070	507,938	427,868
3		80,070		80,070	653,063	572,993
4		80,070		80,070	725,625	645,555
5		80,070	412,500	492,570	725,625	233,055
6		80,070		80,070	725,625	645,555
7		80,070		80,070	725,625	645,555
8		80,070		80,070	725,625	645,555
9		80,070		80,070	725,625	645,555
10		80,070	725,796	805,866	725,625	-80,241
11		80,070		80,070	725,625	645,555
12		80,070		80,070	725,625	645,555
13		80,070		80,070	725,625	645,555
14		80,070		80,070	725,625	645,555
15		80,070	412,500	492,570	725,625	233,055
16		80,070		80,070	725,625	645,555
17		80,070		80,070	725,625	645,555
18		80,070		80,070	725,625	645,555
19		80,070		80,070	725,625	645,555
20		80,070	725,796	805,866	725,625	-80,241
21		80,070		80,070	725,625	645,555
22		80,070		80,070	725,625	645,555
23		80,070		80,070	725,625	645,555
24		80,070		80,070	725,625	645,555
25		80,070	412,500	492,570	725,625	233,055
26		80,070		80,070	725,625	645,555
27		80,070		80,070	725,625	645,555
28		80,070		80,070	725,625	645,555
29		80,070		80,070	725,625	645,555
30		80,070		80,070	725,625	645,555

EIRR : 49.6%

Note:

*1 : Capital cost includes labor cost for the unskilled labors provided by the beneficiaries.

*2 : O & M Cost consists of electric charge, cost for lubricant, payment for pump operators and plumber, other administrative consump

*3 : Replacement Cost :

Green house and drip system ; 50% will be replaced in every 5 years.

Pump replacement ; every 10 years

Pipe system ; 50% of the pipeline needs to be replaced in every 10 years.