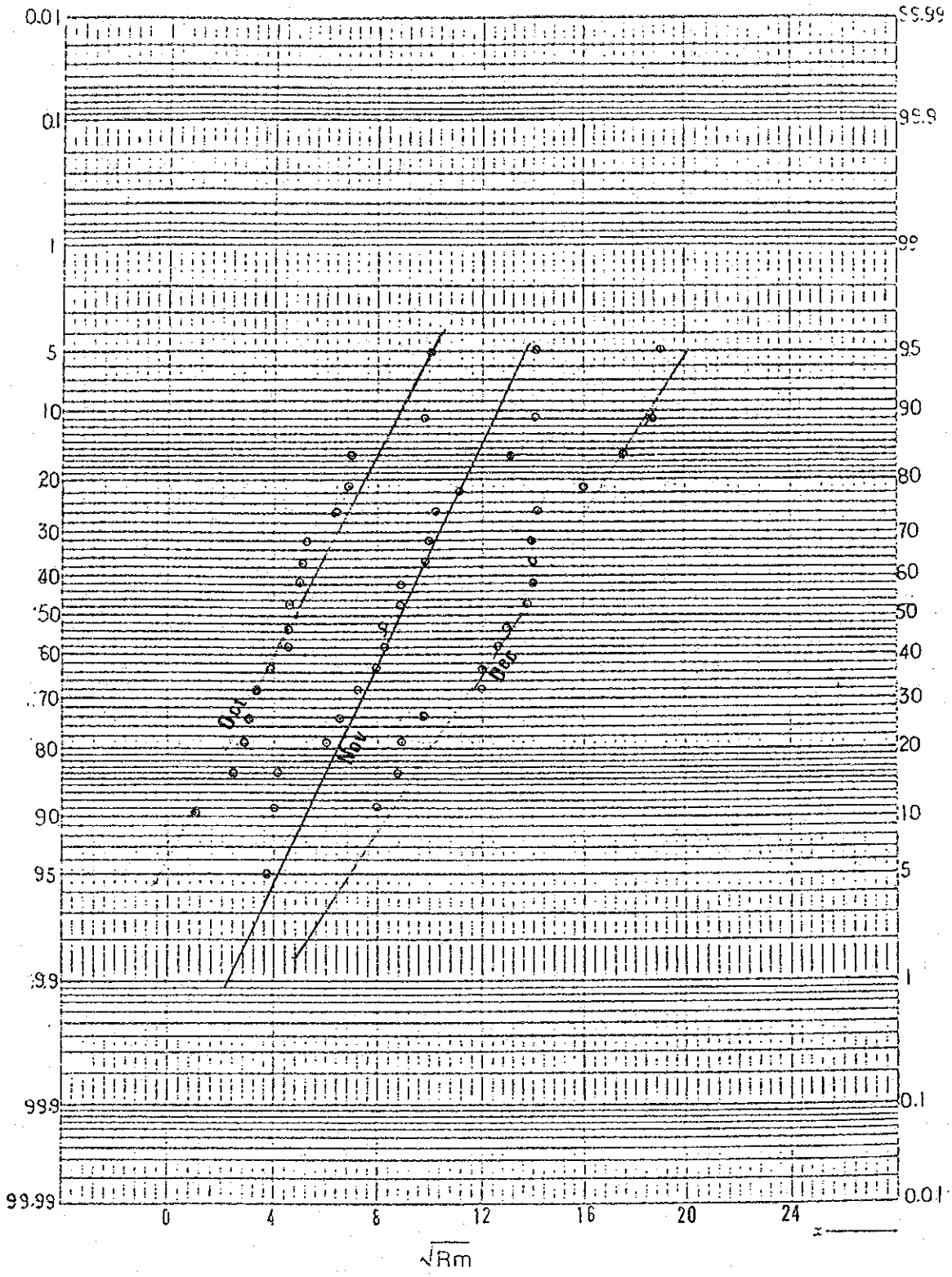


Fig. E·4·6·3 (1) Rainfall probabilty calculation

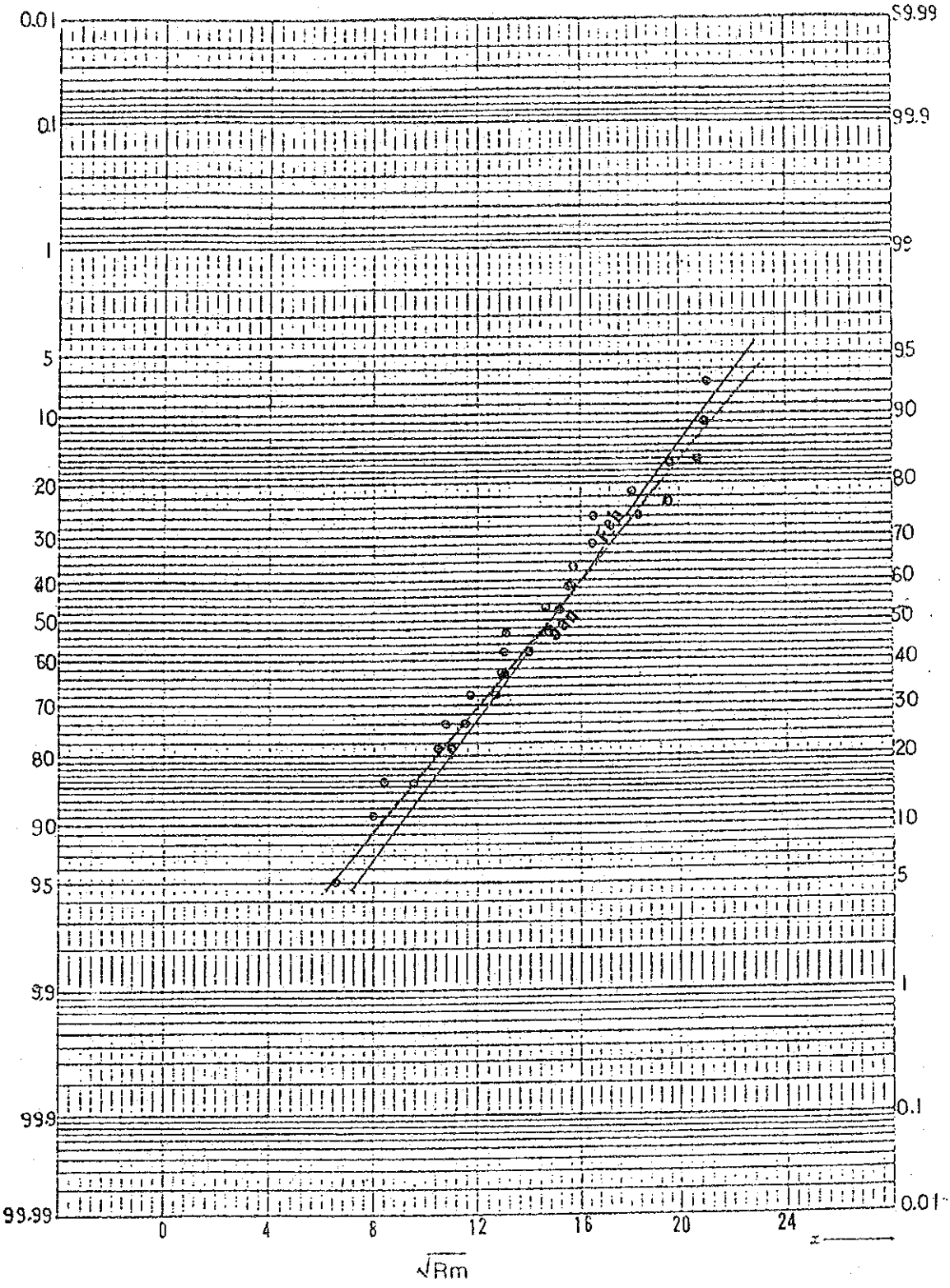


Fig. E-4-6-3 (2) Rainfall probabilty calculation

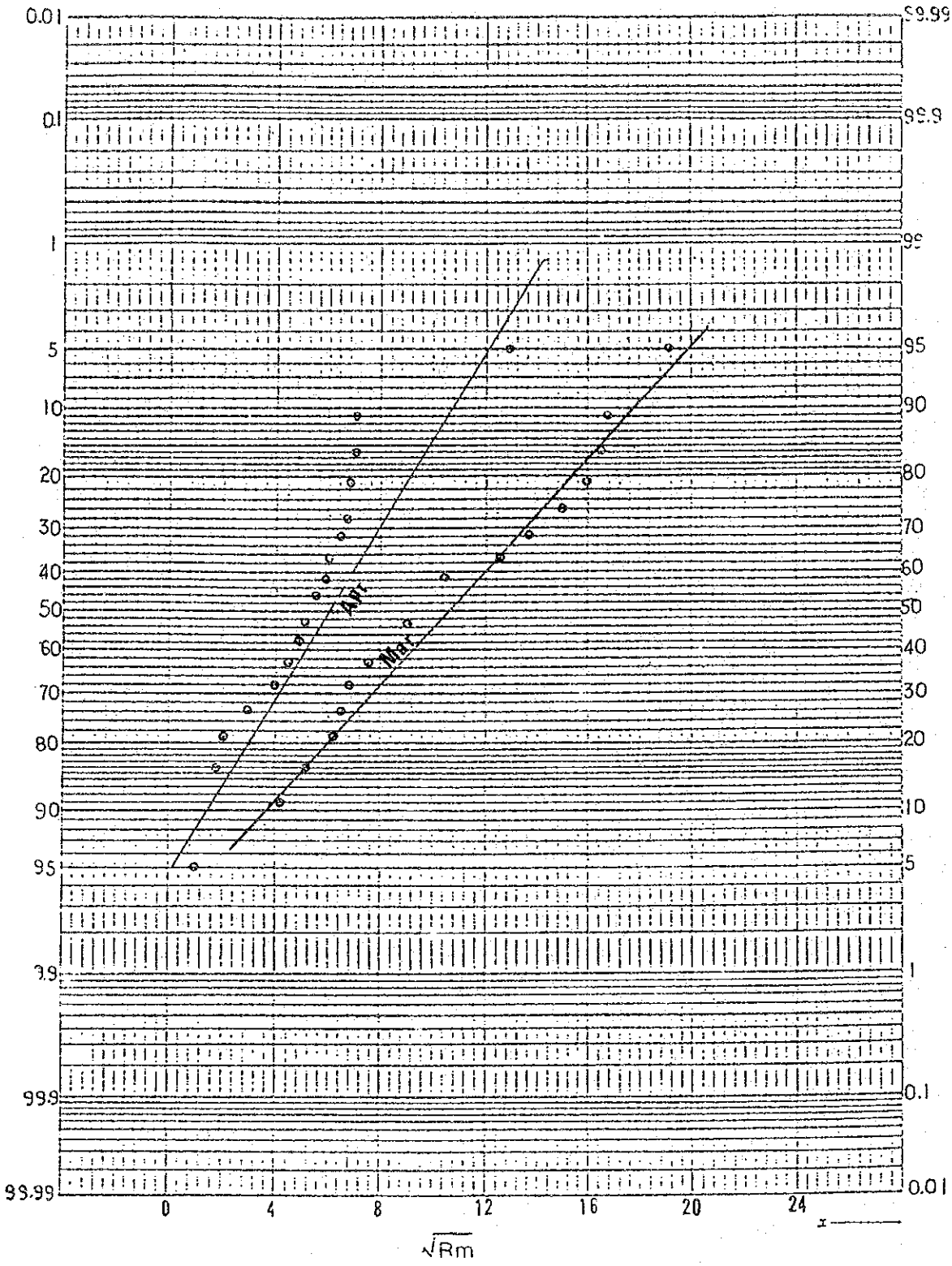


Fig. E·4·6·3 (3) Rainfall probabilty calculation

ANNEX F

FACILITY PLANNING

ANNEX F FACILITIES PLANNING

F-1 Nyakomba Dam Planning (Alternative Plan)

F-2 Cost Comparison of water Alternative Plans

Table F.5.1.1 LIST OF PUMP DIMENSION

		Block				
		A	B	C	D	E
Irrigable Area	(ha)	115	128	140	203	94
Irrigation Water Water	(ℓ /s)	230	256	281	407	189
Pump Discharge	(m^3/min)	16.3	18.1	19.7	28.7	13.4
No. of Pump Units	(Unit)	4	4	4	4	4
Discharge of One Pump Unit	(m^3/min)	5.44	6.06	6.44	9.62	4.46
Pump Diameter	(mm)	ϕ250	ϕ250	ϕ250	ϕ300	ϕ200
Total Pump Head	(m)	52	69	77	69	52
Motor Output	(kw)	96.8	120	146.8	182.5	69.7
Generator Output	(kVA)	400	575	700	850	325

Note : Pump units includes one stand-by unit.

Table F.5.2.1 HYDRAULIC CALCULATION (1/2)

< BLOCK A >

ROUTE	L (m)	Q (m^3/s)	ϕ (mm)	V (m/s)	Loss(m)/h_f
(A-1)					
0	0	-	-	-	-
+ 490	490	0.272	ϕ500	1.386	2.74
+ 2,920	2,430	0.248	ϕ200	1.263	13.22
(A-2)					
0	-		-	-	-
+ 540	540	0.024	ϕ500	0.764	2.55

< BLOCK B >

ROUTE	L (m)	Q (m^3/s)	ϕ (mm)	V (m/s)	Loss(m)/h_f
(B-1)					
0	-		-	-	-
+ 180	180	0.303	ϕ500	1.544	1.23
+ 1,390	1,210	0.135	ϕ400	1.074	5.95
+ 1,630	240	0.090	ϕ350	0.936	0.58
(B-2)					
0	-	-	-	-	-
+ 1,590	1,590	0.168	ϕ400	1.337	10.82
(B-3)					
0	-	-	-	-	-
+ 590	590	0.045	ϕ250	0.916	3.46

< BLOCK C >

ROUTE	L (m)	Q (m^3/s)	ϕ (mm)	V (m/s)	Loss(m)/h_f
(C-1)					
0	-	-	-	-	-
+ 635	635	0.332	ϕ500	1.691	5.14
+ 650	15	0.221	ϕ450	1.390	0.10
+ 1,940	1,290	0.110	ϕ350	1.143	7.69
(C-2)					
0	-	-	-	-	-
+ 440	440	0.111	ϕ350	1.154	2.67
(C-3)					
0	-	-	-	-	-
+ 530	530	0.111	ϕ350	1.154	3.21

Table F.5.2.1 HYDRAULIC CALCULATION (2/2)

< BLOCK D >

ROUTE	L (m)	Q (m^3/s)	ϕ (mm)	V (m/s)	Loss(m)/h_f
(D-1)					
0	-	(0.481)	-	-	-
+ 1,650	1,650	0.481	ϕ700	1.250	5.15
+ 2,110	460	0.290	ϕ500	1.477	2.90
(D-2)					
0	-	-	-	-	-
+ 90	90	0.191	ϕ450	1.201	0.44

< BLOCK E >

ROUTE	L (m)	Q (m^3/s)	ϕ (mm)	V (m/s)	Loss(m)/h_f
(E-1)					
0	-	-	-	-	-
+ 720	720	0.223	ϕ450	1.403	4.66
+ 1,390	670	0.103	ϕ350	1.071	3.53
(E-2)					
0	-	-	-	-	-
+ 20	20	0.120	ϕ400	0.955	0.07

Table F.5.3.1 ELEVATION OF NIGHT STORAGE DAM

Night Storage Dam (NSD)	Irrigable Net Area	Elevation of Highest Plot	Elevation of Proposed Site
	(ha)	(m)	(m)
A-1	10	EL. 835.0	EL. 840.0
-2	105	846.0	852.0
B-1	38	849.0	859.0
-2	71	845.0	851.0
-3	19	850.0	853.0
C-1	46	852.0	856.0
-2	47	825.0	825.0
-3	47	840.0	843.0
D-1	122	849.0	858.0
-2	81	851.0	857.0
E-1	43	831.0	835.0
-2	51	822.0	822.0

Table F.5.3.2 NIGHT STORAGE DAM DIMENSION

NIGHT STORAGE DAM (NSD)	Irrigable Area (ha)	Discharge (m^3/s)	Actual Storage Volume (m^3)	Design Volume (m^3)	DIMENSION (L×B×H)
< BLOCK A >					
NSD - A1	10	0.024	86.4	110	7.5× 7.5× 2.0
A2	105	0.248	892.8	1,080	23.3×23.3× 2.0
< BLOCK B >					
NSD - B1	71	0.168	604.8	730	19.1×19.1× 2.0
B2	19	0.045	162.0	200	10.0×10.0× 2.0
B3	38	0.090	324.0	390	14.0×14.0× 2.0
< BLOCK C >					
NSD - C1	46	0.110	396.0	480	15.5×15.5× 2.0
C2	47	0.111	399.6	480	15.5×15.5× 2.0
C3	47	0.111	399.6	480	15.5×15.5× 2.0
< BLOCK D >					
NSD - D1	122	0.290	1,044.0	1,260	25.1×25.1× 2.0
D2	81	0.191	687.6	830	20.4×20.4× 2.0
< BLOCK E >					
NSD - E1	43	0.103	370.8	445	15.0×15.0× 2.0
E2	51	0.120	432.0	518.4	16.2×16.2× 2.0

Table F.5.4.1 LIST OF IRRIGATION CANAL LENGTH (1/2)

< BLOCK A >

Route	Length (m)	Road Crossing Work (place)
IC - A1	1,780	2
A2	740	-
A3	880	2
A3-1	380	
A4	1,080	2
A5	1,400	1
A6	800	-
Sub Total	7,060	7

< BLOCK B >

Route	Length (m)	Road Crossing Work (place)
IC - B1	920	2
B2	880	2
B3	1,500	1
B4	280	1
B5	920	1
B6	420	-
B7	1,280	1
B8	820	-
Sub Total	7,020	6

< BLOCK C >

Route	Length (m)	Road Crossing Work (place)
IC - C1	1,280	2
C2	460	1
C3	1,180	2
C4	480	1
C5	780	-
C6	480	1
C7	220	1
C8	320	-
C9	260	-
C10	620	1
C11	260	-
C12	940	2
C13	720	2
C14	980	1
C15	580	1
Sub Total	9,560	15

Table F.5.4.1 LIST OF IRRIGATION CANAL LENGTH (2/2)

< BLOCK D >

Route	Length (m)	Road Crossing Work (place)
IC - D1	1,700	1
D2	2,140	1
D3	520	-
D4	1,980	1
D5	1,300	1
D6	1,140	1
D7	1,040	1
Sub Total	9,820	6

< BLOCK E >

Route	Length (m)	Road Crossing Work (place)
IC - B1	860	1
B2	840	1
B3	480	-
B4	500	-
B5	960	1
B6	740	-
B7	540	-
Sub Total	4,920	3

Table F.5.4.2 LIST OF DRAINAGE CANAL LENGTH (1/2)

< BLOCK A >

Route	Length (m)	Road Crossing Work (place)
DC - A1	780	1
A2	1,180	1
A3	940	1
A3-1	240	-
A4	500	-
A5	520	-
A6	580	1
A7	620	1
Sub Total	5,360	5

< BLOCK B >

Route	Length (m)	Road Crossing Work (place)
DC - B1	640	-
B2	820	1
B3	980	1
B4	440	-
B5	1,060	-
B6	760	-
B7	1,280	-
B8	1,420	1
Sub Total	7,400	3

< BLOCK C >

Route	Length (m)	Road Crossing Work (place)
DC - C1	600	1
C2	500	1
C3	600	-
C4	900	-
C5	580	-
C6	980	1
C7	240	-
C8	920	1
C9	840	1
C10	340	1
C11	600	-
Sub Total	7,100	6

Table F.5.4.1 LIST OF DRAINAGE CANAL LENGTH (2/2)

< BLOCK D >

Route	Length (m)	Road Crossing Work (place)
DC - D1	960	-
D2	1,320	-
D3	480	-
D4	660	-
D5	1,740	-
D6	1,120	-
D7	1,440	-
D8	1,080	-
Sub Total	8,800	-

< BLOCK E >

Route	Length (m)	Road Crossing Work (place)
DC - B1	540	-
B2	600	-
B3	600	-
B4	900	-
B5	960	1
B6	940	-
B7	500	-
Sub Total	5,040	1

Table F.5.5.1 LIST OF ROAD LENGTH

< BLOCK A >

Rout	Length
TR - A	540
FR - A1	440
A2	620
A3	520
A4	440
A5	240
A6	300
A7	420
Sub Total	2,980

< BLOCK B >

Rout	Length
TR - B	240
FR - B1	240
B2	720
B3	1,040
B4	1,500
B5	1,380
Sub Total	4,880
Canal/River Crossing Work	1 (B5)

< BLOCK C >

Rout	Length
TR - C	220
FR - C1	540
C2	900
C3	520
C4	680
C5	280
C6	780
C7	540
Sub Total	4,240

< BLOCK D >

Rout	Length
TR - D	3,280
FR - D1	1,220
D2	2,220
D3	1,480
D4	1,180
D5	1,160
Sub Total	7,260
Canal/River Crossing Work	2 (D)

< BLOCK E >

Rout	Length
TR - E	3,640
FR - E1	400
E2	480
E3	700
E4	1,140
E5	1,180
Sub Total	3,900
Canal/River Crossing Work (Choo River)	1

Total Length

TR	:	7,920 m
FR	:	23,260 m
Canal/River Crosing Work	:	4 places

Note) TR: Trunk Road B=5m
FR: Farm Road B=3m

F-1 Nyakomba Dam Planning (Alternative Plan)

(a) Selection of proposed dam site

The proposed dam site on the Nyakomba river is selected at the upper stream point of 1.5km from the Nyakomba bridge near the Nyakomba B.C. after the basin survey. The river elevation is 869.83 meters that is enough height for the proposed irrigation area which are laid out between 820 m and 850 m (SWL).

And houses and farms to be compensated after the dam is completed are few, so the place will be sellected as a suitable dam site.

(b) Rating Curve

The rating curve which are water level - storage volume curve (H-Q curve)" and "water level storage reservoir area curve (H-A curve)" are shown in Figure F.1.

(c) Trial of water balance

Some water balance trial are carried out using the estimated inflow data and the estimated outflow data (required irrigation water) aiming to the examination of irrigable are that is covered by the storaged water, and the confirmation of water level fructuation.

For the examination year of the trial are selected a basic year which is a drought year (1986/87) in return period 10 years and a normal year which is a average rainfall year (1988/89).

The result of these trials are as follows. And these results are shown in Figure F.2 and F.3, and Table F.1.

Trial Year	Total Inflow	Total Outflow (Water Requirement)	Irrigable Area Ratio	Carry Over
	(m^3)	(m^3)	(%)	(m^3)
Basic Year (1986/87)	7,917,000	7,917,000	69	0
Normal Year (1988/89)		11,392,000	100	2,568,000

(d) Designed Dam Dimension

The designed storage volume of the Nyakomba dam is should be based on the outflow volume of 11,392,000 m^3 which is able to cover the all of the proposed area. In final, another extra volume for dead water and others is added to the above effective volume.

Therefore the proposed dam capacity is as below.

The normal full water level is selected to EL 916.4 (SWL) using the rating curve. And the dam crest elevation is decided to EL 920.0 considering a

spillway, freeboad and others.

Therefore, even though a drought year as the basic year realised, the most of all the irrigable area is able to get the irrigation water using the carried over water volume from the previous year.

The dam type is selected from the earth fill dam because there is good soil and rocks for the dam material around the site.

The outline of the proposed dam are as below.

Type of Dam	=	Earth fill dam
Height of Dam	=	50 m
Crest Length	=	560 m
Total Capacity	=	8,000,000 m
Design Flood Discharge	=	360 m^3/s

The long-section of dam axis and cross section are shown in Figure F.4 and F.5.

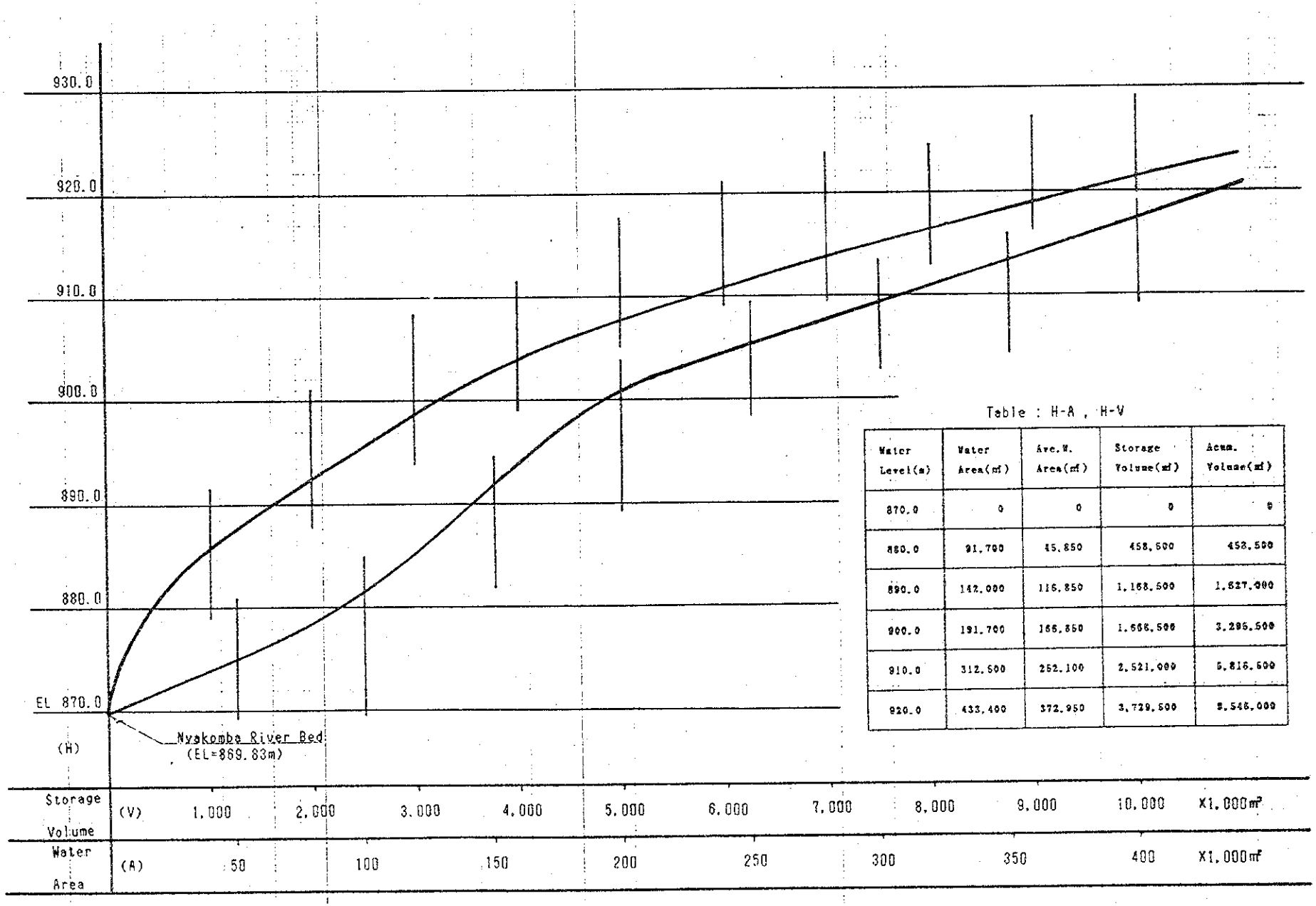


Table : H-A , H-V

Water Level(m)	Water Area(m²)	Ave.W. Area(m²)	Storage Volume(m³)	Accm. Volume(m³)
870.0	0	0	0	0
880.0	91,700	45,850	458,500	458,500
890.0	142,000	116,850	1,168,500	1,627,000
900.0	191,700	166,850	1,668,500	3,295,500
910.0	312,500	252,100	2,521,000	5,816,500
920.0	433,400	372,950	3,729,500	9,546,000

Figure F.1 RATING CURVES OF NYAKOMBA DAM

Figure F.2 FRACTUATION OF RESERVOIR WATER LEVEL (m)

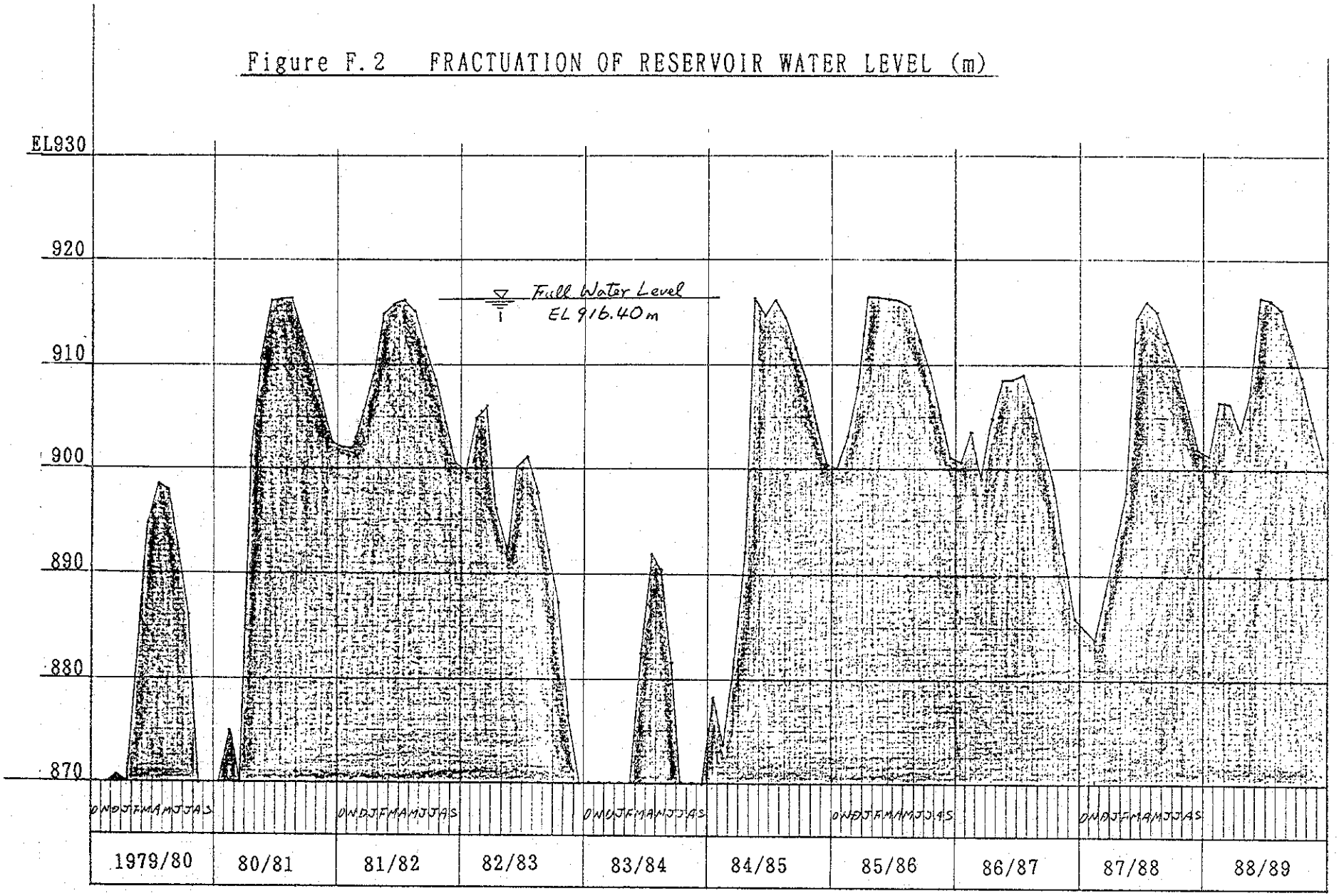
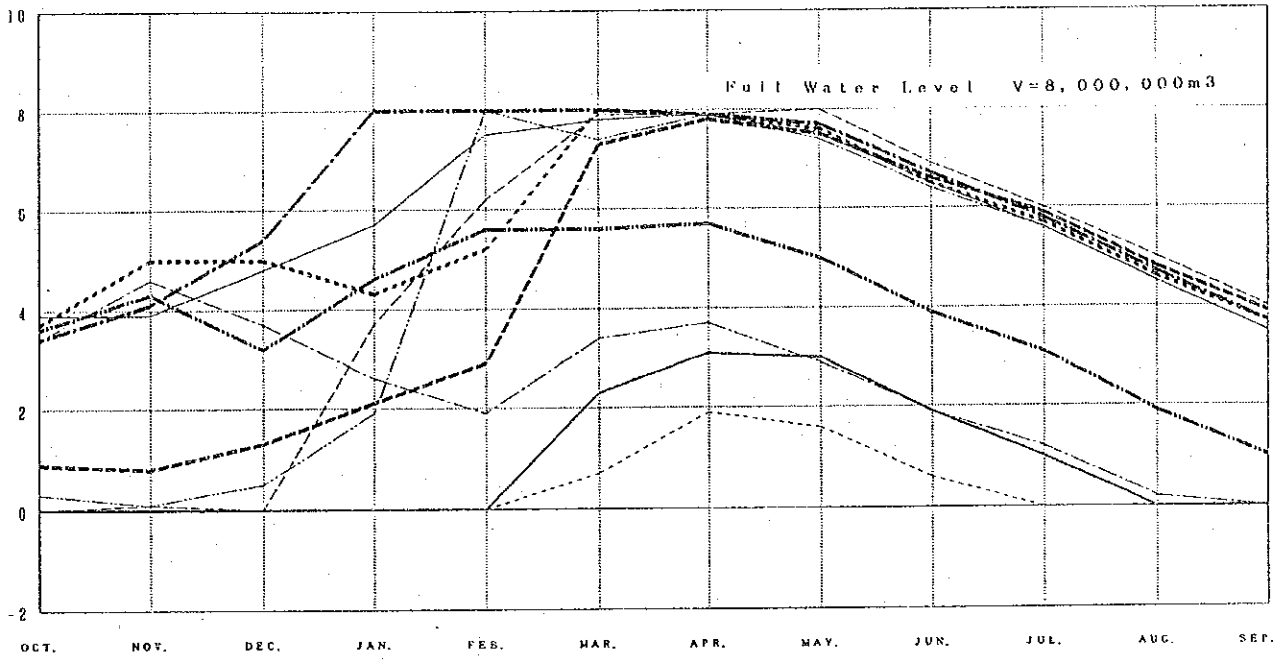
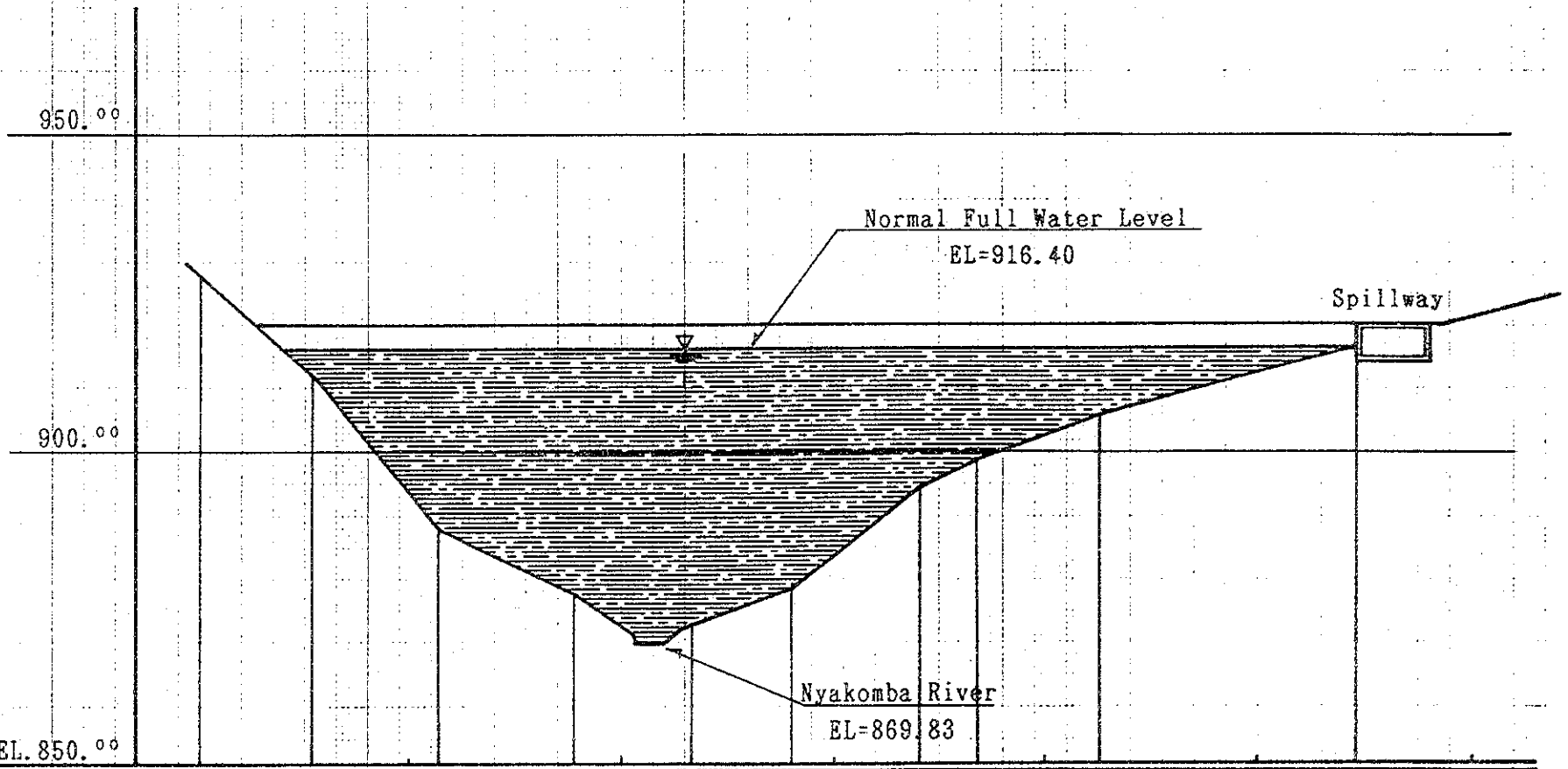


Figure F.3 WATER BALANCE (1979 - 1989)



(Unit : MCM)

	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.
79/80 —	0.0	0.0	0.0	0.0	0.0	2.3	3.1	3.0	1.9	1.0	0.0	0.0
80/81 --	0.0	0.1	0.0	3.7	6.2	7.9	7.9	8.0	6.9	6.0	5.0	4.0
81/82 —	3.9	3.9	4.8	5.7	7.5	7.8	7.9	7.5	6.5	5.6	4.5	3.5
82/83 ---	3.4	4.6	3.7	2.6	1.9	3.4	3.7	2.9	1.9	1.2	0.2	0.0
83/84 ····	0.0	0.0	0.0	0.0	0.0	0.7	1.9	1.6	0.6	0.0	0.0	0.0
84/85 ---	0.3	0.1	0.5	1.9	8.0	7.4	7.9	7.4	6.4	5.6	4.5	3.5
85/86 ---	3.4	4.1	5.4	8.0	8.0	8.0	7.9	7.7	6.7	5.8	4.7	3.7
86/87 ---	3.6	4.3	3.2	4.6	5.6	5.6	5.7	5.0	3.9	3.1	1.9	1.0
87/88 ---	0.9	0.8	1.3	2.1	2.9	7.3	7.8	7.5	6.6	5.9	4.8	3.9
88/89 ---	3.7	5.0	5.0	4.3	5.2	8.0	7.9	7.6	6.5	5.7	4.6	3.7



G.HEIGHT	927.92	911.80	887.54	877.23	872.83	878.12	894.09	898.85	905.73	916.18		
CUM.DIS.	0.0	54.0	114.0	178.0	234.0	280.0	340.0	368.0	426.0	546.0		
INT.DIS.	0.0	54.0	60.0	64.0	56.0	46.0	60.0	28.0	58.0	120.0		
STATION	(No.0)		(No.1)		(No.2)		(No.3)		(No.4)		(No.5)	(No.6)

Figure F.4 LONG SECTION OF NYAKOMBA DAM AXIS (ALTERNATIVE)

V=1/1,000 , H=1/3,000

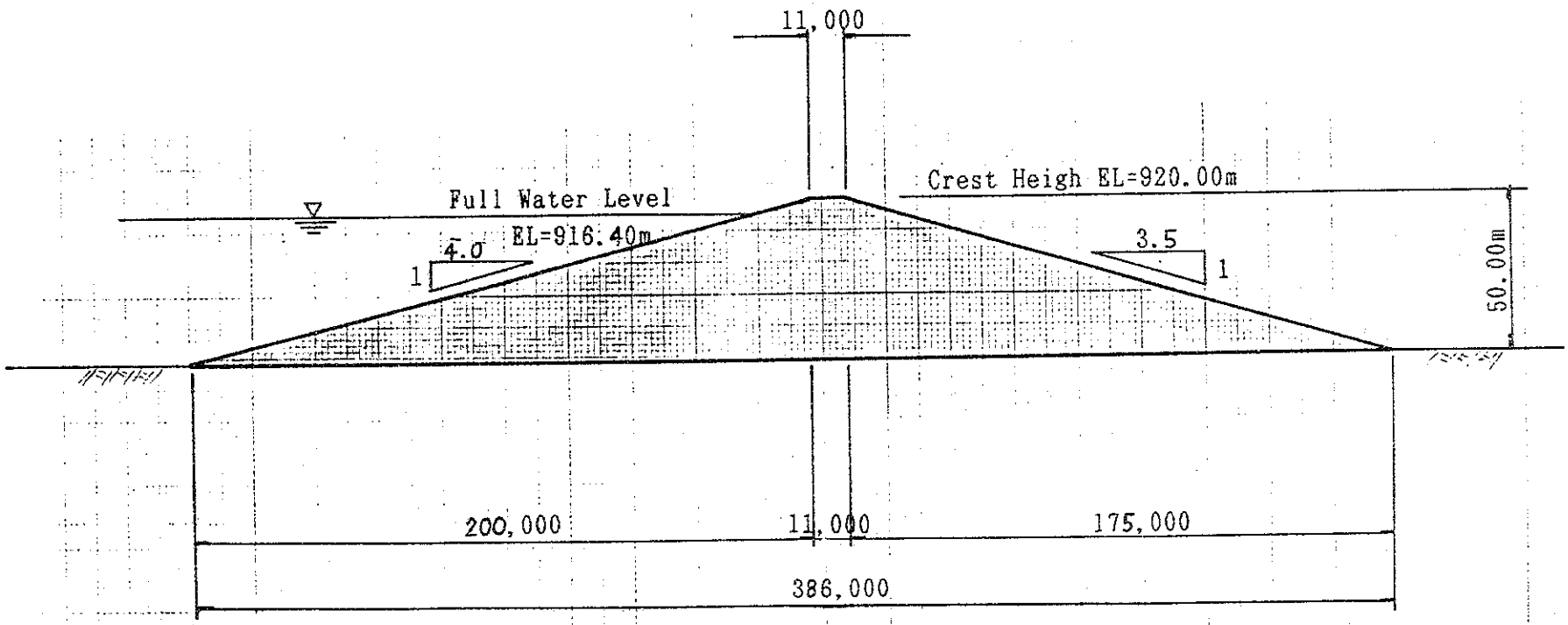


Figure F.5 NYAKOMBA DAM CROSS SECTION
(+215.00)

F-2 Cost Comparison of Water Resources Alternative Plans

Based on the water rosources plan in which two alternative plans are considered, comparative study on construction cost is undertaken below. Tow alternative plans are;

Alternative Plan A : Pumped up water from Gairezi River
Alternative Plan B : Storaged water by Nyakomba dam

1. Alternative Plan A

1) Description of Facility and Equipment

-Pumping Station

-Pump type : Double suction volute pump,
motor operated using generater

-Number of pumping station : 5 sta.

-Dimension and discharge of pump :

Block-A P.S.	ϕ250x4, 400KVAx1,	5.44Cu.m/min
Block-B P.S.	ϕ250x4, 575KVAx1,	6.06Cu.m/min
Block-C P.S.	ϕ250x4, 700KVAx1,	6.64Cu.m/min
Block-D P.S.	ϕ300x4, 850KVAx1,	9.62Cu.m/min
Block-E P.S.	ϕ200x4, 325KVAx1,	4.46Cu.m/min

-Other facility (for each pumping station) :
Fuel tank(4500L), crane,pipes and valves, suction pit, revetment, pumphouse, generator house, operator's quarter (2 x 40㎡)

-Water conveyance pipeline

-Pipe material : Steel pipe

-Pipe dimension and length

ϕ700	L=1.73km	ϕ350	L=3.32km
ϕ500	L=4.41km	ϕ250	L=0.62km
ϕ450	L=0.87km	ϕ200	L=0.57km
ϕ400	L=2.96km	(Total	L=14.48km)

2. Alternative Plan B

1) Description of Facility

-Storage Dam

-Dam type : Homogeneous type earth fill dam

-Dam height : H=50m

-Crest length : L1=560m

-Storage capacity : 8,000,000 Cu.m

-Design flood discharge : 360 Cu.m/s

-Crest width : B=11m

-River bed width : L2=10m

-Upstream bank slope : 1:m=1:4.0

-Downstream bank slope : 1:n=1:3.5

-Embankment volume :

V=1/2xBxHx(L1+L2)+1/6(m+n)xH2 x(L1+2xL2)

=1/2x11x50x(560+10)+1/6(4.0+3.5)x502 x(560+2*10)

=1,970,000 Cu.m

-Water conveyance canal

-Canal type : Trapezoid shape w/ concrete lining and mesh wire

-Dimension and length :

Type-1	BxH=0.70m x 0.95m,	L=3.5km
Type-2	BxH=0.60m x 0.85m,	L=5.2km
Type-3	BxH=0.45m x 0.70m,	L=6.7km
Type-4	BxH=0.65m x 0.90m,	L=3.0km
Type-5	BxH=0.55m x 0.80m,	L=2.7km
Type-6	BxH=0.35m x 0.60m,	L=3.7km

-Other facility : Road crossing culvert (L=7m), quarter for gate operators (2 x 40㎡)

3.Construction Cost

Description	Unit	Alternative-A Q'ty	U.C.	Amount	Alternative-B Q'ty	U.C	Amount
			(Z$)	(,000Z$)		(Z$)	(,000Z$)
-Preliminary and general	L.S	1	--	1,916	1	--	7,834
-Intake pumping station*1	No	5	--	9,678	--	--	--
-Water conveyance pipeline *1	Km	14.48	--	5,945	--	--	--
-Night storage dam *1	No	12	--	596	12	--	596
-Storage dam *2(embankment)	Cu.m	--	--	--	1,970,000	14.4	28,368
-Water conveyance canal(T-1)	m	--	--	--	3,500	118	413
-do- (T-2)	m	--	--	--	5,200	105	546
-do- (T-3)	m	--	--	--	6,700	82	549
-do- (T-4)	m	--	--	--	3,000	112	336
-do- (T-5)	m	--	--	--	2,700	100	270
-do- (T-6)	m	--	--	--	3,700	70	259
(Sub-total)				18,135			39,171
-Other works *3				12,067			12,067
-Other cost*4				6,124			6,124
(Total)				36,326			57,362

Note: *1: Refer to Annex H for construction cost.

*2: Unit construction cost of dam embankment is based on other dam projects in Zimbabwe.

*3: Include in-field works and operation/management facility of which cost is taken from Annex H and equal to both plans.

*4: Include engineering and administration cost, physical contingency, and compensation which are equal to both plans.

ANNEX G

PROJECT MANAGEMENT AND IMPLEMENTATION

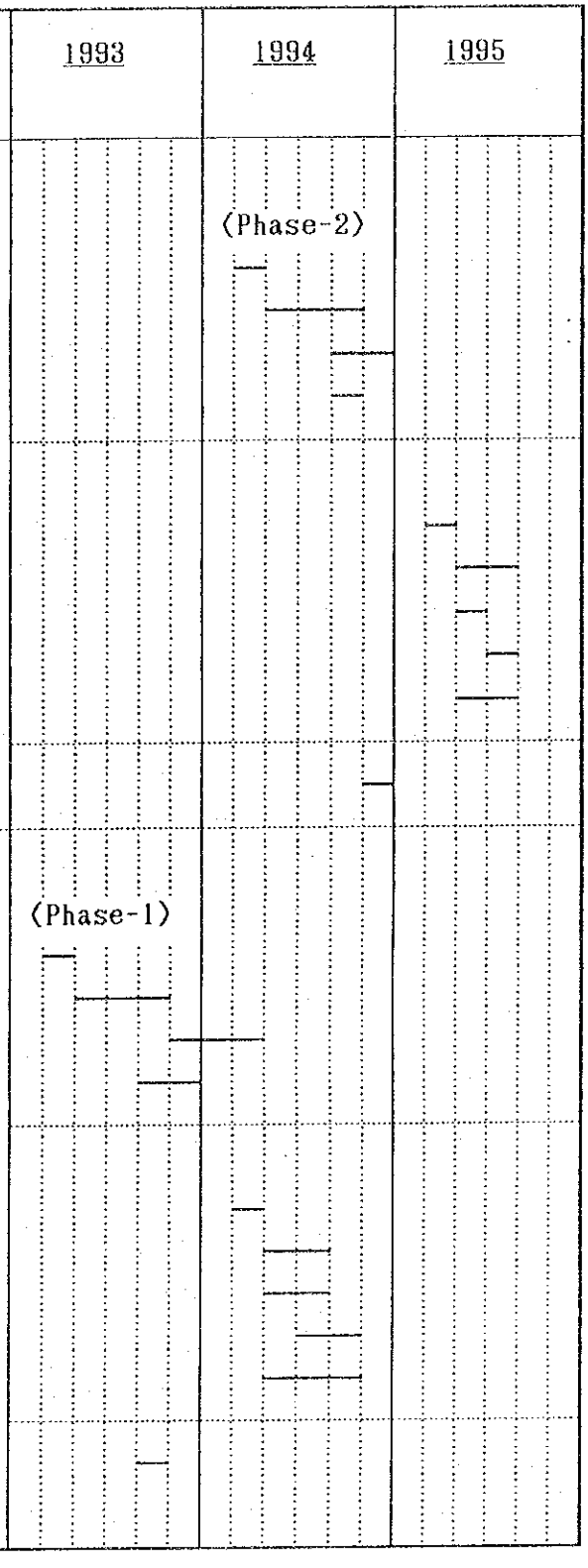
ANNEX G PROJECT MANAGEMENT AND IMPLEMENTATION

FIGURE G.1 CONSTRUCTION TIME SCHEDULE

FIGURE G.2 SCHEDULE OF CONSULTING SERVICES

FIGURE G.1 CONSTRUCTION TIME SCHEDULE (1/3)

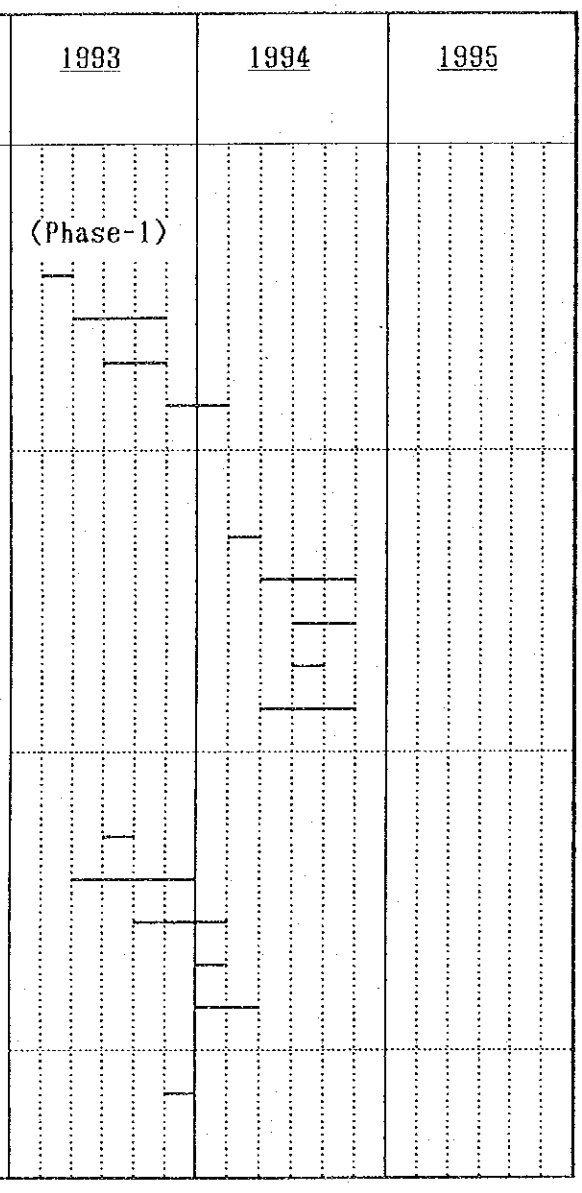
Description	Unit	Q'ty
1.Block-A		
1) Intake & Water Conveyance Facility		
- Temporary Works	L.S	-
- Intake Pumping Sta.	sta.	1
- Water Conveyance Pipeline	km	3.6
- Night Storage Dam	cum	1170
2) In-Field Works		
- Temporary Works	L.S	-
- Irrigation Canal	km	7.4
- Drainage Canal	km	5.4
- Farm Road	km	3.5
- Land Grading	ha	23
3) Marketing Facility	no	2
2.Block-B		
1) Intake & Water Conveyance Facility		
- Temporary Works		L.S
- Intake Pumping Sta.	sta.	1
- Water Conveyance Pipeline	km	4.1
- Night Storage Dam	cum	1310
2) In-Field Works		
- Temporary Works	L.S	-
- Irrigation Canal	km	7.4
- Drainage Canal	km	7.4
- Farm Road	km	5.1
- Land Grading	ha	26
3) Marketing Facility	no	2



(Contin.)

FIGURE G.1 CONSTRUCTION TIME SCHEDUL (2/3)

Description	Unit	Q'ty
3.Block-C		
1) Intake & Water Conveyance Facility		
- Temporary Works	L.S	-
- Intake Pumping Sta.	sta.	1
- Water Conveyance Pipeline	km	3.5
- Night Storage Dam	cum	1440
2) In-Field Works		
- Temporary Works	L.S	-
- Irrigation Canal	km	10.0
- Drainage Canal	km	7.1
- Farm Road	km	4.5
- Land Grading	ha	28
3) Project Management Office		
- Temporary Works	L.S	-
- Procurement of Equipment	L.S	-
- Building Works	sqm	1260
- Water Supply Facility	no	1
- Fencing/Motor Pool/Gate	L.S	-
4) Marketing Facility	no	2



(Contin.)

FIGURE G.1 CONSTRUCTION TIME SCHEDUL (3/3)

Description	Unit	Q'ty
4.Block-D		
1) Intake & Water Conveyance Facility		
- Temporary Works	L.S	-
- Intake Pumping Sta.	sta.	1
- Water Conveyance Pipeline	km	2.3
- Night Storage Dam	cum	2090
2) In-Field Works		
- Temporary Works	L.S	-
- Irrigation Canal	km	9.7
- Drainage Canal	km	8.8
- Farm Road	km	10.5
- Land Grading	ha	41
3) Marketing Facility	no	2
5.Block-E		
1) Intake & Water Conveyance Facility		
- Temporary Works	L.S	-
- Intake Pumping Sta.	sta.	1
- Water Conveyance Pipeline	km	1.5
- Night Storage Dam	cum	970
2) In-Field Works		
- Temporary Works	L.S	1
- Irrigation Canal	km	5.2
- Drainage Canal	km	5.0
- Farm Road	km	7.5
- Land Grading	ha	19
3) Marketing Facility	no	2

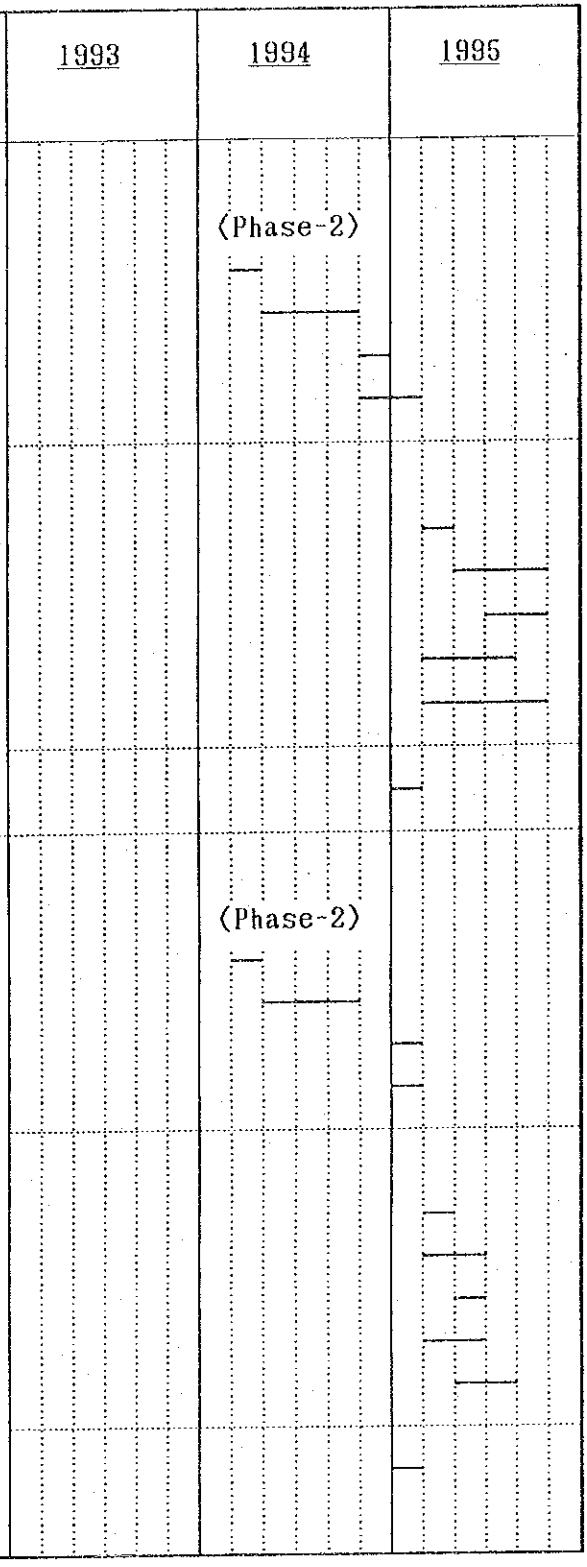
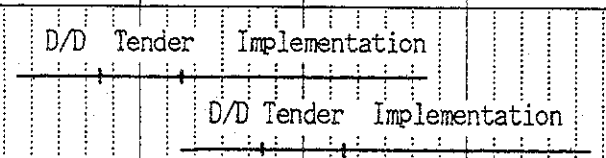


FIGURE G.2 SCHEDULE OF CONSULTING SERVICES



Description	Man-Month Required			
	Phese-1		phas 2	
	M-M	FE/LE	M-M	FE/LE
1. Detailed Design Stage				
- Project manager	6	FE.	6	FE.
- Irrigation engineer	5	FE.	5	FE.
- Design engineer	5	LE.	5	LE.
- Mechanical engineer	4	LE.	4	LE.
- Cost estimater	3	LE.	3	LE.
- Spec writer, Tender specialist	3	LE.	3	LE.
Sub-Total	26		26	
2. Tender Stage				
- Tender specialist,	6	FE.	6	FE.
Sub-Total	6		6	
3. Construction Supervision Stage			18	FE.
- Resident engineer	18	FE.		
- Specialist as required	3	FE.	3	FE.
Sub-Total	21		21	
Total	53	FE. 38 LE. 15	53	FE. 38 LE. 15

NOTE: FE.: Foreign Engineer, LE.: Local Engineer

ANNEX H

COST ESTIMATION

ANNEX H COST ESTIMATE

TABLE H.1 UNIT CONSTRUCTION RATE (1/2)

(Unit:Z$)

Description	Unit	F/C	L/C	Total	Remark
Reinforced concrete	Cu.m	190	280	470	210kg/Sq.cm
Plain concrete	Cu.m	100	150	250	160Kg/Sq.cm
Lining concrete(w/meshwire)	Cu.m	140	200	340	
Stone masonry	Cu.m	50	80	130	
Excavation (Structure)	Cu.m	5	3	8	
-do- (Trench)	Cu.m	6	4	10	
-do- (NSD)	Cu.m	6	4	10	
-do- (Rock)	Cu.m	60	25	85	
Backfill	Cu.m	1.5	5	6.5	
Sand bed for pipes	Cu.m	5	25	30	
Clearing and grubbing	Ha	4,200	1,800	6,000	
Stripping & back-spreading	Cu.m	4.8	3.2	8	
Stripping (waste)	Cu.m	2.4	1.6	4	
Fill/Embankment	Cu.m	4	2.5	6.5	
Sodding	Sq.m	-	5	5	
Land grading/levelling,	Ha	480	320	800	
Pipelaying (S.P) ϕ 700	m	5	5	10	
-do- ϕ 500	m	4	4	8	
-do- ϕ 400	m	4	4	8	
-do- ϕ 300	m	3	3	6	
-do- ϕ 200	m	3	3	6	
Irrigation canal					
Type - 1 (300 x 250)	m	10	16	26	Concrete lining
Type - 2 (300 x 300)	m	12	18	30	-do-
Type - 3 (300 x 350)	m	14	20	34	-do-
Type - 4 (300 x 400)	m	15	23	38	-do-
Type - 5 (300 x 450)	m	16	24	40	-do-
Type - 6 (300 x 500)	m	18	26	44	-do-
Drop structure	No	10	30	40	H=150mm
Trunk farm road	m	12	18	30	w=5m,gravel
Secondary farm road	m	8	12	20	w=3m,gravel

(Contin.)

TABLE H.1 UNIT CONSTRUCTION RATE (2/2)

(Unit:Z$)

Description	Unit	F/C	L/C	Total	Remark
Access road	m	12	18	30	w=5m,gravel
Road crossing culvert	No	700	700	1,400	L=7m,RC φ600
Fencing (wire mesh)	m	20	45	65	
-do- (barbed wire)	m	3	7	10	
Entrance gate	No	450	550	1,000	
Office building	Sq.m	240	360	600	
Warehouse, Workshop	Sq.m	180	270	450	
Staff quarter	Sq.m	200	500	700	
Pumphouse	Sq.m	250	250	500	
Topo survey	Sqm	0.1	0.4	0.5	
Route survey	Km	300	2,200	2,500	
Boring works	m	200	200	400	
Steel pipe (φ700)	m	460	50	510	Including
-do- (φ500)	m	320	35	355	bend &
-do- (φ450)	m	300	30	330	fittings
-do- (φ400)	m	270	30	300	
-do- (φ350)	m	240	30	270	
-do- (φ250)	m	205	20	225	
-do- (φ200)	m	150	15	165	
Pick-up	No	19,400	5,100	24,500	
Motor cycle	No	5,700	1,430	1,130	125cc
Generator	No	53,000	5,900	58,900	50 KVA
Bulldozer	No	183,000	20,400	203,400	11 ton
Backhoe	No	154,000	17,000	171,000	0.25 Cu.m
Truck	No	59,900	6,600	66,500	4 ton
Loader	No	77,000	8,500	85,500	0.45 Cu.m
Tractor	No	51,300	5,700	57,000	50 HP
Motorized grader	No	154,000	17,000	171,000	
Tow-grader	No	12,800	1,400	14,200	

TABLE H.2 BREAKDOWN OF PROJECT COST (as of Feb 1990)

(Unit: 1,000 Z$)

Description	Block A			Block B			Block C			Block D			Block E			Total		
	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total
1. Construction Cost																		
1-1. Intake & water Conveyance Facility																		
-Preliminary and General	199	192	391	210	200	410	201	194	395	207	193	400	159	161	320	976	940	1,916
-Intake Pumping Station	1,343	478	1,821	1,437	493	1,930	1,489	496	1,985	1,730	527	2,257	1,221	464	1,685	7,220	2,458	9,678
-Water Conveyance Pipeline	1,226	249	1,475	1,206	251	1,457	924	209	1,133	1,112	213	1,325	460	95	555	4,928	1,017	5,945
-Night Storage Dam	51	46	97	69	66	135	71	68	139	71	64	135	46	44	90	308	288	596
(Sub Total)	2,819	965	3,784	2,922	1,010	3,932	2,685	967	3,652	3,120	997	4,117	1,886	764	2,650	13,432	4,703	18,135
1-2. In-Field Works																		
-Preliminary and General	167	172	339	185	189	374	202	210	412	279	285	564	147	155	302	980	1,011	1,991
-Irrigation Canal	140	231	371	138	229	367	168	283	451	182	309	491	86	149	235	714	1,201	1,915
-Drainage Canal	67	65	132	84	83	167	84	82	166	97	96	193	57	57	114	389	383	772
-Farm road	32	48	80	44	66	110	38	58	96	103	153	256	79	118	197	296	443	739
-Land Grading Works	239	146	385	264	162	426	288	177	465	416	256	672	196	120	316	1,403	861	2,264
(Sub Total)	645	662	1,307	715	729	1,444	780	810	1,590	1,077	1,099	2,176	565	599	1,164	3,782	3,899	7,681
1-3. Operation & Management Facility																		
-Preliminary and General	26	38	64	26	38	64	148	244	392	26	38	64	26	38	64	252	396	648
-Project Management Office	--	--	--	--	--	--	1,907	921	2,828	--	--	--	--	--	--	1,907	921	2,828
-Marketing Facility	74	108	182	74	108	182	74	108	182	74	108	182	74	108	182	370	540	910
(Sub Total)	100	146	246	100	146	246	2,129	1,273	3,402	100	146	246	100	146	246	2,529	1,857	4,386
Total of 1	3,564	1,773	5,337	3,737	1,885	5,622	5,594	3,050	8,644	4,297	2,242	6,539	2,551	1,509	4,060	19,743	10,459	30,202
2. Engineering and Adminstration Cost																		
-Administration Cost(3%)	16	144	160	17	152	169	26	233	259	19	177	196	12	110	122	90	816	906
-Engineering Services	226	87	313	339	131	470	339	131	470	226	87	313	226	87	313	1,356	523	1,879
-Investigation Works	10	20	30	10	20	30	11	22	33	11	24	35	10	22	32	52	108	160
Total of 2	252	251	503	366	303	669	376	386	762	256	288	544	248	219	467	1,498	1,447	2,945
3. Physical Contingency(10%)	356	177	533	374	188	562	559	305	864	430	224	654	255	151	406	1,974	1,045	3,019
4. Compensation	0	27	27	0	30	30	0	33	33	0	48	48	0	22	22	0	160	160
Total (1-4)	4,172	2,228	6,400	4,477	2,406	6,883	6,529	3,774	10,303	4,983	2,802	7,785	3,054	1,901	4,955	23,215	13,111	36,326

TABLE H.3 BREAKDOWN OF CONSTRUCTION COST (Block-A)

(1/16)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
1-1. Intake & Water Conveyance Facility									
1-1-1. Preliminary and General	L.S	1	--	--	--	199	192	391	
1-1-2. Intake Pumping Station									
1) River Diversion Workes	L.S	1	--	--	--	17	17	34	5% of 3)
2) Supply of Equipment									
-Pump & motor w/valves	set	4	96,000	10,000	106,000	384.0	40.0	424.0	ϕ250 Include 20% parts
-Generator	set	1	484,000	53,000	537,000	484.0	53.0	537.0	400 KVA - do -
-Fuel tank & pipes	set	2	1,800	1,200	3,000	3.6	2.4	6.0	V=4500 L
-Crane w/accessories	set	1	2,800	1,200	4,000	2.8	1.2	4.0	Mannual type 2ton
-Sand pump	set	1	6,600	400	7,000	6.6	0.4	7.0	
-Steel gate	No	2	51,000	5,000	56,000	102.0	10.0	112.0	2000*2000mm
Sub-total of 2)						983	107	1,090	
3) Installation & Civil Workes									
-Construction of pumphouse	m²	205	250	250	500	51.2	51.3	102.5	
-Installation of equipment	L.S	1	--	--	--	49.1	5.4	54.5	5% of equipment
-Concrete for suction pit	m³	520	190	280	470	98.8	145.6	244.4	
-Revetment	m³	600	50	80	130	30.0	48.0	78.0	
-Excavation (soil)	m³	2,450	5	3	8	12.2	7.4	19.6	
-Excavation (rock)	m³	1,050	60	25	85	63.0	26.3	89.3	
-Backfill	m³	1,200	1.5	5	6.5	1.8	6.0	7.8	
-Fencing	m	170	20	45	65	3.4	7.7	11.1	Wire mesh H=6 feet
-Access road	m	30	12	18	30	0.4	0.5	0.9	W=5m gravel pave
-Operator's quarter	No	2	8,400	19,600	28,000	16.8	39.2	56.0	A=40m²
-Miscelleneous works	L.S	1	--	--	--	16.3	16.6	32.9	5%
Sub-total of 3)						343	354	697	
Total of 1-1-2						1,343	478	1,821	
1-1-3. Water Conveyance Pipeline									
1) Supply of Pipe Material									
-Steel pipe (ϕ700)	m	--	460	50	510	--	--	--	
- -do- (ϕ500)	m	3,070	320	35	355	982.0	108.0	1,090.0	
- -do- (ϕ450)	m	--	300	30	330	--	--	--	
- -do- (ϕ400)	m	--	270	30	300	--	--	--	
- -do- (ϕ350)	m	--	240	30	270	--	--	--	
- -do- (ϕ250)	m	--	205	20	225	--	--	--	
- -do- (ϕ200)	m	570	150	15	165	85.0	9.0	94.0	
Sub-total of 1)						1,067	117	1,184	

(Contin.)

2) Pipelaying Works									
-Clearing and grubbing	ha	2.25	4,200	1,800	6,000	9.4	4.1	13.5	
-Installation of pipes(φ700)	m	--	5	5	10	--	--	--	
- -do- (φ500-φ400)	m	3,070	4	4	8	12.3	12.3	24.6	
- -do- (φ350-φ200)	m	570	3	3	6	1.7	1.7	3.4	
-Excavation (soil)	m³	5,300	6	4	10	31.8	21.2	53.0	
-Excavation (rock)	m³	1,400	60	25	85	84.0	35.0	119.0	
-Backfill	m³	5,400	1.5	5	6.5	8.1	27.0	35.1	
-Sand bed for pipes	m³	960	5	25	30	4.8	24.0	28.8	
-Miscelleneous works	L.S	1	--	--	--	6.9	6.7	13.6	5%
Sub-total of 2)						159	132	291	
Total of 1-1-3						1,226	249	1,475	
1-1-4. Night Storage Dam									
-Clearing and grubbing	ha	0.21	4,200	1,800	6,000	0.9	0.4	1.3	
-Stripping (waste)	m³	210	2.4	1.6	4	0.5	0.3	0.8	
-Excavation (soil)	m³	1,010	6	4	10	6.1	4.0	10.1	
-Excavation (rock)	m³	250	60	25	85	15.0	6.3	21.3	
-Fill/embankment	m³	813	4	2.5	6.5	3.3	2.0	5.3	
-Reinforced concrete	m³	10	190	280	470	1.9	2.8	4.7	For inlet & outlet
-Gate for outlet	No	2	2,400	1,600	4,000	4.8	3.2	8.0	
-Outlet culvert (RCφ600)	m	45	110	90	200	4.9	4.1	9.0	
-Sodding	m²	1,100	0	5	5	0	5.5	5.5	
-Lining concrete	m³	77	140	200	340	10.8	15.4	26.2	
-Miscelleneous works	L.S	1	--	--	--	2.8	2.0	4.8	5%
Sub-total of 1-1-4						51	46	97	
Total of 1-1						2,819	965	3,784	
1-2. In-Field Works									
1-2-1. Preliminary and General	L.S	1	--	--	--	167	172	339	
1-2-2. Irrigation canal									
-Excavation (soil)	m³	1,260	6	4	10	7.6	5.0	12.6	
-Concrete canal (type-1)	m	--	10	16	26	--	--	--	Piain concrete
- -do- (type-2)	m	5,200	12	18	30	62.4	93.6	156.0	-do-
- -do- (type-3)	m	--	14	20	34	--	--	--	-do-
- -do- (type-4)	m	--	15	23	38	--	--	--	-do-
- -do- (type-5)	m	1,470	16	24	40	23.5	35.3	58.8	-do-
- -do- (type-6)	m	750	18	26	44	13.5	19.5	33.0	-do-
-Farm inlet	No	400	20	60	80	8.0	24.0	32.0	
-Drop structure	No	1,180	10	30	40	11.8	35.4	47.2	H=150mm
-Road crossing (RC φ600)	No	7	700	700	1,400	4.9	4.9	9.8	L=7m
-Turn-out structure	No	4	450	450	900	1.8	1.8	3.6	Include steel gate
-Miscelleneous works	L.S	1	--	--	--	6.5	11.5	18	5%
Total of 1-2-2						140	231	371	

(Contin.)

1-2-3. Drainage Canal									
-Excavation	m³	6,430	6	4	10	38.6	25.7	64.3	
-Road crossing (RC φ600)	No	5	700	700	1,400	3.5	3.5	7.0	L=7m
-Erosion protection weir	No	27	800	1,200	2,000	21.6	32.4	54.0	Include revetment
-Miscelleneous works	L.S	1	--	--	--	3.3	3.4	6.7	5%
Total of 1-2-3						67	65	132	
1-2-4. Farm Road									
-Trunk farm road	m	540	12	18	30	6.5	9.7	16.2	W=5m
-Secondary farm road	m	2,980	8	12	20	23.8	35.8	59.6	W=3m
-Miscelleneous works	L.S	1	--	--	--	1.7	2.5	4.2	5%
Total of 1-2-4						32	48	80	
1-2-5. Land Grading Works									
-Clearing and grubbing	ha	12	4,200	1,800	6,000	50.4	21.6	72	For 10% area
-Stripping & back-spreading	m³	34,500	4.8	3.2	8	165.6	110.4	276.0	For 20% area
-Land levelling	ha	23	480	320	800	11.0	7.4	18.4	For 20% area
-Miscelleneous works	L.S	1	--	--	--	12.0	6.6	18.6	5%
Total of 1-2-5						239	146	385	
Total of 1-2						645	662	1,307	
1-3. Operation & Management Facility									
1-3-1. Preliminary and General	L.S	1	--	--	--	26	38	64	
1-3-2. Marketing Facility									
-Warehouse for general crops	No	1	22,000	32,000	54,000	22.0	32.0	54.0	A=120 m²
-Warehouse for tobacco	No	2	26,000	38,000	64,000	52.0	76.0	128.0	A=400 m²
Sub-total of 1-3-2						74	108	182	
Total of 1-3						100	146	246	
(Total of Construction Cost for Block-A)						3,564	1,773	5,337	

(Contin.)

TABLE H.3 BREAKDOWN OF CONSTRUCTION COST (Block-B)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
1-1. Intake & Water Conveyance Facility									
1-1-1. Preliminary and General	L.S	1	--	--	--	210	200	410	
1-1-2. Intake Pumping Station									
1) River Diversion Workes	L.S	1	--	--	--	17	18	35	5% of 3)
2) Supply of Equipment									
-Pump & motor w/valves	set	4	107,000	12,000	119,000	428.0	48.0	476.0	φ250 Include 20% parts
-Generator	set	1	528,000	58,000	586,000	528.0	58.0	586.0	575 KVA - do -
-Fuel tank & pipes	set	2	1,800	1,200	3,000	3.6	2.4	6.0	V=4500 L
-Crane w/accessories	set	1	2,800	1,200	4,000	2.8	1.2	4.0	Mannual type 2ton
-Sand pump	set	1	6,600	400	7,000	6.6	0.4	7.0	
-Steel gate	No	2	51,000	5,000	56,000	102.0	10.0	112.0	2000*2000mm
Sub-total of 2)						1,071	120	1,191	
3) Installation & Civil Workes									
-Construction of pumphouse	m²	207	250	250	500	51.7	51.8	103.5	
-Installation of equipment	L.S	1	--	--	--	53.5	6.0	59.5	5% of equipment
-Concrete for suction pit	m³	520	190	280	470	98.8	145.6	244.4	
-Revetment	m³	600	50	80	130	30.0	48.0	78.0	
-Excavation (soil)	m³	2,450	5	3	8	12.2	7.4	19.6	
-Excavation (rock)	m³	1,050	60	25	85	63.0	26.3	89.3	
-Backfill	m³	1,200	1.5	5	6.5	1.8	6.0	7.8	
-Fencing	m	170	20	45	65	3.4	7.7	11.1	Wire mesh H=6 feet
-Access road	m	30	12	18	30	0.4	0.5	0.9	W=5m gravel pave
-Operator's quarter	No	2	8,400	19,600	28,000	16.8	39.2	56.0	A=40m²
-Miscelleneous works	L.S	1	--	--	--	17.4	16.5	33.9	5%
Sub-total of 3)						349	355	704	
Total of 1-1-2						1,437	493	1,930	
1-1-3. Water Conveyance Pipeline									
1) Supply of Pipe Material									
-Steel pipe (φ700)	m	--	460	50	510	--	--	--	
- -do- (φ500)	m	190	320	35	355	61.0	7.0	68.0	
- -do- (φ450)	m	--	300	30	330	--	--	--	
- -do- (φ400)	m	2,940	270	30	300	794.0	88.0	882.0	
- -do- (φ350)	m	250	240	30	270	60.0	8.0	68.0	
- -do- (φ250)	m	620	205	20	225	127.0	13.0	140.0	
- -do- (φ200)	m	--	150	15	165	--	--	--	
Sub-total of 1)						1,042	116	1,158	

(Contin.)

2) Pipelaying Works									
-Clearing and grubbing	ha	2.5	4,200	1,800	6,000	10.5	4.5	15.0	
-Installation of pipes(φ700)	m	--	5	5	10	--	--	--	
- -do- (φ500-φ400)	m	3,130	4	4	8	12.5	12.5	25.0	
- -do- (φ350-φ200)	m	870	3	3	6	2.6	2.6	5.2	
-Excavation (soil)	m³	5,600	6	4	10	33.6	22.4	56.0	
-Excavation (rock)	m³	1,400	60	25	85	84.0	35.0	119.0	
-Backfill	m³	5,500	1.5	5	6.5	8.3	27.5	35.8	
-Sand bed for pipes	m³	970	5	25	30	4.8	24.3	29.1	
-Miscelleneous works	L.S	1	--	--	--	7.7	6.2	13.9	5%
Sub-total of 2)						164	135	299	
Total of 1-1-3						1,206	251	1,457	
1-1-4. Night Storage Dam									
-Clearing and grubbing	ha	0.28	4,200	1,800	6,000	1.2	0.5	1.7	
-Stripping (waste)	m³	280	2.4	1.6	4	0.7	0.4	1.1	
-Excavation (soil)	m³	1,140	6	4	10	6.8	4.6	11.4	
-Excavation (rock)	m³	280	60	25	85	16.8	7.0	23.8	
-Fill/embankment	m³	1,170	4	2.5	6.5	4.7	2.9	7.6	
-Reinforced concrete	m³	15	190	280	470	2.9	4.2	7.1	For inlet & outlet
-Gate for outlet	No	3	2,400	1,600	4,000	7.2	4.8	12.0	
-Outlet culvert (RCφ600)	m	95	110	90	200	10.4	8.6	19.0	
-Sodding	m²	1.600	0	5	5	0	8.0	8.0	
-Lining concrete	m³	108	140	200	340	15.1	21.6	36.7	
-Miscelleneous works	L.S	1	--	--	--	3.2	3.4	6.6	5%
Sub-total of 1-1-4						69	66	135	
Total of 1-1						2,922	1,010	3,932	
1-2. In-Field Works									
1-2-1. Preliminary and General	L.S	1	--	--	--	185	189	374	
1-2-2. Irrigation canal									
-Excavation (soil)	m³	1,200	6	4	10	7.2	4.8	12.0	
-Concrete canal (type-1)	m	--	10	16	26	--	--	--	Plain concrete
- -do- (type-2)	m	5,170	12	18	30	62.0	93.1	155.1	-do-
- -do- (type-3)	m	--	14	20	34	--	--	--	-do-
- -do- (type-4)	m	1,470	15	23	38	22.1	33.8	55.9	-do-
- -do- (type-5)	m	--	16	24	40	--	--	--	-do-
- -do- (type-6)	m	740	18	26	44	13.3	19.2	32.6	-do-
-Farm inlet	No	430	20	60	80	8.6	25.8	34.4	
-Drop structure	No	1,170	10	30	40	11.7	35.1	46.8	H=150mm
-Road crossing (RC φ600)	No	6	700	700	1,400	4.2	4.2	8.4	L=7m
-Turn-out structure	No	5	450	450	900	2.2	2.3	4.5	Include steel gate
-Miscelleneous works	L.S	1	--	--	--	6.7	10.7	17.3	5%
Total of 1-2-2						138	229	367	

(Contin.)

1-2-3. Drainage Canal									
-Excavation	m³	8,070	6	4	10	48.4	32.3	80.7	
-Road crossing (RC φ600)	No	3	700	700	1,400	2.1	2.1	4.2	L=7m
-Erosion protection weir	No	37	800	1,200	2,000	29.6	44.4	74.0	Include revetment
-Miscelleneous works	L.S	1	--	--	--	3.9	4.2	8.1	5%
Total of 1-2-3						84	83	167	
1-2-4. Farm Road									
-Trunk farm road	m	240	12	18	30	2.9	4.3	7.2	W=5m
-Secondary farm road	m	4,880	8	12	20	39.0	58.6	97.6	W=3m
-Miscelleneous works	L.S	1	--	--	--	2.1	3.1	5.2	5%
Total of 1-2-4						44	66	110	
1-2-5. Land Grading Works									
-Clearing and grubbing	ha	13	4,200	1,800	6,000	54.6	23.4	78.0	For 10% area
-Stripping & back-spreading	m³	38,400	4.8	3.2	8	184.3	122.9	307.2	For 20% area
-Land levelling	ha	26	480	320	800	12.5	8.3	20.8	For 20% area
-Miscelleneous works	L.S	1	--	--	--	12.6	7.4	20.0	5%
Total of 1-2-5						264	162	426	
Total of 1-2						715	729	1,444	
1-3. Operation & Management Facility									
1-3-1. Preliminary and General	L.S	1	--	--	--	26	38	64	
1-3-2. Marketing Facility									
-Warehouse for general crops	No	1	22,000	32,000	54,000	22.0	32.0	54.0	A=120 m²
-Warehouse for tobacco	No	2	26,000	38,000	64,000	52.0	76.0	128.0	A=400 m²
Sub-total of 1-3-2						74	108	182	
Total of 1-3						100	146	246	
(Total of Construction Cost for Block-B)						3,737	1,885	5,622	

(Contin.)

TABLE H.3 BREAKDOWN OF CONSTRUCTION COST (Block-C)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
1-1. Intake & Water Conveyance Facility									
1-1-1. Preliminary and General	L.S	1	--	--	--	201	194	395	
1-1-2. Intake Pumping Station									
1) River Diversion Workes	L.S	1	--	--	--	17	18	35	5% of 3)
2) Supply of Equipment									
-Pump & motor w/valves	set	4	114,000	12,000	126,000	456.0	48.0	504.0	φ250 Include 20% parts
-Generator	set	1	550,000	61,000	611,000	550.0	61.0	611.0	700 KVA - do -
-Fuel tank & pipes	set	2	1,800	1,200	3,000	3.6	2.4	6.0	V=4500 L
-Crane w/accessories	set	1	2,800	1,200	4,000	2.8	1.2	4.0	Mannual type 2ton
-Sand pump	set	1	6,600	400	7,000	6.6	0.4	7.0	
-Steel gate	No	2	51,000	5,000	56,000	102.0	10.0	112.0	2000*2000mm
Sub-total of 2)						1,121	123	1,244	
3) Installation & Civil Workes									
-Construction of pumphouse	m²	207	250	250	500	51.7	51.8	103.5	
-Installation of equipment	L.S	1	--	--	--	56.0	6.2	62.2	5% of equipment
-Concrete for suction pit	m³	520	190	280	470	98.8	145.6	244.4	
-Revetment	m²	600	50	80	130	30.0	48.0	78.0	
-Excavation (soil)	m³	2,450	5	3	8	12.2	7.4	19.6	
-Excavation (rock)	m³	1,050	60	25	85	63.0	26.3	89.3	
-Backfill	m³	1,200	1.5	5	6.5	1.8	6.0	7.8	
-Fencing	m	170	20	45	65	3.4	7.7	11.1	Wire mesh H=6 feet
-Access road	m	30	12	18	30	0.4	0.5	0.9	W=5m gravel pave
-Operator's quarter	No	2	8,400	19,600	28,000	16.8	39.2	56.0	A=40m²
-Miscelleneous works	L.S	1	--	--	--	16.9	16.3	33.2	5%
Sub-total of 3)						351	355	706	
Total of 1-1-2						1,489	496	1,985	
1-1-3. Water Conveyance Pipeline									
1) Supply of Pipe Material									
-Steel pipe (φ700)	m	--	460	50	510	--	--	--	
- -do- (φ500)	m	670	320	35	355	214.0	24.0	238.0	
- -do- (φ450)	m	15	300	30	330	4.0	1.0	5.0	
- -do- (φ400)	m	--	270	30	300	--	--	--	
- -do- (φ350)	m	2,370	240	30	270	569.0	71.0	640.0	
- -do- (φ250)	m	--	205	20	225	--	--	--	
- -do- (φ200)	m	--	150	15	165	--	--	--	
Sub-total of 1)						787	96	883	

(Contin.)

2) Pipelaying Works									
-Clearing and grubbing	ha	2.15	4,200	1,800	6,000	9.0	3.9	12.9	
-Installation of pipes(φ700)	m	--	5	5	10	--	--	--	
- -do- (φ500-φ400)	m	685	4	4	8	2.7	2.8	5.5	
- -do- (φ350-φ200)	m	2,370	3	3	6	7.1	7.1	14.2	
-Excavation (soil)	m³	4,800	6	4	10	28.8	19.2	48.0	
-Excavation (rock)	m³	1,200	60	25	85	72.0	30.0	102.0	
-Backfill	m³	4,700	1.5	5	6.5	7.1	23.5	30.6	
-Sand bed for pipes	m³	840	5	25	30	4.2	21.0	25.2	
-Miscelleneous works	L.S	1	--	--	--	6.1	5.5	11.6	5%
Sub-total of 2)						137	113	250	
Total of 1-1-3						924	209	1,133	
1-1-4. Night Storage Dam									
-Clearing and grubbing	ha	0.3	4,200	1,800	6,000	1.3	0.5	1.8	
-Stripping (waste)	m³	290	2.4	1.6	4	0.7	0.5	1.2	
-Excavation (soil)	m³	1,230	6	4	10	7.4	4.9	12.3	
-Excavation (rock)	m³	310	60	25	85	18.6	7.8	26.4	
-Fill/embankment	m³	1,230	4	2.5	6.5	4.9	3.1	8.0	
-Reinforced concrete	m³	15	190	280	470	2.9	4.2	7.1	For inlet & outlet
-Gate for outlet	No	3	2,400	1,600	4,000	7.2	4.8	12.0	
-Outlet culvert (RCφ600)	m	75	110	90	200	8.2	6.8	15.0	
-Sodding	m²	1,700	0	5	5	0	8.5	8.5	
-Lining concrete	m³	117	140	200	340	16.4	23.4	39.8	
-Miscelleneous works	L.S	1	--	--	--	3.4	3.5	6.9	5%
Sub-total of 1-1-4						71	68	139	
Total of 1-1						2,685	967	3,652	
1-2. In-Field Works									
1-2-1. Preliminary and General	L.S	1	--	--	--	202	210	412	
1-2-2. Irrigation canal									
-Excavation (soil)	m³	1,280	6	4	10	7.7	5.1	12.8	
-Concrete canal (type-1)	m	7,030	10	16	26	70.3	112.5	182.8	Plain concrete
- -do- (type-2)	m	--	12	18	30	--	--	--	-do-
- -do- (type-3)	m	2,000	14	20	34	28.0	40.0	68.0	-do-
- -do- (type-4)	m	1,010	15	23	38	15.2	23.2	38.4	-do-
- -do- (type-5)	m	--	16	24	40	--	--	--	-do-
- -do- (type-6)	m	--	18	26	44	--	--	--	-do-
-Farm inlet	No	460	20	60	80	9.2	27.6	36.8	
-Drop structure	No	1,560	10	30	40	15.6	46.8	62.4	H=150mm
-Road crossing (RC φ600)	No	15	700	700	1,400	10.5	10.5	21.0	L=7m
-Turn-out structure	No	8	450	450	900	3.6	3.6	7.2	Include steel gate
-Miscelleneous works	L.S	1	--	--	--	7.9	13.7	21.6	5%
Total of 1-2-2						168	283	451	

(Contin.)

1-2-3.Drainage Canal								
-Excavation	m³	7,740	6	4	10	46.4	31.0	77.4	
-Road crossing (RC φ600)	No	6	700	700	1,400	4.2	4.2	8.4	L=7m
-Erosion protection weir	No	36	800	1,200	2,000	28.8	43.2	72.0	Include revetment
-Miscelleneous works	L.S	1	--	--	--	4.6	3.6	8.2	5%
Total of 1-2-3						84	82	166	
1-2-4.Farm Road								
-Trunk farm road	m	220	12	18	30	2.6	4.0	6.6	W=5m
-Secondary farm road	m	4,240	8	12	20	33.9	50.9	84.8	W=3m
-Miscelleneous works	L.S	1	--	--	--	1.5	3.1	4.6	5%
Total of 1-2-4						38	58	96	
1-2-5.Land Grading Works								
-Clearing and grubbing	ha	14	4,200	1,800	6,000	58.8	25.2	84.0	For 10% area
-Stripping & back-spreading	m³	42,000	4.8	3.2	8	201.6	134.4	336.0	For 20% area
-Land levelling	ha	28	480	320	800	13.4	9.0	22.4	For 20% area
-Miscelleneous works	L.S	1	--	--	--	14.2	8.4	22.6	5%
Total of 1-2-5						288	177	465	
Total of 1-2						780	810	1,590	
1-3.Operation & Management Facility								
1-3-1.Preliminary and General	L.S	1	--	--	--	148	244	392	
1-3-2.Project Management Office								
1) Facilities								
-Office building	m²	250	240	360	600	60.0	90.0	150.0	
-Warehouse	m²	300	180	270	450	54.0	81.0	135.0	
-Workshop	m²	210	180	270	450	37.8	56.7	94.5	
-Garage	m²	310	180	270	450	55.8	83.7	139.5	
-Multi-purpose hall	m²	190	180	270	450	34.2	51.3	85.5	
-Staff quarter	No	6	12,000	30,000	42,000	72.0	180.0	252.0	A=60m²
-Motor pool	m²	210	25	25	50	5.2	5.3	10.5	Concrete pave
-Water supply facility	No	1	10,000	10,000	20,000	10.0	10.0	20.0	Well,pipes,tank
-Fencing	m	330	3	7	10	1.0	2.3	3.3	W/barbed wire H=6 feet
-Entrance gate	No	2	450	550	1,000	0.9	1.1	2.0	
-Miscelleneous works	L.S	1	--	--	--	17.1	27.6	44.7	5%
Sub-total of 1)						348	589	937	

(Contin.)

2) Equipment and Machinery									
-Pick-up	No	2	19,400	5,100	24,500	38.8	10.2	49.0	
-Motor cycle	No	10	5,700	1,430	7,130	57.0	14.3	71.3	125 cc
-Motorized grader	No	1	154,000	17,000	171,000	154.0	17.0	171.0	B=3.1m
-Office equipment	L.S	1	--	70,000	70,000	0	70.0	70.0	
-Equipment for workshop	L.S	1	--	60,000	60,000	0	60.0	60.0	
-Generator	No	1	53,000	5,900	58,900	53.0	5.9	58.9	50 KVA
-Lightening equipment	L.S	1	--	15,200	15,200	0	15.2	15.2	
-Tractor w/attachment	No	15	51,300	5,700	57,000	769.5	85.5	855.0	50 HP
-Truck	No	1	59,900	6,600	66,500	59.9	6.6	66.5	4 ton
-Bulldorzer	No	1	183,000	20,400	203,400	183.0	20.4	203.4	11 ton
-Backhoe	No	1	154,000	17,000	171,000	154.0	17.0	171.0	0.25m³
-Front end loader	No	1	77,000	8,500	85,500	77.0	8.5	85.5	0.45m³
-Tow-grader	No	1	12,800	1,400	14,200	12.8	1.4	14.2	
Sub-total of 2)						1,559	332	1,891	
Tota of 1-3-2						1,907	921	2,828	
1-3-3.Marketing Facility									
-Warehouse for general crops	No	1	22,000	32,000	54,000	22.0	32.0	54.0	A=120 m²
-Warehouse for tobacco	No	2	26,000	38,000	64,000	52.0	76.0	128.0	A=400 m²
Sub-total of 1-3-2						74	108	182	
Total of 1-3						2,129	1,273	3,402	
(Total of Construction Cost for Block-C)						5,594	3,050	8,644	

(Contin.)

TABLE H.3 BREAKDOWN OF CONSTRUCTION COST (Block-D)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
1-1. Intake & Water Conveyance Facility									
1-1-1. Preliminary and General	L.S	1	--	--	--	207	193	400	
1-1-2. Intake Pumping Station									
1) River Diversion Workes	L.S	1	--	--	--	18	18	36	5% of 3)
2) Supply of Equipment									
-Pump & motor w/valves	set	4	161,000	17,000	178,000	644.0	68.0	712.0	φ300 Include 20% parts
-Generator	set	1	584,000	64,000	648,000	584.0	64.0	648.0	850 KVA - do -
-Fuel tank & pipes	set	2	1,800	1,200	3,000	3.6	2.4	6.0	V=4500 L
-Crane w/accessories	set	1	2,800	1,200	4,000	2.8	1.2	4.0	Mannual type 2ton
-Sand pump	set	1	6,600	400	7,000	6.6	0.4	7.0	
-Steel gate	No	2	51,000	5,000	56,000	102.0	10.0	112.0	2000*2000mm
Sub-total of 2)						1,343	146	1,489	
3) Installation & Civil Workes									
-Construction of pumphouse	m²	233	250	250	500	58.2	58.3	116.5	
-Installation of equipment	L.S	1	--	--	--	67.1	7.3	74.4	5% of equipment
-Concrete for suction pit	m³	520	190	280	470	98.8	145.6	244.4	
-Revetment	m²	600	50	80	130	30.0	48.0	78.0	
-Excavation (soil)	m³	2,450	5	3	8	12.2	7.4	19.6	
-Excavation (rock)	m³	1,050	60	25	85	63.0	26.3	89.3	
-Backfill	m³	1,200	1.5	5	6.5	1.8	6.0	7.8	
-Fencing	m	170	20	45	65	3.4	7.7	11.1	Wire mesh H=6 feet
-Access road	m	30	12	18	30	0.4	0.5	0.9	W=5m gravel pave
-Operator's quarter	No	2	8,400	19,600	28,000	16.8	39.2	56.0	A=40m²
-Miscelleneous works	L.S	1	--	--	--	17.3	16.7	34.0	5%
Sub-total of 3)						369	363	732	
Total of 1-1-2						1,730	527	2,257	
1-1-3. Water Conveyance Pipeline									
1) Supply of Pipe Material									
-Steel pipe (φ700)	m	1,730	460	50	510	796.0	86.0	882.0	
- -do- (φ500)	m	480	320	35	355	153.0	17.0	170.0	
- -do- (φ450)	m	100	300	30	330	30.0	3.0	33.0	
- -do- (φ400)	m		270	30	300	--	--	--	
- -do- (φ350)	m		240	30	270	--	--	--	
- -do- (φ250)	m	--	205	20	225	--	--	--	
- -do- (φ200)	m	--	150	15	165	--	--	--	
Sub-total of 1)						979	106	1,085	

(Contin.)

2) Pipelaying Works									
-Clearing and grubbing	ha	1.5	4,200	1,800	6,000	6.3	2.7	9.0	
-Installation of pipes(φ700)	m	1,730	5	5	10	8.6	8.7	17.3	
- -do- (φ500-φ400)	m	580	4	4	8	2.3	2.3	4.6	
- -do- (φ350-φ200)	m	--	3	3	6	--	--	--	
-Excavation (soil)	m³	4,600	6	4	10	27.6	18.4	46.0	
-Excavation (rock)	m³	1,200	60	25	85	72.0	30.0	102.0	
-Backfill	m³	4,200	1.5	5	6.5	6.3	21.0	27.3	
-Sand bed for pipes	m³	750	5	25	30	3.7	18.8	22.5	
-Miscelleneous works	L.S	1	--	--	--	6.2	5.1	11.3	5%
Sub-total of 2)						133	107	240	
Total of 1-1-3						1,112	213	1,325	
1-1-4. Night Storage Dam									
-Clearing and grubbing	ha	0.23	4,200	1,800	6,000	1.0	0.4	1.4	
-Stripping (waste)	m³	230	2.4	1.6	4	0.5	0.4	0.9	
-Excavation (soil)	m³	1,730	6	4	10	10.4	6.9	17.3	
-Excavation (rock)	m³	430	60	25	85	25.8	10.8	36.6	
-Fill/embankment	m³	1,048	4	2.5	6.5	4.2	2.6	6.8	
-Reinforced concrete	m³	10	190	280	470	1.9	2.8	4.7	For inlet & outlet
-Gate for outlet	No	2	2,400	1,600	4,000	4.8	3.2	8.0	
-Outlet culvert (RCφ600)	m	35	110	90	200	3.8	3.2	7.0	
-Sodding	m³	1,600	0	5	5	0	8.0	8.0	
-Lining concrete	m³	112	140	200	340	15.7	22.4	38.1	
-Miscelleneous works	L.S	--	--	--	--	2.9	3.3	6.2	5%
Sub-total of 1-1-4						71	64	135	
Total of 1-1						3,120	997	4,117	
1-2. In-Field Works									
1-2-1. Preliminary and General	L.S	1	--	--	--	279	285	564	
1-2-2. Irrigation canal									
-Excavation (soil)	m³	1,550	6	4	10	9.3	6.2	15.5	
-Concrete canal (type-1)	m	--	10	16	26	--	--	--	Plain concrete
- -do- (type-2)	m	7,210	12	18	30	86.5	129.8	216.3	-do-
- -do- (type-3)	m	--	14	20	34	--	--	--	-do-
- -do- (type-4)	m	1,440	15	23	38	21.6	33.1	54.7	-do-
- -do- (type-5)	m	--	16	24	40	--	--	--	-do-
- -do- (type-6)	m	1,030	18	26	44	18.5	26.8	45.3	-do-
-Farm inlet	No	700	20	60	80	14.0	42.0	56.0	
-Drop structure	No	1,640	10	30	40	16.4	49.2	65.6	H=150mm
-Road crossing (RC φ600)	No	6	700	700	1,400	4.2	4.2	8.4	L=7m
-Turn-out structure	No	6	450	450	900	2.7	2.7	5.4	Include steel gate
-Miscelleneous works	L.S	1	--	--	--	8.8	15.0	23.8	5%
Total of 1-2-2						182	309	491	

(Contin.)

1-2-3. Drainage Canal									
-Excavation	m³	9,600	6	4	10	57.6	38.4	96.0	
-Road crossing (RC φ600)	No	--	700	700	1,400	--	--	--	L=7m
-Erosion protection weir	No	44	800	1,200	2,000	35.2	52.8	88.0	Include revetment
-Miscelleneous works	L.S	1	--	--	--	4.2	4.8	9.0	5%
Total of 1-2-3						97	96	193	
1-2-4. Farm Road									
-Trunk farm road	m	3,280	12	18	30	39.4	59.0	98.4	W=5m
-Secondary farm road	m	7,260	8	12	20	58.1	87.1	145.2	W=3m
-Miscelleneous works	L.S	1	--	--	--	5.5	6.9	12.4	5%
Total of 1-2-4						103	153	256	
1-2-5. Land Grading Works									
-Clearing and grubbing	ha	20	4,200	1,800	6,000	84.0	36.0	120.0	For 10% area
-Stripping & back-spreading	m³	60,900	4.8	3.2	8	292.3	194.9	487.2	For 20% area
-Land levelling	ha	41	480	320	800	19.7	13.1	32.8	For 20% area
-Miscelleneous works	L.S	1	--	--	--	20.0	12.0	32.0	5%
Total of 1-2-5						416	256	672	
Total of 1-2						1,077	1,099	2,176	
1-3. Operation & Management Facility									
1-3-1. Preliminary and General	L.S	1	--	--	--	26	38	64	
1-3-2. Marketing Facility									
-Warehouse for general crops	No	1	22,000	32,000	54,000	22.0	32.0	54.0	A=120 m²
-Warehouse for tobacco	No	2	26,000	38,000	64,000	52.0	76.0	128.0	A=400 m²
Sub-total of 1-3-2						74	108	182	
Total of 1-3						100	146	246	
(Total of Construction Cost for Block-D)						4,297	2,242	6,539	

(Contin.)

TABLE H.3 BREAKDOWN OF CONSTRUCTION COST (Block-E)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
1-1. Intake & Water Conveyance Facility									
1-1-1. Preliminary and General	L.S	1	--	--	--	159	161	320	
1-1-2. Intake Pumping Station									
1) River Diversion Workes	L.S	1	--	--	--	17	17	34	5% of 3)
2) Supply of Equipment									
-Pump & motor w/valves	set	4	72,000	8,000	80,000	288.0	32.0	320.0	φ200 Include 20% parts
-Generator	set	1	467,000	51,000	518,000	467.0	51.0	518.0	325 KVA - do -
-Fuel tank & pipes	set	2	1,800	1,200	3,000	3.6	2.4	6.0	V=4500 L
-Crane w/accessories	set	1	2,800	1,200	4,000	2.8	1.2	4.0	Mannual type 2ton
-Sand pump	set	1	6,600	400	7,000	6.6	0.4	7.0	
-Steel gate	No	2	51,000	5,000	56,000	102.0	10.0	112.0	2000*2000mm
Sub-total of 2)						870	97	967	
3) Installation & Civil Workes									
-Construction of pumphouse	m²	192	250	250	500	48.0	48.0	96.0	
-Installation of equipment	L.S	1	--	--	--	43.5	4.8	48.3	5% of equipment
-Concrete for suction pit	m³	520	190	280	470	98.8	145.6	244.4	
-Revetment	m²	600	50	80	130	30.0	48.0	78.0	
-Excavation (soil)	m³	2,450	5	3	8	12.2	7.4	19.6	
-Excavation (rock)	m³	1,050	60	25	85	63.0	26.3	89.3	
-Backfill	m³	1,200	1.5	5	6.5	1.8	6.0	7.8	
-Fencing	m	170	20	45	65	3.4	7.7	11.1	Wire mesh H=6 feet
-Access road	m	30	12	18	30	0.4	0.5	0.9	W=5m gravel pave
-Operator's quarter	No	2	8,400	19,600	28,000	16.8	39.2	56.0	A=40m²
-Miscelleneous works	L.S	1	--	--	--	16.1	16.5	32.6	5%
Sub-total of 3)						334	350	684	
Total of 1-1-2						1,221	464	1,685	
1-1-3. Water Conveyance Pipeline									
1) Supply of Pipe Material									
-Steel pipe (φ700)	m	--	460	50	510	--	--	--	
- -do- (φ500)	m	--	320	35	355	--	--	--	
- -do- (φ450)	m	760	300	30	330	228.0	23.0	251.0	
- -do- (φ400)	m	20	270	30	300	5.0	1.0	6.0	
- -do- (φ350)	m	700	240	30	270	168.0	21.0	189.0	
- -do- (φ250)	m	--	205	20	225	--	--	--	
- -do- (φ200)	m	--	150	15	165	--	--	--	
Sub-total of 1)						401	45	446	

(Contin.)

2) Pipelaying Works									
-Clearing and grubbing	ha	0.91	4,200	1,800	6,000	3.8	1.7	5.5	
-Installation of pipes(φ700)	m	--	5	5	10	--	--	--	
- -do- (φ500-φ400)	m	780	4	4	8	3.1	3.1	6.2	
- -do- (φ350-φ200)	m	700	3	3	6	2.1	2.1	4.2	
-Excavation (soil)	m³	2,100	6	4	10	12.6	8.4	21.0	
-Excavation (rock)	m³	500	60	25	85	30.0	12.5	42.5	
-Backfill	m³	2,100	1.5	5	6.5	3.2	10.5	13.7	
-Sand bed for pipes	m³	360	5	25	30	1.8	9.0	10.8	
-Miscelleneous works	L.S	1	--	--	--	2.4	2.7	5.1	5%
Sub-total of 2)						59	50	109	
Total of 1-1-3						460	95	555	
1-1-4. Night Storage Dam									
-Clearing and grubbing	ha	0.19	4,200	1,800	6,000	0.8	0.3	1.1	
-Stripping (waste)	m³	190	2.4	1.6	4	0.5	0.3	0.8	
-Excavation (soil)	m³	830	6	4	10	5.0	3.3	8.3	
-Excavation (rock)	m³	210	60	25	85	12.6	5.3	17.9	
-Fill/embankment	m³	819	4	2.5	6.5	3.3	2.0	5.3	
-Reinforced concrete	m³	10	190	280	470	1.9	2.8	4.7	For inlet & outlet
-Gate for outlet	No	2	2,400	1,600	4,000	4.8	3.2	8.0	
-Outlet culvert (RCφ600)	m	40	110	90	200	4.4	3.6	8.0	
-Sodding	m²	1,100	0	5	5	0	5.5	5.5	
-Lining concrete	m³	78	140	200	340	10.9	15.6	26.5	
-Miscelleneous works	L.S	1	--	--	--	1.8	2.1	3.9	5%
Sub-total of 1-1-4						46	44	90	
Total of 1-1						1,886	764	2,650	
1-2. In-Field Works									
1-2-1. Preliminary and General	L.S	1	--	--	--	147	155	302	
1-2-2. Irrigation canal									
-Excavation (soil)	m³	660	6	4	10	4.0	2.6	6.6	
-Concrete canal (type-1)	m	3,620	10	16	26	36.2	57.9	94.1	Plain concrete
- -do- (type-2)	m	--	12	18	30	--	--	--	-do-
- -do- (type-3)	m	1,030	14	20	34	14.4	20.6	35.0	-do-
- -do- (type-4)	m	520	15	23	38	7.8	12.0	19.8	-do-
- -do- (type-5)	m	--	16	24	40	--	--	--	-do-
- -do- (type-6)	m	--	18	26	44	--	--	--	-do-
-Farm inlet	No	330	20	60	80	6.6	19.8	26.4	
-Drop structure	No	820	10	30	40	8.2	24.6	32.8	H=150mm
-Road crossing (RC φ600)	No	3	700	700	1,400	2.1	2.1	4.2	L=7m
-Turn-out structure	No	5	450	450	900	2.3	2.2	4.5	Include steel gate
-Miscelleneous works	L.S	1	--	--	--	4.4	7.2	11.6	5%
Total of 1-2-2						86	149	235	

(Contin.)

1-2-3. Drainage Canal									
-Excavation	m³	5,500	6	4	10	33.0	22.0	55.0	
-Road crossing (RC φ600)	No	1	700	700	1,400	0.7	0.7	1.4	L=7m
-Erosion protection weir	No	26	800	1,200	2,000	20.8	31.2	52.0	Include revetment
-Miscelleneous works	L.S	1	--	--	--	2.5	3.1	5.6	5%
Total of 1-2-3						57	57	114	
1-2-4. Farm Road									
-Trunk farm road	m	3,640	12	18	30	43.7	65.5	109.2	W=5m
-Secondary farm road	m	3,900	8	12	20	31.2	46.8	78.0	W=3m
-Miscelleneous works	L.S	1	--	--	--	4.1	5.7	9.8	5%
Total of 1-2-4						79	118	197	
1-2-5. Land Grading Works									
-Clearing and grubbing	ha	10	4,200	1,800	6,000	42.0	18.0	60.0	For 10% area
-Stripping & back-spreading	m³	28,200	4.8	3.2	8	135.4	90.2	225.6	For 20% area
-Land levelling	ha	19	480	320	800	9.1	6.1	15.2	For 20% area
-Miscelleneous works	L.S	1	--	--	--	9.5	5.7	15.2	5%
Total of 1-2-5						196	120	316	
Total of 1-2						565	599	1,164	
1-3. Operation & Management Facility									
1-3-1. Preliminary and General	L.S	1	--	--	--	26	38	64	
1-3-2. Marketing Facility									
-Warehouse for general crops	No	1	22,000	32,000	54,000	22.0	32.0	54.0	A=120 m²
-Warehouse for tobacco	No	2	26,000	38,000	64,000	52.0	76.0	128.0	A=400 m²
Sub-total of 1-3-2						74	108	182	
Total of 1-3						100	146	246	
(Total of Construction Cost for Block-E)						2,551	1,509	4,060	

(End)

TABLE H.4 BREAKDOWN OF ENGINEERING COST AND COMPENSATION

(1/2)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	Unit Cost (Z$) L/C	Unit Cost (Z$) Total	Amount (,000 Z$) F/C	Amount (,000 Z$) L/C	Amount (,000 Z$) Total	Remark
Engineering Services for Phase-1									
-Remuneration for F.E.	m-m	38	14,500	--	14,500	551	0	551	
-Remuneration for L.E.	m-m	15	--	5,000	5,000	0	75	75	
-Per diem for F.E.	m-m	38	--	4,000	4,000	0	152	152	
-Per diem for L.E.	m-m	15	--	2,400	2,400	0	36	36	
-Air ticket	No	7	18,000	--	18,000	126	0	126	
Total for Phase-1						677	263	940	
Cost for each block						339	131	470	For Block-B and C
Engineering Services for Phase-2									
-Remuneration for F.E.	m-m	38	14,500	--	14,500	551	0	551	
-Remuneration for L.E.	m-m	15	--	5,000	5,000	0	75	75	
-Per diem for F.E.	m-m	38	--	4,000	4,000	0	152	152	
-Per diem for L.E.	m-m	15	--	2,400	2,400	0	36	36	
-Air ticket	No	7	18,000	--	18,000	126	0	126	
Total for Phase-1						677	263	940	
Cost for each block						226	87	313	For Block-A, D and E
Investigation Works for Block-A									
-Topo survey	m²	3,800	0.1	0.4	0.5	0.4	1.5	1.9	For pump station, etc.
-Route survey	km	4.2	300	2,200	2,500	1.3	9.2	10.5	For pipeline, etc.
-Boring survey (D=20m)	No	2	4,000	4,000	8,000	8.0	8.0	16.0	For pump foundation
-Miscelleneous works	L.S	1	--	--	--	0.3	1.3	1.6	5%
Total						10	20	30	
Investigation Works for Block-B									
-Topo survey	m²	4,100	0.1	0.4	0.5	0.4	1.7	2.1	For pump station, etc.
-Route survey	km	4.2	300	2,200	2,500	1.3	9.2	10.5	For pipeline, etc.
-Boring survey (D=20m)	No	2	4,000	4,000	8,000	8.0	8.0	16.0	For pump foundation
-Miscelleneous works	L.S	1	--	--	--	0.3	1.1	1.4	5%
Total						10	20	30	
Investigation Works for Block-C									
-Topo survey	m²	14,400	0.1	0.4	0.5	1.4	5.8	7.2	For pump station, etc.
-Route survey	km	3.3	300	2,200	2,500	1.0	7.3	8.3	For pipeline, etc.
-Boring survey (D=20m)	No	2	4,000	4,000	8,000	8.0	8.0	16.0	For pump foundation
-Miscelleneous works	L.S	1	--	--	--	0.6	0.9	1.5	5%
Total						11	22	33	

(Contin.)

(2/2)

Investigation Works for Block-D									
-Topo survey	㎡	6,000	0.1	0.4	0.5	0.6	2.4	3.0	For pump station, etc.
-Route survey	km	5.6	300	2,200	2,500	1.7	12.3	14.0	For pipeline, etc.
-Boring survey (D=20m)	No	2	4,000	4,000	8,000	8.0	8.0	16.0	For pump foundation
-Miscelleneous works	L.S	1	--	--	--	0.7	1.3	2.0	5%
Total						11	24	35	
Investigation Works for Block-E									
-Topo survey	㎡	3,300	0.1	0.4	0.5	0.3	1.4	1.7	For pump station, etc.
-Route survey	km	5.1	300	2,200	2,500	1.6	11.2	12.8	For pipeline, etc.
-Boring survey (D=20m)	No	2	4,000	4,000	8,000	8.0	8.0	16.0	For pump foundation
-Miscelleneous works	L.S	1	--	--	--	0.1	1.4	1.5	5%
Total						10	22	32	
Compensation Cost									
1) Block-A	ha	23	--	1,150	1,150	0	27	27	
2) Block-B	ha	26	--	1,150	1,150	0	30	30	
3) Block-C	ha	28	--	1,150	1,150	0	33	33	
4) Block-D	ha	41	--	1,150	1,150	0	48	48	
5) Block-E	ha	19	--	1,150	1,150	0	22	22	
Total						0	160	160	

TABLE H.5 UNIT RATE FOR OPERATION AND MAINTENANCE

(Unit: Z$)

Description	Unit	F/C	L/C	Total	Remark
1) Salary					
Irrigation manager	Annual	0	13,200	13,200	
Foreman/Supervisor	"	0	9,600	9,600	
Extension worker	"	0	8,400	8,400	
Water Bailiff	"	0	8,400	8,400	
Mechanics	"	0	6,000	6,000	
Office clerk	"	0	6,000	6,000	
Typist	"	0	6,000	6,000	
Driver/Operator	"	0	4,800	4,800	
General hands	"	0	3,600	3,600	
Pump Operator	"	0	8,400	8,400	
2) Labour Wages					
Foreman/Ganger	daily	0	200	200	
Skilled labour	"	0	30	30	
Ordinary labour	"	0	25	25	
Carpenter/Mason	"	0	45	45	
Steelman/Pipe fitter	"	0	45	45	
Mechanics	"	0	60	60	
Welder	"	0	45	45	
Operator/Driver	"	0	35	35	
Guard	"	0	30	30	
3) Fuel and Oil					
Diesel oil	L	0.35	0.29	0.64	
Lubricant	L	1.7	1.3	3.0	

TABLE H.6 ANNUAL OPERATION AND MAINTENANCE COST (As of Feb. 1990)

(Unit: 1,000 Z$)

Description	Block A			Block B			Block C			Block D			Block E			Total		
	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total
1.Salary and Wages																		
-Pump Station	0	8.4	8.4	0	8.4	8.4	0	8.4	8.4	0	8.4	8.4	0	8.4	8.4	0	42.0	42.0
-Project Management Office	--	--	--	--	--	--	0	112.8	112.8	--	--	--	--	--	--	0	112.8	112.8
(Total of 1)	0	8.4	8.4	0	8.4	8.4	0	121.2	121.2	0	8.4	8.4	0	8.4	8.4	0	154.8	154.8
2.Equipment and Material																		
2-1.Fuel and Oil																		
-Pump Station	21.4	17.5	38.9	31.2	25.8	56.8	37.8	30.9	68.7	47.2	38.5	85.7	16.5	13.5	30.0	154.1	126.0	280.1
-Project Management Office	--	--	--	--	--	--	2.8	2.2	5.0	--	--	--	--	--	--	2.8	2.2	5.0
(Sub-Total)	21.4	17.5	38.9	31.2	25.8	56.8	40.6	33.1	73.7	47.2	38.5	85.7	16.5	13.5	30.0	156.9	128.2	285.1
2-2.Spare parts and material																		
-Intake & water Conveyance Facil.	10.7	5.3	16.0	11.3	5.6	16.9	16.8	9.1	25.9	12.9	6.7	19.6	7.7	4.5	12.2	59.4	31.2	90.6
-In-field Facility	1.9	2.0	3.9	2.1	2.2	4.3	2.3	2.5	4.8	3.2	3.3	6.5	1.7	1.8	3.5	11.2	11.8	23.0
-Operation & Maintenance Facil.	0.3	0.4	0.7	0.3	0.4	0.7	6.4	3.8	10.2	0.3	0.4	0.7	0.3	0.4	0.7	7.6	5.4	13.0
(Sub-Total)	12.9	7.7	20.6	13.7	8.2	21.9	25.5	15.4	40.9	16.4	10.4	26.8	9.7	6.7	16.4	78.2	48.4	126.6
(Total of 2)	34.3	25.2	59.5	44.9	33.8	78.7	66.1	48.5	114.6	63.6	48.9	112.5	26.2	20.2	46.4	235.1	176.6	411.7
3. General Expenses for PMO																		
-Office & Field Expenses	--	--	--	--	--	--	0	12.1	12.1	--	--	--	--	--	--	0	12.1	12.1
Total (1-3)	34.3	33.6	67.9	44.9	42.2	87.1	66.1	181.8	247.9	63.6	57.3	120.9	26.2	28.6	54.8	235.1	343.5	578.6
4. Replacement Cost																		
1) Pump & generator at pump station(20Y)	868	93	961	956	106	1,062	1,006	109	1,115	1,228	132	1,360	755	83	838	4,813	523	5,336
2) Generator at PMO (20Y)	--	--	--	--	--	--	53	6	59	--	--	--	--	--	--	53	6	59
3) Farming/maintenance machines(10Y)	--	--	--	--	--	--	1,350	150	1,500	--	--	--	--	--	--	1,350	150	1,500
4) Vehicles, other equipment (7Y)	--	--	--	--	--	--	156	31	187	--	--	--	--	--	--	156	31	187

TABLE H.7 BREAKDOWN OF ANNUAL OPERATION AND MAINTENANCE COST

(1/3)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
(For Block-A)									
1. Salary and Wages									
1-1. Pump Station									
-Pump operator	No	1	--	8,400	8,400	0	8.4	8.4	
2. Equipment and Material									
2-1. Fuel and Oil for Pump Station									
-Diesel oil	L	49,200	0.35	0.29	0.64	17.2	14.3	31.5	
-Lubricant	L	2,460	1.7	1.3	3.0	4.2	3.2	7.4	5% of diesel oil
Total of 2-1						21.4	17.5	38.9	
2-2. Spair Parts and Material									
-Intake & water conveyance facility	L.S	1	--	--	--	10.7	5.3	16.0	0.3% of const. cost
-In-field facility	L.S	1	--	--	--	1.9	2.0	3.9	-do-
-Operation & manage. facility	L.S	1	--	--	--	0.3	0.4	0.7	-do-
Total of 2-2						12.9	7.7	20.6	
Total of 2						34.3	25.2	59.5	
Total of 1 and 2						34.3	33.6	67.9	
(For Block-B)									
1. Salary and Wages									
1-1. Pump Station									
-Pump operator	No	1	--	8,400	8,400	0	8.4	8.4	
2. Equipment and Material									
2-1. Fuel and Oil for Pump Station									
-Diesel oil	L	71,900	0.35	0.29	0.64	25.1	20.9	46.0	
-Lubricant	L	3,600	1.7	1.3	3.0	6.1	4.7	10.8	5% of diesel oil
Total of 2-1						31.2	25.6	56.8	
2-2. Spair Parts and Material									
-Intake & water conveyance facility	L.S	1	--	--	--	11.3	5.6	16.9	0.3% of const. cost
-In-field facility	L.S	1	--	--	--	2.1	2.2	4.3	-do-
-Operation & manage. facility	L.S	1	--	--	--	0.3	0.4	0.7	-do-
Total of 2-2						13.7	8.2	21.9	
Total of 2						44.9	33.8	78.7	
Total of 1 and 2						44.9	42.2	87.1	

(Contin.)

(2/3)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
(For Block-C)									
1. Salary and Wages									
1-1. Pump Station									
-Pump operator	No	1	--	8,400	8,400	0	8.4	8.4	
1-2. Project Management Office									
-Irrigation manager	No	1	--	13,200	13,200	0	13.2	13.2	
-Foreman/supervisor	No	3	--	9,600	9,600	0	28.8	28.8	
-Extension worker, WB	No	3	--	8,400	8,400	0	25.2	25.2	
-Clerk, typist, mechanic	No	4	--	6,000	6,000	0	24.0	24.0	
-Driver, operator	No	3	--	4,800	4,800	0	14.4	14.4	
-General hands	No	2	--	3,600	3,600	0	7.2	7.2	
Total of 1-2						0	112.8	112.8	
Total of 1						0	121.2	121.2	
2. Equipment and Material									
2-1. Fuel and Oil									
2-1-1. Pump Station									
-Diesel oil	L	86,900	0.35	0.29	0.64	30.4	25.2	55.6	
-Lubricant	L	4,350	1.7	1.3	3.0	7.4	5.7	13.1	5% of diesel oil
Total of 2-1-1						37.8	30.9	68.7	
2-1-2. Project Management Office									
-Diesel oil	L	6,300	0.35	0.29	0.64	2.2	1.8	4.0	
-Lubricant	L	320	1.7	1.3	3.0	0.6	0.4	1.0	5% of diesel oil
Total of 2-1-2						2.8	2.2	5.0	
Total of 2-1						40.6	33.1	73.7	
2-2. Spair Parts and Material									
-Intake & water conveyance facility	L.S	1	--	--	--	16.8	9.1	25.9	0.3% of const. cost
-In-field facility	L.S	1	--	--	--	2.3	2.5	4.8	-do-
-Operation & manage. facility	L.S	1	--	--	--	6.4	3.8	10.2	-do-
Total of 2-2						25.2	15.4	40.9	
Total of 2						66.1	48.5	114.6	
3. General Expenditure for PMO									
-Office & field expenses	L.S	1	--	--	--	0	12.1	12.1	10% of staff salary
Total of 3						0	12.1	12.1	
Total of 1, 2 and 3						66.1	181.8	247.9	

(Contin.)

(3/3)

Description	Unit	Q'ty	Unit Cost (Z$) F/C	L/C	Total	Amount (,000 Z$) F/C	L/C	Total	Remark
(For Block-D)									
1. Salary and Wages									
1-1. Pump Station									
-Pump operator	No	1	--	8,400	8,400	0	8.4	8.4	
2. Equipment and Material									
2-1. Fuel and Oil for Pump Station									
-Diesel oil	L	108,400	0.35	0.29	0.64	38.0	31.4	69.4	
-Lubricant	L	5,420	1.7	1.3	3.0	9.2	7.1	16.3	5% of diesel oil
Total of 2-1						47.2	38.5	85.7	
2-2. Spair Parts and Material									
-Intake & water conveyance facility	L.S	1	--	--	--	12.9	6.7	19.6	0.3% of const. cost
-In-field facility	L.S	1	--	--	--	3.2	3.3	6.5	-do-
-Operation & manage. facility	L.S	1	--	--	--	0.3	0.4	0.7	-do-
Total of 2-2						16.4	10.4	26.8	
Total of 2						63.6	48.9	112.5	
Total of 1 and 2						63.6	57.3	120.9	
(For Block-E)									
1. Salary and Wages									
1-1. Pump Station									
-Pump operator	No	1	--	8,400	8,400	0	8.4	8.4	
2. Equipment and Material									
2-1. Fuel and Oil for Pump Station									
-Diesel oil	L	38,000	0.35	0.29	0.64	13.3	11.0	24.3	
-Lubricant	L	1,900	1.7	1.3	3.0	3.2	2.5	5.7	5% of diesel oil
Total of 2-1						16.5	13.5	30.0	
2-2. Spair Parts and Material									
-Intake & water conveyance facility	L.S	1	--	--	--	7.7	4.5	12.2	0.3% of const. cost
-In-field facility	L.S	1	--	--	--	1.7	1.8	3.5	-do-
-Operation & manage. facility	L.S	1	--	--	--	0.3	0.4	0.7	-do-
Total of 2-2						9.7	6.7	16.4	
Total of 2						26.2	20.2	46.4	
Total of 1 and 2						26.2	28.6	54.8	

(End)

ANNEX I

PROJECT JUSTIFICATION

ANNEX I PROJECT JUSTIFICATION

Table I .1 Standard Conversion Factor from Trade Statistics

(Unit: Million Z$)

No	Item	Unit	1983	1984	1985	1986	1987	Average of 5 Years
①	1) Total Imports of Good & Services	CIF Z$	1061.6	1200.7	1446.5	1640.4	1741.7	1418.2
②	1) Total Exports of Good & Services	FOB Z$	1150.2	1453.0	1795.5	2170.3	2371.4	1788.1
③	2) Total Custom Duties & Import Taxes	Z$	419.3	498.3	542.4	638.1	663.6	552.3
④	2) Total Export Taxes	Z$	0	0	0	0	0	0
⑤	2) Total Export Subsidies	Z$	0	2.5	10.0	0	0	2.5
⑥	①+②	Z$	2211.8	2653.7	3242.0	3810.7	4113.1	3206.3
⑦	①+②+③−④+⑤	Z$	2631.1	3154.5	3794.4	4448.8	4776.7	3761.1
⑧	Standard Conversion Factor SCF=⑥/⑦	−	0.841	0.841	0.854	0.857	0.861	0.852

NOTES : 1) Quarterly Digest of Statistics, June 1989 from Central Statistical Office

2) Trade Statistics Division, Central Statistical Office

Table I.2 Consumption Conversion Factor from Trade Statistics

(Unit: Million Z$)

No	Item	Unit	1983	1984	1985	1986	1987	Average of 5 Years
①	1) Total Imports of Consumption Goods	CIF Z$	466.9	499.1	615.0	725.5	782.0	617.7
②	1) Total Exports of Consumption Goods	FOB Z$	421.1	597.9	613.8	756.4	849.0	647.6
③	2) Total Custom Duties & Import Taxes on Consumption Goods	Z$	205.3	242.3	276.8	332.2	347.2	280.8
④	2) Total Export Taxes on Consumption Goods	Z$	0	0	0	0	0	0
⑤	2) Total Export Subsidies on Consumption Goods	Z$	0	2.5	10.0	0	0	2.5
⑥	①+②	Z$	888.0	1097.0	1228.8	1481.9	1631.0	1265.3
⑦	①+②+③−④+⑤	Z$	1093.3	1341.8	1515.6	1814.1	1978.2	1548.6
⑧	Consumption Conversion Factor CCF=⑥/⑦	−	0.812	0.818	0.811	0.817	0.824	0.817

NOTES : 1) Quarterly Digest of Statistics, June 1989 from Central Statistical Office

2) Trade Statistics Division, Central Statistical Office

Table I.3 Conversion Factor for Seed & Fertilizer

Item	Cost Component / Conversion Factor	Traded Goods	Non-traded Goods	Skilled Labour	Unskilled Labour	Transportation	Fuel	Tax&Duties	Total
	Conversion Factor	1.000	1) 0.852	2) 0.817	3) 0.245	4) 0.715	5) 0.620	0	
Seed	Composition of Cost (%)	26.7	17.6	1.2	23.5	3.8	20.6	6.6	100.0
	Adjusted Conversion Factor	0.267	0.150	0.010	0.058	0.027	0.128	0	0.640
Fertilizer	Composition of Cost (%)	18.8	12.7	1.8	17.4	3.8	38.9	6.6	100.0
	Adjusted Conversion Factor	0.188	0.108	0.015	0.043	0.027	0.241	0	0.622

1) Standard Conversion Factor from Trade Statistics (0.852)

2) Consumption Conversion Factor from Trade Statistics (0.817)

3) Consumption Conversion Factor from Trade Statistics (0.817) × Shadow Wage Rate from World Bank Estimation (0.300)=0.245

4) Estimated from Conversion Factors for Truck & Train

5) Conversion Factor for Oil from World Bank Estimation (0.620)

Table I.4 Price Structure of Maize

Cost Item	Unit	Constant 1990 Price		
		Financial	Conversion Factor	Economic
1) Projected 2000 FOB Export Price of Maize(US), NO.2, Yellow	US$/t	116.0	n.r.	116.0
Projected 2000 FOB Export Price of Maize(US), No.2 Yellow(US$1=Z$2.304)	Z$/t	267.3	n.r.	267.3
2) Corresponding FOB Export Price Durban	Z$/t	326.1	n.r.	326.1
Export Tax (0%)	Z$/t	0	0	0
Export Subsidy (0%)	Z$/t	0	0	0
3) Port Handling Charge	Z$/t	3.0	0.245	0.7
4) Estimated GMB Export Margin (5.0%)	Z$/t	15.4	0.817	12.6
5) Transport and Handling Charge from Project Area to Durban	Z$/t	121.3	0.706	85.6
6) Approved Agent Margin (2.5%)	Z$/t	4.5	0.817	3.7
7) Packing Charge	Z$/t	2.5	0.245	0.6
Farmgate Price	Z$/t	179.4	1.238	222.9

Notes : 1) World Bank Commodity Price Forecasts for 2000 Price in 1985 Constant US Dollar Adjusted to 1990 Constant US Dollar Using MUV Index of 159.4
2) Considered to reflect the long-term relationship between FOB Durban and FOB Gulf Ports
3) National Railway of Zimbabwe, Mutare Office
4) Grain Marketing Board, Nyanga Depot
5) Refer to Table I.7
6) Grain Marketing Board, Nyanga Depot
7) Grain Marketing Board, Nyanga Depot

Table I.5 Price Structure of Wheat

Cost Item	Unit	Constant 1990 Price		
		Financial	Conversion Factor	Economic
1) Projected 2000 FOB Export Price of Wheat (Canadian), No.1 Western Red Spring 13.5%	US$/t	180.0	n.r.	180.0
Projected 2000 FOB Export Price of Wheat (Canadian), No.1 Western Red Spring 13.5% (US$1=Z$2,304)	Z$/t	414.7	n.r.	414.7
2) Corresponding FOB Export Price Durban	Z$/t	394.0	n.r.	394.0
Export Tax (0%)	Z$/t	0	0	0
Export Subsidy (0%)	Z$/t	0	0	0
3) Port Handling Charge	Z$/t	3.0	0.245	0.7
4) Estimated GMB Export Margin (5.0%)	Z$/t	18.6	0.817	15.2
5) Transport and Handling Charge from Project Area to Durban	Z$/t	121.3	0.706	85.6
6) Approved Agent Margin (2.5%)	Z$/t	6.1	0.817	5.0
7) Packing Charge	Z$/t	2.5	0.245	0.6
Farmgate Price	Z$/t	242.5	1.183	286.9

Remarks : 1) World Bank Commodity Price Forecasts for 2000 Price in 1985 Constant US Dollar Adjusted to 1990 Constant US Dollar Using MUV Index of 159.4
2) Considered to reflect the long-term relationship between FOB Durban and FOB Canada
3) National Railway of Zimbabwe, Mutare Office
4) Grain Marketing Board, Nyanga Depot
5) Refer to Table I.7 .
6) Grain Marketing Board, Nyanga Depot
7) Grain Marketing Board, Nyanga Depot

Table I.6 Price Structure of Cotton

Cost Item	Unit	Constant 1990 Price		
		Financial	Conversion Factor	Economic
1) Projected 2000 CIF Export Price of Cotton (Outlook"A"Index), Middling (1-3/32)	US$/t	1660.0	n.r.	1660.0
Projected 2000 CIF Export Price of Cotton (Outlook"A"Index), Middling (1-3/32) (US$1=Z$2.304)	Z$/t	3824.6	n.r.	3824.6
2) Corresponding FOB Export Price Durban	Z$/t	3327.4	n.r.	3327.4
Export Tax (0%)	Z$/t	00	0	0
Export Subsidy (0%)	Z$/t	00	0	0
3) Port Handing Charge	Z$/t	8.0	0.245	2.0
4) CMB Export Margin (5%)	Z$/t	158.1	0.817	129.2
5) Yielding Ratio of Cotton Lint from Seed	(%)	35.7	n.r.	35.7
6) Ginning Cost	Z$/t	15.4	0.817	12.6
7) Transport and Handling Charge from Project Area to Durban	Z$/t	139.2	0.719	100.2
8) Packing Charge	Z$/t	6.7	0.245	1.6
Farmgate Price	Z$/t	967.3	1.061	1026.6

Notes : 1) World Bank Commodity Price Forecasts for 2000 Price in 1985 Constant Us Dollar Adjusted to 1990 Constant US Dollar Using Mur Index of 159.4
2) Considered to refrect the long-term relationship between FOB Durban and CIF Europe
3) National Railway of Zimbabwe, Mutare Office
4) Cotton Marketing Board, Mutare Office
5) Cotton Marketing Board, Mutare Office
6) Cotton Marketing Board, Mutare Office
7) Refer to Table I.7
8) Cotton Marketing Board, Nyamaropa Depot

Table I.7 Transport and Handling Charge from Project Area to Durban

Ⓐ Maize & Wheat

Transport and Handling	Vehicle	Distance (km)	Unit Cost (Z$/t·km)	Financial Cost(Z$/t)	Conversion Factor	Economic Cost(Z$/t)
Project Area→Nyanga Depot	Truck	87	0.18	1) 15.7	0.680	10.7
Handling Charge at Nyanga Depot	n.r.	n.r.	n.r.	1) 1.2	0.245	0.3
Nyanga Depot→Mutare Depot	Truck	109	0.18	1) 19.6	0.680	13.3
Handling Charge at Mutare Depot	n.r.	n.r.	n.r.	1) 1.2	0.245	0.3
Mutare Depo→Beit Bridge	Train (in Zimbabwe)	1,000	0.03	2) 30.0	0.730	21.9
Beit Bridge→Durban Port	Train (in South Africa)	1,339	0.04	2) 53.6	0.730	39.1
TOTAL COST	n.r.	2,535	n.r.	121.3	0.706	85.6

NOTES : 1) GMB, Nyanga Depot
2) National Railway of Zimbabwe, Mutare Office

Ⓑ Cotton

Transport and Handling	Vehicle	Distance (km)	Unit Cost (Z$/t·km)	Financial Cost(Z$/t)	Conversion Factor	Economic Cost(Z$/t)
Project Area→Myamaropa Depot	Truck	18	0.18	1) 3.2	0.680	2.2
Handling Charge at Myamaropa Depot	n.r.	n.r.	n.r.	1) 1.2	0.245	0.3
Myamaropa Depot→Mutare Depot	Truck	178	0.18	1) 32.0	0.680	21.8
Handling Charge at Mutare Depot	n.r.	n.r.	n.r.	1) 1.2	0.245	0.3
Ginning Cost at CMB Mutare Factory	n.r.	n.r.	n.r.	2) 18.0	0.817	14.7
Mutare Depo→Beit Bridge	Train (in Zimbabwe)	1,000	0.03	3) 30.0	0.730	21.9
Beit Bridge→Durban Port	Train (in South Africa)	1,339	0.04	3) 53.6	0.730	39.1
TOTAL COST	n.r.	2,535	n.r.	139.2	0.719	100.2

NOTES : 1) CMB, Nyamaropa Depot
2) CMB, Mutare Office
3) National Railway of Zimbabwe, Mutare Office

Table I .8 . Financial Prices (Producer Prices) for Agricultural Products

Grade \ Price	1990 Feb.Producer Price (Z$/t)	Share of Each Grade (%)
Maize Average	214.70	100
A	215.00	90
B	212.80	8
C	210.50	2
D	186.60	0
Cotton Average	904.00	100
A	925.00	70
ASS	920.00	10
B	860.00	10
C	840.00	5
D	730.00	5
Sugarbean Average	435.00	100
A	450.00	50
B	420.00	50
Wheat Average	398.60	100
AS	400.00	95
BS	396.90	2
CS	393.80	1
DS	384.60	1
U	300.00	1
Ground Nuts Average	971.60	100
A1	1000.00	60
A2	981.00	10
A3	963.00	10
A4	944.50	5
B1	900.50	5
B2	850.00	5
B3	800.00	5
Soyabean Average	456.62	100
A1	461.79	80
A	456.75	10
BB	435.00	5
C	395.20	5
Coffee Average	4649.00	100
1	4920.00	50
2	4715.00	20
3	4510.00	10
4	4305.00	5
5	4100.00	5
6	3895.00	5
7	3690.00	3
8	3485.00	2
Sunflower Average	436.86	100
AA	455.00	60
BB	432.25	25
CA	372.00	15

Table I .9 Financial and Economic Prices
of Non-trated & Minor-trated(Traded but Minor-in-share)Farm Output

Price / Crop	Financial Price (Z$/kg)	Conversion Factor	Economic Price (Z$/kg)
Sugarbean	1) 0.435	0.852	0.371
Soyabean	1) 0.457	0.852	0.389
Ground Nuts	1) 0.972	0.852	0.828
Sunflower	1) 0.437	0.852	0.372
Coffee	1) 4.649	0.852	3.961
Onion	2) 1.700	0.852	1.448
Tobacco	3) 3.071	0.852	2.616

NOTES : 1) Financial prices of sugarbean, soyabean, ground nuts, sunflower and coffee are GMB producer prices.

2) Financial price of onion is local market price.

3) Financial price of tobacco is average market price in 1989 auction.

Table I.10 Financial and Economic Prices of Farm Inputs

Item		Unit	① Financial Price	② Sales Tax	③ = ① − ② Financial Price Less Sales Tax	④ Conversion Factor	⑤ = ③ × ④ Economic Price
Seed	Maize Seed	Z$/kg	3.25	0.00	3.25	0.640	2.08
	Cotton Seed	Z$/kg	0.21	0.00	0.21	0.640	0.13
	Tobacco Seed	Z$/kg	3.60	0.00	3.60	0.640	2.30
	Sugarbean Seed	Z$/kg	0.45	0.00	0.45	0.640	0.29
	Soyabean Seed	Z$/kg	0.99	0.00	0.99	0.640	0.63
	Ground Nuts Seed	Z$/kg	2.42	0.00	2.42	0.640	1.55
	Sunflower Seed	Z$/kg	4.80	0.00	4.80	0.640	3.07
	Coffee Seed	Z$/kg	12.00	0.00	12.00	0.640	7.68
	Wheat Seed	Z$/kg	2.44	0.00	2.44	0.640	1.56
	Onion Seed	Z$/kg	627.90	0.00	627.90	0.640	401.86
Fertilizer	Compound B	Z$/t	723.00	0.00	723.00	0.622	449.71
	Compound D	Z$/t	575.00	0.00	575.00	0.622	357.65
	Compound L	Z$/t	652.20	0.00	652.20	0.622	405.67
	Compound S	Z$/t	705.00	0.00	705.00	0.622	438.51
	Ammonium Nitrate	Z$/t	597.60	0.00	597.60	0.622	371.71
	Manure	Z$/t	10.00	0.00	10.00	0.622	6.22
	Gypsum	Z$/t	195.00	0.00	195.00	0.622	121.29
Chemical	Agrithrin	Z$/ℓ	103.90	11.54	92.36	0.622	57.45
	Carbaryl	Z$/kg	22.95	2.55	20.40	0.622	12.69
	Deldrin	Z$/kg	11.25	1.25	10.00	0.622	6.22
	Cuttoran	Z$/kg	34.00	3.78	30.22	0.622	18.80
	Atrazine	Z$/kg	34.00	3.78	30.22	0.622	18.80
	Endosulfan	Z$/kg	26.95	2.99	23.96	0.622	14.90
	Dithane	Z$/kg	21.05	3.24	18.71	0.622	11.64
	Anilirime	Z$/kg	34.00	3.78	30.22	0.622	18.80
	Decamethrin	Z$/ℓ	11.67	1.30	10.37	0.622	6.45
	Thiram	Z$/kg	12.75	1.42	11.33	0.622	7.05
	Mancozeb	Z$/kg	18.05	2.01	16.04	0.622	9.98
	Cypermethrin	Z$/ℓ	23.35	2.59	20.76	0.622	12.91
	Copper Oxchloride	Z$/kg	6.50	0.72	5.78	0.622	3.60
	Thiodan	Z$/kg	26.95	2.99	23.96	0.622	14.90
	Rogor	Z$/ℓ	25.90	2.88	23.02	0.622	14.32
	EDB	Z$/ℓ	14.25	1.58	12.67	0.622	7.88
Machinery & Equipment	Scotch Cart	Z$/Unit	136.00	15.11	120.89	0.852	103.00
	Cultivaler	Z$/Unit	189.50	21.06	168.44	0.852	143.51
	Wheel burrow	Z$/Unit	159.95	17.77	142.18	0.852	121.14
	Plough	Z$/Unit	117.95	13.11	104.84	0.852	89.32
	Sickle	Z$/Unit	8.95	0.99	7.96	0.852	6.78
	Hoe	Z$/Unit	5.25	0.58	4.67	0.852	3.98
	Napsak Sprayer	Z$/Unit	239.50	26.61	212.89	0.852	181.38
	EDB Injection	Z$/Unit	150.00	16.67	133.33	0.852	113.60
	Tracter	Z$/Unit·day	1)45.00	0.00	45.00	0.852	38.34
Labour	Skilled Labour	Z$/m·d	2.75	0.00	2.75	0.817	2.25
	Unskilled Labour	Z$/m·d	2.00	0.00	2.00	0.245	0.49
	Draft Animal Labour	Z$/o·d	1.38	0.00	1.38	0.245	0.34
Change	Development Fee	Z$/ha	6.00	0.00	6.00	0.817	4.90
	CMB Cotton Handling Charge	Z$/ha	6.00	0.00	6.00	0.817	4.90

NOTES : 1) Lental Fee

Table I .11 Conversion Factors for Construction Cost, Operation & Management Cost, and Replacement Cost

Cost Items	① Share(%)	Components	Traded Good &Serveces	Non-traded Good&Services	Skilled Labour	Unskilled Labour	Transfered Values	②Conversion Factor for Each Cost Item	①×②
		Conversion Factor	1.000	0.852	0.817	0.245	0		
Construction Cost	100.0	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	0.796
Intake&Water Conveyance Facilities	60.1	[n.r.] n.r.	[69.2] 0.692	[7.3] 0.062	[5.1] 0.042	[11.8] 0.029	[6.6] 0	[100%] 0.825	0.496
In-Field Works	25.4	[n.r.] n.r.	[46.0] 0.460	[19.0] 0.162	[5.7] 0.047	[22.7] 0.056	[6.6] 0	[100%] 0.725	0.184
Operation&Management Facilities	14.5	[n.r.] n.r.	[53.9] 0.539	[23.7] 0.202	[3.2] 0.026	[12.6] 0.031	[6.6] 0	[100%] 0.798	0.116
Operation&Maintenance Cost	100.0	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	0.800
Salery&Wages	34.8	[n.r.] n.r.	[0] 0	[0] 0	[90.0] 0.735	[10.0] 0.025	[0] 0	[100%] 0.760	0.264
Fuel&Oil	37.1	[40.2] 1) 0.249	[53.2] 0.532	[0] 0	[0] 0	[0] 0	[6.6] 0	[100%] 0.781	0.290
Spare Parts&Materials	25.6	[n.r.] n.r.	[57.6] 0.576	[35.8] 0.305	[0] 0	[0] 0	[6.6] 0	[100%] 0.881	0.226
General Expenses	2.5	[n.r.] n.r.	[0] 0	[93.4] 0.796	[0] 0	[0] 0	[6.6] 0	[100%] 0.796	0.020
Replacemant Cost	—	—	—	—	—	—	—	—	—
Pump&Generator at Pump Station	n.r.	[n.r.] n.r.	[84.2] 0.842	[9.2] 0.078	[0] 0	[0] 0	[6.6] 0	[100%] 0.920	0.920
Generator at PMO	n.r.	[n.r.] n.r.	[83.9] 0.839	[9.5] 0.081	[0] 0	[0] 0	[6.6] 0	[100%] 0.920	0.920
Farming&Maintenance Machines	n.r.	[n.r.] n.r.	[84.1] 0.841	[9.3] 0.079	[0] 0	[0] 0	[6.6] 0	[100%] 0.920	0.920
Vehicle&Other Equipment	n.r.	[n.r.] n.r.	[77.9] 0.779	[15.5] 0.132	[0] 0	[0] 0	[6.6] 0	[100%] 0.911	0.911

NOTES : 1) Conversion factor for fuel (0.620) is applied.

Table I.12 Financial & Economic Project Cost

(Unit:thousand Z$)

Cost Items	Financial Cost	Conversion Factor	Economic Cost
Investment Cost			
(1) Construciton Cost	18135.0	0.825	14961.0
① Intake & Water Conveyance Facilities	7681.0	0.725	5569.0
② In-field Works	4386.0	0.798	3500.0
③ Operation & Managemant	30202.0	0.798	24030.0
(2) Engineering & Administration Cost	2945.0	0.927	2730.0
(3) Compensation	160.0	0.000	0.0
(4) Physical Contingency	3019.0	0.886	2674.8
Total	36326.0	0.810	29434.8
Operation & Maintenance Cost			
(1) Salary & Wages	154.8	0.760	117.6
(2) Fuel & Oil	285.1	0.781	222.7
(3) Spare Parts & Materials	126.6	0.881	111.5
(4) General Expenses	12.1	0.796	9.6
Total	578.6	0.800	461.4
Replacement Cost			
Pump & Generator at Pump Station (20Y)	5336.0	0.920	4909.1
Generator at PMO (20Y)	59.0	0.920	54.3
Farming & Maintenance machines (10Y)	1500.0	0.920	1380.0
Velicle & Other Equipment (7Y)	187.0	0.911	170.4

Table I.13 Investment Schedule

(Unit: thousand Z$)

Cost			Year 1991	1992	1993	1994	1995	Total
Financial Cost	Block A	F/C			77	935	2805	3817
		L/C			76	499	1475	2050
		Total			153	1434	4280	5867
	Block B	F/C	84	83	982	2947		4096
		L/C	69	70	525	1551		2215
		Total	153	153	1507	4498		6311
	Block C	F/C	86	86	1451	4350		5973
		L/C	88	88	831	2466		3473
		Total	174	174	2282	6816		9446
	Block D	F/C			79	1120	3361	4560
		L/C			88	633	1858	2579
		Total			167	1753	5219	7139
	Block E	F/C			76	680	2039	2795
		L/C			67	425	1257	1749
		Total			143	1105	3296	4544
	Total	F/C	170	169	2665	10032	8205	21241
		L/C	157	158	1587	5574	4590	12066
		Total	327	327	4252	15606	12795	33307
Economic Cost	Block A	F/C			62	751	2254	3067
		L/C			61	401	1185	1647
		Total			123	1152	3439	4714
	Block B	F/C	67	67	789	2368		3291
		L/C	55	56	422	1246		1779
		Total	122	123	1211	3614		5070
	Block C	F/C	69	69	1166	3495		4799
		L/C	71	71	668	1981		2791
		Total	140	140	1834	5476		7590
	Block D	F/C			63	900	2700	3663
		L/C			71	509	1493	2073
		Total			134	1409	4193	5736
	Block E	F/C			61	546	1638	2245
		L/C			54	341	1010	1405
		Total			115	887	2648	3650
	Total	F/C	136	136	2141	8060	6592	17065
		L/C	126	127	1276	4478	3688	9695
		Total	262	263	3417	12538	10280	26760

Table I .14 Net Production Value (Without-Project Case)

Crop \ Item		Yield (Kg/ha)	Farmgate Price (Z$/kg)	Gross Production Value (Z$/ha)	Prodution Cost (Z$/ha)	Net Production Value (Z$/ha)	Area (ha)	Total Net Prodution Value (Z$)
MAIZE	F	2800	0.215	602.0	632.6	▲ 30.6	619.9	▲18969
	E	2800	0.223	624.4	451.5	172.9	619.9	107181
COTTON	F	1462	0.904	1321.6	977.9	343.7	456.8	157002
	E	1462	1.027	1501.5	626.2	875.3	456.8	399837
TOBACCO	F	941	3.071	2889.8	1571.3	1318.5	14.9	19646
	E	941	2.616	2461.7	1111.8	1349.9	14.9	20114
SUGARBEAN	F	1082	0.435	470.7	587.7	▲117.0	3.3	▲ 386
	E	1082	0.371	401.4	405.6	▲ 4.2	3.3	▲ 14
SOYABEAN	F	1138	0.457	520.1	536.7	▲ 16.6	0.5	▲ 8
	E	1138	0.389	442.7	384.6	58.1	0.5	29
GROUND NUTS	F	1030	0.972	1001.2	480.5	520.7	4.4	2291
	E	1030	0.828	852.8	350.6	502.2	4.4	2210
SUNFLOWER	F	963	0.437	420.8	632.5	▲211.7	36.9	▲7812
	E	963	0.372	358.2	446.4	▲ 88.2	36.9	▲3255
COFFEE	F	1085	4.649	5044.2	1009.4	4034.8	4.8	19367
	E	1085	3.961	4297.7	709.9	3587.8	4.8	17221
Total	F	n.r.	n.r.	n.r.	n.r.	n.r.	1141.5	171131
	E	n.r.	n.r.	n.r.	n.r.	n.r.	1141.5	543323

NOTES : F = Financial Value
E = Economic Value

Table I.15 Net Production Value (With-Project Case)

Crop \ Item		Yield (Kg/ha)	Farmgate Price (Z$/kg)	Gross Production Value (Z$/ha)	Prodution Cost (Z$/ha)	Net Production Value (Z$/ha)	Area (ha)	Total Net Prodution Value (Z$)
MAIZE	F	6000	0.215	1290.0	994.3	295.7	238.0	70377
	E	6000	0.223	1338.0	677.5	660.5	238.0	157199
COTTON	F	2800	0.904	2531.2	1282.1	1249.1	204.0	254816
	E	2800	1.027	2875.6	820.9	2054.7	204.0	419159
TOBACCO	F	2400	3.071	7370.4	2461.4	4909.0	204.0	1001436
	E	2400	2.616	6278.4	1672.6	4605.8	204.0	939583
SUGARBEAN 1	F	1600	0.435	696.0	635.7	60.3	238.0	14351
	E	1600	0.371	593.6	445.8	147.8	238.0	35176
SUGARBEAN 2	F	1700	0.435	739.5	635.7	103.8	204.0	21175
	E	1700	0.371	630.7	445.8	184.9	204.0	37720
WHEAT	F	3500	0.399	1396.5	874.7	521.8	442.0	230636
	E	3500	0.287	1004.5	607.0	397.5	442.0	175695
GROUND NUTS	F	3000	0.972	2916.0	810.4	2105.6	34.0	71590
	E	3000	0.828	2484.0	568.3	1915.7	34.0	65134
ONION	F	20000	1.700	34000.0	2907.5	31092.5	34.0	1057145
	E	20000	1.448	28960.0	1928.2	27031.8	34.0	919081
IRRIGATION TOTAL	F	n.r.	n.r.	n.r.	n.r.	n.r.	680.0	2721526
	E	n.r.	n.r.	n.r.	n.r.	n.r.	680.0	2748747
MAIZE	F	3220	0.215	692.3	695.9	▲ 3.6	254.0	▲ 914
	E	3220	0.223	718.1	496.7	221.4	254.0	56236
COTTON	F	1681	0.904	1519.6	1075.7	443.9	207.5	92109
	E	1681	1.027	1726.4	688.8	1037.6	207.5	215302
NON-IRRIGATION TOTAL	F	n.r.	n.r.	n.r.	n.r.	n.r.	461.5	91195
	E	n.r.	n.r.	n.r.	n.r.	n.r.	461.5	271538
TOTAL	F	n.r.	n.r.	n.r.	n.r.	n.r.	1141.5	2812721
	E	n.r.	n.r.	n.r.	n.r.	n.r.	1141.5	3020285

NOTES : F = Financial Value
E = Economic Value

Table I.16 Road Benefit

Item / Block	① Number of Household	② Average Daily Man-time Saving per Household (h)	③=②/7h Average Daily Man-day Saving per Household (man·day)	④ Operation Day (day)	⑤=③×④ Average Annual Man-day Saving per Household (man·day)	⑥=①×⑤ Annual Man-day Saving (man·day)	⑦ Minimum Wage Rate (Z$/day)	⑧=⑥×⑦ Financial Road Benefit (Z$)	⑨ Convension Factor for Unskilled Labour	⑩=⑧×⑨ Economic Road Benefit (Z$)
Block A	60	1.00	0.143	60	8.6	516.0	2.0	1032.0	0.245	252.8
Block B	75	1.00	0.143	60	8.6	645.0	2.0	1290.0	0.245	316.1
Block C	67	1.20	0.171	60	10.3	690.1	2.0	1380.2	0.245	338.1
Block D	111	1.40	0.200	60	12.0	1332.0	2.0	2664.0	0.245	652.7
Block E	53	1.00	0.143	60	8.6	455.8	2.0	911.6	0.245	223.3
Total	366	n.r.	n.r.	n.r.	n.r.	3638.9	n.r.	7277.8	0.245	1783.0

Table I.17 Domestic Water Benefit

Item / Block	① Number of Household	② Average Daily Man-time Saving per Household (h)	③=②/7h Average Daily Man-day Saving per Household (man·day)	④ Operation Day (day)	⑤=③×④ Average Annual Man-day Saving per Household (man·day)	⑥=①×⑤ Annual Man-day Saving (man·day)	⑦ Minimum Wage Rate (Z$/day)	⑧=⑥×⑦ Financial Domestic Water Benefit (Z$)	⑨ Convension Factor for Unskilled Labour	⑩=⑧×⑨ Economic Domestic Water Benefit (Z$)
Block A	60	1.25	0.179	180	32.2	1932.0	2.0	3864.0	0.245	946.7
Block B	75	1.25	0.179	180	32.2	2415.0	2.0	4830.0	0.245	1183.4
Block C	67	1.50	0.214	180	38.5	2579.5	2.0	5159.0	0.245	1264.0
Block D	111	1.75	0.250	180	45.0	4995.0	2.0	9990.0	0.245	2447.6
Block E	53	1.25	0.179	180	32.2	1706.6	2.0	3413.2	0.245	836.2
Total	366	n.r.	n.r.	n.r.	n.r.	13628.1	n.r.	27256.2	0.245	6677.9

Table I.18 Crop Budget per Hectare (WITHOUT-PROJECT CASE)

Item \ Crop	Price	Quantity Unit	Unit Cost (Z$/kg)	MAIZE		COTTON		TOBACCO		SUGARBEAN		SOYABEAN		GROUND NUTS		SUNFLOWER		COFFEE	
				Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/kha	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)
① Yield		kg/ha		2800		1862		981		1082		1138		1030		963		1085	
② Farmgate Prince	F	Z$/ha		0.215		0.904		3,071		0.435		0.457		0.972		0.437		4.689	
	E			0.223		1.027		2,610		0.371		0.389		0.828		0.372		3.961	
③ Gross Production Value	F	Z$/ha			602.0		1321.6		2889.8		470.7		520.1		1001.2		420.8		5048.2
	E				624.4		1501.5		2461.7		401.6		482.7		852.8		358.2		4297.7
④ Production Cost	F	Z$/ha			632.6		977.9		1571.3		587.9		536.7		480.5		632.5		1009.4
	E				851.5		626.2		1111.8		405.6		384.6		350.6		446.8		706.9
Seed																			
Standard Variety	F	kg/ha	1)	23.8	77.4	20.7	8.3	116.7	60.1	120.0	54.0	76.0	75.2	50.0	121.0	30.0	144.0	2.8	33.6
	E		1)	23.8	49.5	20.7	2.7	116.7	38.4	120.0	34.6	76.0	47.9	50.0	77.5	30.0	92.1	2.8	21.5
Fertilizer																			
Compound B	F	kg/ha	0.723					416.0	300.8										
	E		0.450					416.0	187.2										
Compound D	F	kg/ha	0.575	182.0	104.7					165.0	94.9			33.3	19.1				
	E		0.358	182.0	65.2					165.0	59.1			33.3	11.9				
Compound L	F	kg/ha	0.652			226.2	147.5					125.0	81.5						
	E		0.400			226.2	91.8					125.0	50.8						
Compound S	F	kg/ha	0.705					33.0	23.3							150.0	105.8		
	E		0.439					33.0	14.5							150.0	65.9		
Ammonium Nitrate	F	kg/ha	0.598	130.1	77.8	127.6	76.3	333.0	199.1	165.0	98.7	83.0	49.6	16.7	10.0			340.0	203.3
	E		0.372	130.1	48.4	127.6	47.5	333.0	123.9	165.0	61.4	83.0	30.9	16.7	6.2			340.0	126.5
Chemical																			
Agrithrin	F	kg/ha	103.90			0.9	93.5												
	E		57.45			0.9	51.7												
Carbaryl	F	kg/ha	22.95			2.9	66.6												
	E		12.69			2.9	36.8												
Deldrin	F	kg/ha	11.25															0.7	7.9
	E		6.22															0.7	4.4
Thiodan	F	kg/ha	26.95			3.6	97.0			1.0	27.0								
	E		14.90			3.6	53.6			1.0	14.9								
Rogor	F	ℓ/ha	25.90(25%)			1.2	31.1	2.7	69.9										
	E		14.32(25%)			1.2	17.2	2.7	38.7										
EDB	F	ℓ/ha	14.25(25%)					4.5	64.1										
	E		7.88(25%)					4.5	35.5										
Machinevy & Equipment Depriciation																			
Scotch Cart	F	ha	14.39(5%)	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4
	E		10.90(5%)	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9
Cultivater	F	ha	10.00(5%)	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0
	E		7.60(5%)	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6
Wheel burrow	F	ha	8.46(5%)	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5
	E		6.61(5%)	1.0	6.6	1.0	6.6	1.0	6.6	1.0	6.6	1.0	6.6	1.0	6.6	1.0	6.6	1.0	6.6
Plough	F	ha	6.24(5%)	1.0	6.2	1.0	6.2	1.0	6.2	1.0	6.2	1.0	6.2	1.0	6.2	1.0	6.2	1.0	6.2
	E		4.73(5%)	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7
Sickle	F	ha	2.37(5%)	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4
	E		1.79(5%)	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8
Hoe	F	ha	2.22(5%)	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2
	E		1.68(5%)	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7
Napsak Sprayer	F	ha	15.84(5%)			1.0	5.6	1.0	15.8	1.0	15.8							1.0	15.8
	E		12.00(5%)			1.0	12.0	1.0	12.0	1.0	12.0							1.0	12.0
EDB Injection	F	ha	9.92(25%)				9.9	1.0	9.9										
	E		7.51(25%)				7.5	1.0	7.5										
Tobacco Drying Facility	F	ha	3)					1.0	150.0										
	E		3)					1.0	127.8										
Labour																			
Family Labour	F	m-day /ha	2.35(5%)	105.0	288.8	101.0	298.3	210.0	577.5	77.0	211.8	92.0	253.0	92.0	253.0	105.0	288.8	210.0	577.5
	E		2.25(5%)	105.0	236.3	107.0	240.8	210.0	472.5	77.0	173.3	92.0	207.0	92.0	207.0	105.0	236.3	210.0	472.5
Hired Labour	F	m-day /ha	2.00(5%)			28.0	56.0											58.0	116.0
	E		0.49(5%)			28.0	13.7											58.0	28.4
Draft Animal	F	Oxen-day	1.35(5%)	28.0	28.6	32.0	84.2	33.0	45.5	22.0	30.4	16.0	22.1	16.0	22.1	28.0	38.6		
	E		0.34(5%)	28.0	9.5	32.0	10.9	33.0	11.2	22.0	7.5	16.0	5.4	16.0	5.4	28.0	9.5		
Charge																			
Development Fee	F	ha	6.00(5%)	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0
	E		4.90(5%)	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9
CMB Cotton Handling Charge	F	ha	6.00(5%)			1.0	6.0												
	E		4.90(5%)			1.0	4.9												
Interest																			
AFC Loan Interest	F	ha	5.61(5%)	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6
	E		4.58(5%)	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6
⑤ Net Production Value	F	Z$/ha			▲30.6		393.7		1318.5		▲117.0		▲16.6		520.7		▲211.7		4034.8
	E				172.9		875.3		1349.9		▲4.2		58.1		502.2		▲88.2		3587.8

1) Unit cost of each seed is refered in Table I.10

2) Unit : g

3) Estimated Central Fee for Tobacco Drying Facility per Ha-Year

Table I.19 Crop Budget per Hectare (WITH-PROJECT CASE)

Item \ Crop	Price	Quantity Unit	Unit Cost (Z$/kg)	MAIZE		COTTON		TOBACCO		SUGARBEAN 1		SUGARBEAN 2		WHEAT		GROUND NUTS		ONION	
				Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)	Quantity	Cost (Z$/ha)
① Yield		kg/ha		6000		2800		2400		1600		1700		3500		3000		20000	
② Farmgate Price	F	Z$/kg		0.215		0.908		3.071		0.435		0.435		0.399		0.972		1.700	
	E			0.223		1.027		2.616		0.371		0.371		0.287		0.828		1.448	
③ Gross Production Value	F	Z$/ha			1290.0		2531.2		7370.4		696.0		739.5		1396.5		2916.0	34000.0	
	E				1338.0		2875.6		6278.4		593.6		630.7		1004.5		2488.0	28960.0	
④ Production Cost	F	Z$/ha			994.3		1282.1		2461.4		635.7		635.7		874.7		810.4		2907.5
	E				677.5		820.9		1672.6		445.8		445.8		607.0		568.3		1928.2
Seed																			
Standard Variety	F	kg/ha		30.0	97.5	25.0	5.3	10.0	36.0	80.0	36.0	80.0	36.0	80.0	195.2	80.0	193.6	3.0	1883.7
	E			30.0	62.4	25.0	5.3	10.0	23.0	80.0	23.2	80.0	23.2	80.0	124.8	80.0	124.0	3.0	1205.6
Fertilizer																			
Compound B	F	kg/ha	0.723					1200.0	867.6										
	E		0.450					1200.0	580.0										
Compound D	F	kg/ha	0.575	300.0	172.5					200.0	115.0	200.0	115.0	300.0	172.5				
	E		0.358	300.0	107.4					200.0	71.6	200.0	71.6	300.0	107.4				
Compound L	F	kg/ha	0.652			350.0	228.2									200.0	130.4		
	E		0.406			350.0	142.1									200.0	81.2		
Compound S	F	kg/ha	0.705					30.0	21.2									500.0	352.5
	E		0.439					30.0	13.2									500.0	219.5
Ammonium Nitrate	F	kg/ha	0.598	150.0	89.7	250.0	149.5	300.0	179.4	100.0	59.8	100.0	59.8	150.0	89.7				
	E		0.372	150.0	55.8	250.0	93.0	300.0	111.6	100.0	37.2	100.0	37.2	150.0	55.8				
Manure	F	kg/ha	0.010	3230.0	32.3	530.0	5.3												
	E		0.006	3230.0	19.4	530.0	3.2												
Gypsum	F	kg/ha	0.195													200.0	39.0		
	E		0.121													200.0	24.2		
Chemical																			
Carbaryl	F	kg/ha	22.95	1.0	23.0	3.5	80.3			0.8	18.4	0.8	18.4						
	E		12.69	1.0	12.7	3.5	44.4			0.8	10.2	0.8	10.2						
Cuttoran	F	kg/ha	34.00			3.2	108.8												
	E		18.80			3.2	60.2												
Atrazine	F	kg/ha	34.00	2.8	95.2														
	E		18.80	2.8	52.6														
Endosulfan	F	kg/ha	26.95															0.9	24.3
	E		14.90															0.9	13.4
Dithane	F	kg/ha	21.05															1.8	37.9
	E		11.68															1.8	21.0
Anilirime	F	kg/ha	34.00					1.2	40.8										
	E		18.80					1.2	22.6										
Decamethrin	F	ℓ/ha	11.67 (25%)					1.4	16.3										
	E		6.45 (25%)					1.4	9.0										
Thiram	F	kg/ha	12.75							0.2	2.6	0.2	2.6			0.1	1.3		
	E		7.05							0.2	1.4	0.2	1.4			0.1	0.7		
Mancozab	F	kg/ha	18.05							1.2	21.7	1.2	21.7						
	E		9.98							1.2	12.0	1.2	12.0						
Cypermethrin	F	ℓ/ha	33.35 (25%)					0.6	14.0										
	E		12.91 (25%)					0.5	7.7										
Copper Oxychlorid	F	kg/ha	6.50													2.0	13.0		
	E		3.60													2.0	7.2		
Thiodan	F	kg/ha	26.95			3.5	94.3												
	E		14.90			3.5	52.2												
EDB	F	ℓ/ha	14.25 (25%)					22.0	313.5										
	E		7.88 (25%)					22.0	173.4										
Machinevy & Equipment Depriciation																			
Scotch Cart	F	ha	14.39 (25%)	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4	1.0	14.4
	E		10.90 (25%)	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9	1.0	10.9
Cultivater	F	ha	10.03 (25%)	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0	1.0	10.0
	E		7.60 (25%)	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6	1.0	7.6
Wheel burrow	F	ha	8.46 (25%)	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5	1.0	8.5
	E		6.41 (25%)	1.0	6.4	1.0	6.4	1.0	6.4	1.0	6.4	1.0	6.4	1.0	6.4	1.0	6.4	1.0	6.4
Plough	F	ha	8.24 (25%)	1.0	8.2	1.0	8.2	1.0	8.2	1.0	8.2	1.0	8.2	1.0	8.2	1.0	8.2	1.0	8.2
	E		4.73 (25%)	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7	1.0	4.7
Sickle	F	ha	2.37 (25%)	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4	1.0	2.4
	E		1.79 (25%)	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8	1.0	1.8
Hoe	F	ha	2.22 (25%)	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2	1.0	2.2
	E		1.68 (25%)	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7	1.0	1.7
Napsak Sprayer	F	ha	15.84 (25%)	1.0	15.8	1.0	15.8	1.0	15.8	1.0	15.8	1.0	15.8	1.0	15.8	1.0	15.8	1.0	15.8
	E		12.00 (25%)	1.0	12.0	1.0	12.0	1.0	12.0	1.0	12.0	1.0	12.0	1.0	12.0	1.0	12.0	1.0	12.0
EDB Injection	F	ha	9.97 (25%)					1.0	9.9										
	E		7.51 (25%)					1.0	7.5										
Tracter	F	ha	33.46 (25%)	1.0	25.0	1.0	25.0	1.0	25.0	1.0	25.0	1.0	25.0	1.0	25.0	1.0	25.0	1.0	25.0
	E		27.43 (25%)	1.0	20.4	1.0	20.4	1.0	20.4	1.0	20.4	1.0	20.4	1.0	20.4	1.0	20.4	1.0	20.4
Tobacco Drying Facility	F	ha	159.00 (25%)					1.0	159.0										
	E		127.66 (25%)					1.0	127.8										
Labour																			
Family Labour	F	man-day /ha	2.73 (25%m-d)	125.0	341.8	137.0	376.8	245.0	673.8	92.0	253.0	92.0	253.0	110.0	302.5	110.0	302.5	170.0	467.5
	E		2.25 (25%m-d)	125.0	281.3	137.0	308.3	245.0	551.3	92.0	207.0	92.0	207.0	110.0	247.5	110.0	247.5	170.0	382.5
Hired Labour	F	man-day /ha	2.50 (25%m-d)			43.0	86.0												
	E		0.49 (25%m-d)			43.0	21.1												
Draft Animal	F	oxen-day /ha	1.38 (25%o-d)	32.0	44.2	33.0	45.5	31.0	42.8	24.0	33.1	24.0	33.1	25.0	34.5	25.0	34.5	33.0	45.5
	E		0.34 (25%o-d)	32.0	10.9	33.0	11.2	31.0	10.5	24.0	8.2	24.0	8.2	25.0	8.5	25.0	8.5	33.0	11.2
Charge																			
Development Fee	F	ha	6.00 (25%)	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0	1.0	6.0
	E		4.90 (25%)	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9	1.0	4.9
CMB Cotton Handling Charge	F	ha	6.00 (25%)			1.0	6.0												
	E		4.90 (25%)			1.0	4.9												
Interest																			
AFC Loan Interest	F	ha	5.61 (25%)	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6	1.0	5.6
	E		4.58 (25%)	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6	1.0	4.6
⑤ Net Production Value	F	Z$/ha			295.7		1249.1		4909.0		60.3		103.8		521.8		2105.6		31092.5
	E				660.5		2054.7		4605.8		197.8		184.9		397.5		1915.7		27031.8

Table I.20 Economic Internal rate of Return

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION; SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	5 % INC.BENEFIT	8 % INC.BENEFIT
1	1991	262.00	0.00	0.00	-262.00	-262.00	-262.00
2	1992	263.00	0.00	0.00	-263.00	-250.48	-238.55
3	1993	3417.00	0.00	0.00	-3417.00	-3099.32	-2811.17
4	1994	12638.00	185.00	0.00	-12723.00	-10990.61	-9494.10
5	1995	10200.00	461.00	796.00	-9948.00	-8182.60	-5731.84
6	1996	0.00	461.00	1968.00	1527.00	1196.44	937.45
7	1997	0.00	461.00	1998.00	1537.00	1139.47	850.29
8	1998	0.00	461.00	2237.00	1776.00	1262.17	897.00
9	1999	0.00	461.00	2485.00	2024.00	1369.92	927.22
10	2000	0.00	461.00	2485.00	2024.00	1304.69	841.01
11	2001	0.00	631.00	2485.00	1854.00	1138.20	698.75
12	2002	0.00	461.00	2485.00	2024.00	1183.39	691.92
13	2003	0.00	461.00	2485.00	2024.00	1127.04	627.58
14	2004	0.00	1841.00	2485.00	644.00	341.53	181.12
15	2005	0.00	461.00	2485.00	2024.00	1022.26	516.31
16	2006	0.00	461.00	2485.00	2024.00	973.59	468.31
17	2007	0.00	461.00	2485.00	2024.00	927.22	424.77
18	2008	0.00	631.00	2485.00	1854.00	808.89	352.92
19	2009	0.00	461.00	2485.00	2024.00	841.81	349.46
20	2010	0.00	461.00	2485.00	2024.00	800.97	316.97
21	2011	0.00	461.00	2485.00	2024.00	762.82	287.50
22	2012	0.00	461.00	2485.00	2024.00	726.52	260.77
23	2013	0.00	461.00	2485.00	2024.00	691.92	236.53
24	2014	0.00	6750.00	2485.00	-4265.00	-1388.56	-452.08
25	2015	0.00	631.00	2485.00	1854.00	574.87	179.25
26	2016	0.00	461.00	2485.00	2024.00	597.69	176.50
27	2017	0.00	461.00	2485.00	2024.00	569.23	160.89
28	2018	0.00	461.00	2485.00	2024.00	542.12	145.21
29	2019	0.00	461.00	2485.00	2024.00	516.31	131.71
30	2020	0.00	461.00	2485.00	2024.00	491.72	119.46
31	2021	0.00	461.00	2485.00	2024.00	468.31	108.35
32	2022	0.00	631.00	2485.00	1854.00	408.55	90.83
33	2023	0.00	461.00	2485.00	2024.00	424.77	89.14
34	2024	0.00	1941.00	2485.00	644.00	128.72	25.73
35	2025	0.00	461.00	2485.00	2024.00	385.25	72.34
36	2026	0.00	461.00	2485.00	2024.00	366.93	66.52
37	2027	0.00	461.00	2485.00	2024.00	349.46	60.34
38	2028	0.00	461.00	2485.00	2024.00	332.82	54.73
39	2029	0.00	631.00	2485.00	1854.00	290.35	45.47
40	2030	0.00	461.00	2485.00	2024.00	301.88	45.82
41	2031	0.00	461.00	2485.00	2024.00	287.52	40.84
42	2032	0.00	461.00	2485.00	2024.00	273.81	37.04
43	2033	0.00	461.00	2485.00	2024.00	260.77	33.60
44	2034	0.00	6750.00	2485.00	-4265.00	-523.33	-54.22
45	2035	0.00	461.00	2485.00	2024.00	238.53	27.64
46	2036	0.00	631.00	2485.00	1854.00	208.34	22.97
47	2037	0.00	461.00	2485.00	2024.00	214.54	22.74
48	2038	0.00	461.00	2485.00	2024.00	204.32	20.63
49	2039	0.00	461.00	2485.00	2024.00	194.59	18.71
50	2040	0.00	461.00	2485.00	2024.00	185.33	16.97
	TOTAL	26750.00	37749.00	111378.00	45859.00	1733.83	-9377.09
	(US $)	11614.58	16384.11	48341.15	20342.45	752.53	-3835.89

EIRR= 5.50%

4. EIRR= 5.50%
5. BENEFIT-COST(B/C) RATIO: 1.05 (5%), 0.87 (10%), 0.79 (12%), 0.74 (13%), 0.67 (15%)
6. SENSITIVITY ANALYSIS;

	-- EIRR --
(I) BASE CASE	5.50%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	4.47%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	3.32%
(IV) BENEFIT MINUS TEN PERCENT	4.44%
(V) COST PLUS TEN PERCENT	4.54%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	5.41%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	5.23%

Table I.21 Shadow Income Weight

Type of Household	Number of Household	Composition (%)	Estimated Average Household Income (z$/year)	Shadow Income Weight		
				e=0.5	e=1.0	e=2.0
Urban High-Income Employee	237,000	14.1	14,241	0.37	0.14	0.02
Small-scale Commercial Land Owner	14,000	0.8	8,291	0.61	0.25	0.06
Urban Low-Income Employee	213,000	12.7	4,568	0.67	0.45	0.20
Large-Scale Commercial Land Employee	209,000	12.4	2,256	0.95	0.91	0.83
Small-Scale Communal Land Owner	458,000	27.3	1,988	1.01	1.03	1.06
Small-Scale Communal Land in Project Area	618	0.037	1,268	1.27	1.62	3.24
Others	524,000	31.2	2,906	0.84	0.71	0.50
Not Classified	25,000	1.5	n.a.	n.a.	n.a.	n.a.
Total	1,680,000	100.0	4,453	0.68	0.46	0.21
Tax-Exempt Income Level	n.r.	n.r.	2,050	1.00	1.00	1.00

NOTES : 1) Large-scale Commercial Land Owners have been excluded.

2) Average household income in 1985 has been inflated by CPI of 1.41 in 1990.

3) "e" indicates elasiticy of marginal utility.

Table I.22.1 Social Internal Rate of Return

(Case 1, e= 0.5)

1. PROJECT NAME: Zimbabwe, Nyakombe Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	0 % INC.BENEFIT	9 % INC.BENEFIT
1	1991	262.00	0.00	0.00	-262.00	-262.00	-262.00
2	1992	263.00	0.00	0.00	-263.00	-243.52	-225.40
3	1993	3417.00	0.00	0.00	-3417.00	-2928.53	-2511.60
4	1994	12538.00	186.00	0.00	-12723.00	-10899.93	-9317.65
5	1995	10290.00	461.00	1810.00	-9731.00	-7152.58	-5257.38
6	1996	0.00	461.00	2525.00	2064.00	1404.72	956.03
7	1997	0.00	461.00	2525.00	2064.00	1300.67	819.64
8	1998	0.00	461.00	2941.00	2480.00	1298.71	810.30
9	1999	0.00	461.00	3156.00	2695.00	1456.82	786.64
10	2000	0.00	461.00	3156.00	2695.00	1348.17	674.42
11	2001	0.00	631.00	3156.00	2525.00	1169.56	541.73
12	2002	0.00	461.00	3156.00	2695.00	1156.84	495.72
13	2003	0.00	461.00	3156.00	2695.00	1078.22	425.00
14	2004	0.00	1941.00	3156.00	1315.00	483.62	177.79
15	2005	0.00	461.00	3156.00	2695.00	917.64	312.39
16	2006	0.00	461.00	3156.00	2695.00	849.58	287.82
17	2007	0.00	461.00	3156.00	2695.00	786.64	229.61
18	2008	0.00	631.00	3156.00	2525.00	682.43	184.44
19	2009	0.00	461.00	3156.00	2695.00	674.42	168.77
20	2010	0.00	461.00	3156.00	2695.00	624.46	144.78
21	2011	0.00	461.00	3156.00	2695.00	578.21	124.85
22	2012	0.00	461.00	3156.00	2695.00	535.38	106.36
23	2013	0.00	461.00	3156.00	2695.00	495.72	91.18
24	2014	0.00	6750.00	3156.00	-3594.00	-612.11	-184.25
25	2015	0.00	631.00	3156.00	2525.00	398.19	52.79
26	2016	0.00	461.00	3156.00	2695.00	393.52	57.46
27	2017	0.00	461.00	3156.00	2695.00	364.37	49.26
28	2018	0.00	461.00	3156.00	2695.00	337.38	42.24
29	2019	0.00	461.00	3156.00	2695.00	312.39	36.21
30	2020	0.00	461.00	3156.00	2695.00	289.25	31.04
31	2021	0.00	461.00	3156.00	2695.00	267.82	26.62
32	2022	0.00	631.00	3156.00	2525.00	232.34	21.38
33	2023	0.00	461.00	3156.00	2695.00	229.61	19.56
34	2024	0.00	1941.00	3156.00	1315.00	183.74	9.19
35	2025	0.00	461.00	3156.00	2695.00	196.88	14.38
36	2026	0.00	461.00	3156.00	2695.00	182.28	12.33
37	2027	0.00	461.00	3156.00	2695.00	168.77	10.57
38	2028	0.00	461.00	3156.00	2695.00	156.27	9.06
39	2029	0.00	631.00	3156.00	2525.00	135.57	7.28
40	2030	0.00	461.00	3156.00	2695.00	133.98	6.66
41	2031	0.00	461.00	3156.00	2695.00	124.05	5.71
42	2032	0.00	461.00	3156.00	2695.00	114.86	4.98
43	2033	0.00	461.00	3156.00	2695.00	106.36	4.28
44	2034	0.00	6750.00	3156.00	-3594.00	-131.33	-4.99
45	2035	0.00	461.00	3156.00	2695.00	91.18	3.09
46	2036	0.00	631.00	3156.00	2525.00	79.10	2.48
47	2037	0.00	461.00	3156.00	2695.00	78.17	2.27
48	2038	0.00	461.00	3156.00	2695.00	72.38	1.94
49	2039	0.00	461.00	3156.00	2695.00	67.02	1.67
50	2040	0.00	461.00	3156.00	2695.00	62.05	1.43
	TOTAL	26750.00	37749.00	141453.00	76944.00	188.36	-9623.83
	(US $)	11614.53	16384.11	61394.53	33395.83	81.76	-3742.99

EIRR= 8.08%

4. EIRR= 8.08%
5. BENEFIT-COST(B/C) RATIO: 1.33 (5%), 0.85 (10%), 0.73 (12%), 0.68 (13%), 0.60 (15%)
6. SENSITIVITY ANALYSIS;

	-- EIRR --
(I) BASE CASE	8.08%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	6.59%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	5.06%
(IV) BENEFIT MINUS TEN PERCENT	6.91%
(V) COST PLUS TEN PERCENT	7.02%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	8.02%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	7.93%

Table I.22.2 Social Internal Rate of Return

(Case 2, e= 1.0)

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	11 % INC.BENEFIT	12 % INC.BENEFIT
1	1991	262.00	0.00	0.00	-262.00	-262.00	-262.00
2	1992	263.00	0.00	0.00	-263.00	-236.94	-213.45
3	1993	3417.00	0.00	0.00	-3417.00	-2773.31	-2250.98
4	1994	12538.00	185.00	0.00	-12723.00	-9302.95	-6802.24
5	1995	10200.00	461.00	1288.00	-9453.00	-6226.98	-4101.91
6	1996	0.00	461.00	3221.00	2760.00	1637.93	972.03
7	1997	0.00	461.00	3221.00	2760.00	1476.61	788.92
8	1998	0.00	461.00	3624.00	3163.00	1523.49	733.88
9	1999	0.00	461.00	4026.00	3565.00	1546.95	671.26
10	2000	0.00	461.00	4026.00	3565.00	1393.65	544.81
11	2001	0.00	631.00	4026.00	3395.00	1195.67	421.10
12	2002	0.00	461.00	4026.00	3565.00	1131.12	359.08
13	2003	0.00	461.00	4026.00	3565.00	1019.82	291.28
14	2004	0.00	1941.00	4026.00	2185.00	562.67	144.90
15	2005	0.00	461.00	4026.00	3565.00	827.06	191.87
16	2006	0.00	461.00	4026.00	3565.00	745.10	155.73
17	2007	0.00	461.00	4026.00	3565.00	671.26	126.39
18	2008	0.00	631.00	4026.00	3395.00	575.92	97.69
19	2009	0.00	461.00	4026.00	3565.00	544.91	83.26
20	2010	0.00	461.00	4026.00	3565.00	490.82	67.58
21	2011	0.00	461.00	4026.00	3565.00	442.18	54.85
22	2012	0.00	461.00	4026.00	3565.00	398.36	44.51
23	2013	0.00	461.00	4026.00	3565.00	358.88	36.13
24	2014	0.00	6758.00	4026.00	-2724.00	-247.05	-22.41
25	2015	0.00	631.00	4026.00	3395.00	277.39	22.65
26	2016	0.00	461.00	4026.00	3565.00	262.41	19.32
27	2017	0.00	461.00	4026.00	3565.00	236.41	15.68
28	2018	0.00	461.00	4026.00	3565.00	212.98	12.72
29	2019	0.00	461.00	4026.00	3565.00	191.87	10.33
30	2020	0.00	461.00	4026.00	3565.00	172.86	8.38
31	2021	0.00	461.00	4026.00	3565.00	155.73	6.80
32	2022	0.00	631.00	4026.00	3395.00	133.61	5.25
33	2023	0.00	461.00	4026.00	3565.00	126.39	4.48
34	2024	0.00	1941.00	4026.00	2185.00	69.79	2.23
35	2025	0.00	461.00	4026.00	3565.00	102.58	2.95
36	2026	0.00	461.00	4026.00	3565.00	92.42	2.48
37	2027	0.00	461.00	4026.00	3565.00	83.25	1.94
38	2028	0.00	461.00	4026.00	3565.00	75.01	1.58
39	2029	0.00	631.00	4026.00	3395.00	64.35	1.22
40	2030	0.00	461.00	4026.00	3565.00	60.88	1.04
41	2031	0.00	461.00	4026.00	3565.00	54.85	0.84
42	2032	0.00	461.00	4026.00	3565.00	49.41	0.69
43	2033	0.00	461.00	4026.00	3565.00	44.51	0.53
44	2034	0.00	6758.00	4026.00	-2724.00	-30.64	-0.34
45	2035	0.00	461.00	4026.00	3565.00	36.13	0.37
46	2036	0.00	631.00	4026.00	3395.00	31.02	0.28
47	2037	0.00	461.00	4026.00	3565.00	29.32	0.24
48	2038	0.00	461.00	4026.00	3565.00	26.42	0.22
49	2039	0.00	461.00	4026.00	3565.00	23.80	0.18
50	2040	0.00	461.00	4026.00	3565.00	21.44	0.13
	TOTAL	26760.00	37749.00	100446.00	115937.00	95.41	-7745.00
	(US $)	11614.59	16384.11	78318.58	52319.88	41.41	-3351.89

EIRR= 11.05%

4. EIRR= 11.05%
5. BENEFIT-COST(B/C) RATIO: 1.70 (5%), 1.09 (10%), 0.93 (12%), 0.87 (13%), 0.76 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
I) BASE CASE	11.05%
II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	8.88%
III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	6.86%
IV) BENEFIT MINUS TEN PERCENT	9.71%
V) COST PLUS TEN PERCENT	9.84%
VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	11.83%
VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	10.99%

Table I.23.1 Financial Internal Rate of Return

(Case 1, Government Subsidy in O/M Cost = 0%)

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$,
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	4 % INC.BENEFIT	5 % INC.BENEFIT
1	1991	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1992	327.00	0.00	0.00	-327.00	-314.42	-302.33
3	1993	4252.00	0.00	0.00	-4252.00	-3931.21	-3634.63
4	1994	15606.00	291.00	0.00	-15937.00	-14079.04	-12516.21
5	1995	12795.00	579.00	856.00	-12518.00	-10780.44	-9146.78
6	1996	0.00	579.00	2141.00	1562.00	1293.85	1056.23
7	1997	0.00	579.00	2141.00	1562.00	1234.47	975.62
8	1998	0.00	579.00	2400.00	1930.00	1398.65	1056.78
9	1999	0.00	579.00	2676.00	2097.00	1532.26	1118.61
10	2000	0.00	579.00	2676.00	2097.00	1473.32	1035.14
11	2001	0.00	766.00	2676.00	1910.00	1290.33	871.76
12	2002	0.00	579.00	2676.00	2097.00	1362.17	884.04
13	2003	0.00	579.00	2676.00	2097.00	1309.78	818.08
14	2004	0.00	2079.00	2676.00	597.00	358.64	215.33
15	2005	0.00	579.00	2676.00	2097.00	1210.97	699.30
16	2006	0.00	579.00	2676.00	2097.00	1164.39	646.64
17	2007	0.00	579.00	2676.00	2097.00	1119.61	597.77
18	2008	0.00	766.00	2676.00	1910.00	980.54	523.38
19	2009	0.00	579.00	2676.00	2097.00	1035.14	518.97
20	2010	0.00	579.00	2676.00	2097.00	995.33	472.42
21	2011	0.00	579.00	2676.00	2097.00	957.04	436.78
22	2012	0.00	579.00	2676.00	2097.00	920.23	403.83
23	2013	0.00	579.00	2676.00	2097.00	884.84	373.36
24	2014	0.00	6995.00	2676.00	-4219.00	-1711.78	-694.61
25	2015	0.00	766.00	2676.00	1910.00	745.13	290.69
26	2016	0.00	579.00	2676.00	2097.00	786.62	295.07
27	2017	0.00	579.00	2676.00	2097.00	756.37	272.81
28	2018	0.00	579.00	2676.00	2097.00	727.27	252.23
29	2019	0.00	579.00	2676.00	2097.00	699.30	233.20
30	2020	0.00	579.00	2676.00	2097.00	672.41	215.61
31	2021	0.00	579.00	2676.00	2097.00	646.54	199.34
32	2022	0.00	766.00	2676.00	1910.00	566.24	167.87
33	2023	0.00	579.00	2676.00	2097.00	597.77	170.48
34	2024	0.00	2079.00	2676.00	597.00	163.63	44.85
35	2025	0.00	579.00	2676.00	2097.00	552.67	145.66
36	2026	0.00	579.00	2676.00	2097.00	531.41	134.67
37	2027	0.00	579.00	2676.00	2097.00	510.97	124.51
38	2028	0.00	579.00	2676.00	2097.00	491.32	115.11
39	2029	0.00	766.00	2676.00	1910.00	430.30	96.94
40	2030	0.00	579.00	2676.00	2097.00	454.25	98.40
41	2031	0.00	579.00	2676.00	2097.00	436.79	98.98
42	2032	0.00	579.00	2676.00	2097.00	419.99	84.11
43	2033	0.00	579.00	2676.00	2097.00	403.83	77.77
44	2034	0.00	6995.00	2676.00	-4219.00	-781.22	-144.65
45	2035	0.00	579.00	2676.00	2097.00	373.35	66.49
46	2036	0.00	766.00	2676.00	1910.00	326.99	55.99
47	2037	0.00	579.00	2676.00	2097.00	345.22	56.82
48	2038	0.00	579.00	2676.00	2097.00	331.92	52.54
49	2039	0.00	579.00	2676.00	2097.00	319.15	48.57
50	2040	0.00	579.00	2676.00	2097.00	306.89	44.91
	TOTAL	33307.00	43819.00	119939.00	43813.00	1254.65	-12653.89
	(US $)	14456.16	18931.88	52058.86	18668.84	544.56	-4624.08

EIRR= 4.26%

4. EIRR= 4.26%
5. BENEFIT-COST(B/C) RATIO: 0.93 (5%), 0.58 (10%), 0.52 (12%), 0.47 (13%), 0.41 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
(I) BASE CASE	4.26%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	3.43%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	2.47%
(IV) BENEFIT MINUS TEN PERCENT	3.26%
(V) COST PLUS TEN PERCENT	3.35%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	4.13%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	3.91%

Table I.23.2 Financial Internal Rate of Return

(Case 2, Government Subsidy in O/M Cost = 10%)

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	4 % INC.BENEFIT	5 % INC.BENEFIT
1	1991	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1992	327.00	0.00	0.00	-327.00	-314.42	-302.33
3	1993	4252.00	0.00	0.00	-4252.00	-3931.21	-3634.63
4	1994	15000.00	208.02	0.00	-15014.00	-14058.69	-12498.03
5	1995	12796.00	521.00	656.00	-12460.00	-12650.86	-9104.48
6	1996	0.00	521.00	2141.00	1620.00	1331.52	1084.41
7	1997	0.00	521.00	2141.00	1620.00	1280.31	1011.85
8	1998	0.00	521.00	2400.00	1888.00	1434.72	1090.27
9	1999	0.00	521.00	2676.00	2155.00	1574.64	1150.57
10	2000	0.00	521.00	2676.00	2155.00	1514.07	1063.77
11	2001	0.00	689.00	2676.00	1987.00	1342.35	906.84
12	2002	0.00	521.00	2676.00	2155.00	1399.05	909.31
13	2003	0.00	521.00	2676.00	2155.00	1346.01	840.71
14	2004	0.00	1971.00	2676.00	805.00	483.48	290.35
15	2005	0.00	521.00	2676.00	2155.00	1244.46	718.84
16	2006	0.00	521.00	2676.00	2155.00	1196.68	664.43
17	2007	0.00	521.00	2676.00	2155.00	1150.57	614.30
18	2008	0.00	689.00	2676.00	1987.00	1020.07	523.69
19	2009	0.00	521.00	2676.00	2155.00	1063.77	525.11
20	2010	0.00	521.00	2676.00	2155.00	1022.85	485.49
21	2011	0.00	521.00	2676.00	2155.00	983.51	448.86
22	2012	0.00	521.00	2676.00	2155.00	945.69	415.00
23	2013	0.00	521.00	2676.00	2155.00	909.31	383.69
24	2014	0.00	6286.00	2676.00	-3530.00	-1432.21	-591.00
25	2015	0.00	689.00	2676.00	1987.00	775.17	302.41
26	2016	0.00	521.00	2676.00	2155.00	808.38	303.24
27	2017	0.00	521.00	2676.00	2155.00	777.29	280.36
28	2018	0.00	521.00	2676.00	2155.00	747.39	259.21
29	2019	0.00	521.00	2676.00	2155.00	718.64	239.65
30	2020	0.00	521.00	2676.00	2155.00	691.00	221.57
31	2021	0.00	521.00	2676.00	2155.00	664.43	204.86
32	2022	0.00	689.00	2676.00	1987.00	589.07	174.63
33	2023	0.00	521.00	2676.00	2155.00	614.30	175.11
34	2024	0.00	1871.00	2676.00	805.00	220.65	60.48
35	2025	0.00	521.00	2676.00	2155.00	567.95	149.69
36	2026	0.00	521.00	2676.00	2155.00	546.11	138.39
37	2027	0.00	521.00	2676.00	2155.00	525.11	127.95
38	2028	0.00	521.00	2676.00	2155.00	504.91	118.38
39	2029	0.00	689.00	2676.00	1987.00	447.64	100.85
40	2030	0.00	521.00	2676.00	2155.00	466.82	101.12
41	2031	0.00	521.00	2676.00	2155.00	448.86	93.49
42	2032	0.00	521.00	2676.00	2155.00	431.60	86.44
43	2033	0.00	521.00	2676.00	2155.00	415.00	79.92
44	2034	0.00	6286.00	2676.00	-3530.00	-653.64	-121.93
45	2035	0.00	521.00	2676.00	2155.00	383.69	68.31
46	2036	0.00	689.00	2676.00	1987.00	340.17	58.24
47	2037	0.00	521.00	2676.00	2155.00	354.74	58.48
48	2038	0.00	521.00	2676.00	2155.00	341.10	53.99
49	2039	0.00	521.00	2676.00	2155.00	327.99	49.92
50	2040	0.00	521.00	2678.00	2155.00	315.37	46.15
	TOTAL	33307.00	39252.00	119939.00	47390.00	2899.10	-9878.55
	(US $)	14456.16	17036.46	52056.85	20584.24	1258.33	-4297.57

EIRR= 4.59%

4. EIRR= 4.59%
5. BENEFIT-COST(B/C) RATIO: 0.96 (5%), 0.62 (10%), 0.51 (12%), 0.47 (13%), 0.41 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
(I) BASE CASE	4.59%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	3.74%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	2.77%
(IV) BENEFIT MINUS TEN PERCENT	3.62%
(V) COST PLUS TEN PERCENT	3.71%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	4.47%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	4.27%

Table I.23.3 Financial Internal Rate of Return

(Case 3,Government Subsidy in O/M Cost = 20%)

1. PROJECT NAME; Zimbabwe, Nyakombe Project
2. EXCHANGE RATE; 1US $= 2.30 Z$ (1990)
3. UNIT; Thousand Z$
4. CALCULATION; SHOWN AS FOLLOWS,

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	4 % INC.BENEFIT	5 % INC.BENEFIT
1	1991	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1992	327.00	0.00	0.00	-327.00	-314.42	-302.33
3	1993	4262.00	0.00	0.00	-4252.00	-3931.21	-3634.63
4	1994	15000.00	106.00	0.00	-15791.00	-14038.14	-12479.08
5	1995	12795.00	463.00	856.00	-12402.00	-10081.28	-9062.02
6	1996	0.00	463.00	2141.00	1870.00	1370.19	1133.60
7	1997	0.00	463.00	2141.00	1670.00	1328.16	1048.07
8	1998	0.00	463.00	2409.00	1946.00	1478.00	1123.77
9	1999	0.00	463.00	2676.00	2213.00	1617.02	1181.54
10	2000	0.00	463.00	2676.00	2213.00	1554.82	1092.40
11	2001	0.00	613.00	2676.00	2063.00	1393.69	941.53
12	2002	0.00	463.00	2676.00	2213.00	1437.62	933.79
13	2003	0.00	463.00	2676.00	2213.00	1382.23	863.34
14	2004	0.00	1663.00	2676.00	1013.00	608.38	365.38
15	2005	0.00	463.00	2676.00	2213.00	1277.95	737.99
16	2006	0.00	463.00	2676.00	2213.00	1228.60	682.31
17	2007	0.00	463.00	2676.00	2213.00	1181.54	630.83
18	2008	0.00	613.00	2676.00	2063.00	1059.09	543.71
19	2009	0.00	463.00	2676.00	2213.00	1092.48	539.24
20	2010	0.00	463.00	2676.00	2213.00	1050.38	498.66
21	2011	0.00	463.00	2676.00	2213.00	1009.98	460.94
22	2012	0.00	463.00	2676.00	2213.00	971.14	426.17
23	2013	0.00	463.00	2676.00	2213.00	933.79	394.82
24	2014	0.00	5516.00	2676.00	-2840.00	-1152.26	-457.50
25	2015	0.00	613.00	2676.00	2063.00	804.82	313.98
26	2016	0.00	463.00	2676.00	2213.00	830.13	311.43
27	2017	0.00	463.00	2676.00	2213.00	798.21	287.90
28	2018	0.00	463.00	2676.00	2213.00	767.51	266.19
29	2019	0.00	463.00	2676.00	2213.00	737.99	246.10
30	2020	0.00	463.00	2676.00	2213.00	709.60	227.53
31	2021	0.00	463.00	2676.00	2213.00	682.31	210.37
32	2022	0.00	613.00	2676.00	2063.00	611.60	181.31
33	2023	0.00	463.00	2676.00	2213.00	630.83	179.82
34	2024	0.00	1663.00	2676.00	1013.00	277.66	76.10
35	2025	0.00	463.00	2676.00	2213.00	593.24	153.71
36	2026	0.00	463.00	2676.00	2213.00	560.81	142.12
37	2027	0.00	463.00	2676.00	2213.00	539.24	131.48
38	2028	0.00	463.00	2676.00	2213.00	518.50	121.48
39	2029	0.00	613.00	2676.00	2063.00	464.76	104.70
40	2030	0.00	463.00	2676.00	2213.00	479.38	103.84
41	2031	0.00	463.00	2676.00	2213.00	460.94	96.81
42	2032	0.00	463.00	2676.00	2213.00	443.22	88.77
43	2033	0.00	463.00	2676.00	2213.00	426.17	82.07
44	2034	0.00	5516.00	2676.00	-2840.00	-525.98	-97.39
45	2035	0.00	463.00	2676.00	2213.00	394.02	70.15
46	2036	0.00	613.00	2676.00	2063.00	353.18	60.46
47	2037	0.00	463.00	2676.00	2213.00	364.29	59.97
48	2038	0.00	463.00	2676.00	2213.00	350.29	55.44
49	2039	0.00	463.00	2676.00	2213.00	336.81	51.28
50	2040	0.00	463.00	2676.00	2213.00	323.85	47.39
	TOTAL	33387.00	34869.00	119939.00	51743.00	4542.02	-9124.85
	(US $)	14456.16	15142.82	52056.86	22457.90	1971.35	-3951.41

EIRR= 4.91%

4. EIRR= 4.91%
5. BENEFIT-COST(B/C) RATIO: 0.99 (5%), 0.61 (10%), 0.52 (12%), 0.48 (13%), 0.42 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
(I) BASE CASE	4.91%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	4.05%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	3.06%
(IV) BENEFIT MINUS TEN PERCENT	3.97%
(V) COST PLUS TEN PERCENT	4.05%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	4.80%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	4.62%

Table I.23.4 Financial Internal Rate of Return

Case 4, Government Subsidy in O/M Cost = 30%)

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	5 % INC.BENEFIT	6 % INC.BENEFIT
1	1991	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1992	327.00	0.00	0.00	-327.00	-311.43	-298.60
3	1993	4252.00	0.00	0.00	-4252.00	-3858.69	-3498.13
4	1994	15606.00	162.00	0.00	-15768.00	-13620.99	-11756.32
5	1995	12796.00	486.00	958.00	-12344.00	-10156.44	-8354.91
6	1996	0.00	486.00	2141.00	1736.00	1360.28	1065.75
7	1997	0.00	486.00	2141.00	1736.00	1296.43	956.67
8	1998	0.00	486.00	2486.00	2084.00	1484.21	1012.16
9	1999	0.00	486.00	2678.00	2271.00	1637.10	1040.37
10	2000	0.00	486.00	2678.00	2271.00	1463.91	943.65
11	2001	0.00	536.00	2678.00	2140.00	1313.77	886.54
12	2002	0.00	486.00	2678.00	2271.00	1327.91	776.34
13	2003	0.00	486.00	2678.00	2271.00	1264.58	704.16
14	2004	0.00	1456.00	2678.00	1221.00	647.52	343.39
15	2005	0.00	486.00	2678.00	2271.00	1147.91	579.32
16	2006	0.00	486.00	2678.00	2271.00	1092.39	525.46
17	2007	0.00	486.00	2678.00	2271.00	1040.37	476.61
18	2008	0.00	536.00	2678.00	2140.00	933.67	407.36
19	2009	0.00	486.00	2678.00	2271.00	943.65	392.10
20	2010	0.00	486.00	2678.00	2271.00	898.71	355.65
21	2011	0.00	486.00	2678.00	2271.00	856.92	322.59
22	2012	0.00	486.00	2678.00	2271.00	815.16	292.59
23	2013	0.00	486.00	2678.00	2271.00	776.34	265.39
24	2014	0.00	4927.00	2678.00	-2151.00	-700.30	-226.00
25	2015	0.00	536.00	2678.00	2140.00	663.55	225.74
26	2016	0.00	486.00	2678.00	2271.00	670.63	198.04
27	2017	0.00	486.00	2678.00	2271.00	638.70	179.63
28	2018	0.00	486.00	2678.00	2271.00	608.28	162.93
29	2019	0.00	486.00	2678.00	2271.00	579.32	147.78
30	2020	0.00	486.00	2678.00	2271.00	551.73	134.84
31	2021	0.00	486.00	2678.00	2271.00	525.46	121.59
32	2022	0.00	536.00	2678.00	2140.00	471.67	123.91
33	2023	0.00	486.00	2678.00	2271.00	476.61	109.02
34	2024	0.00	1456.00	2678.00	1221.00	244.84	49.79
35	2025	0.00	486.00	2678.00	2271.00	432.32	92.29
36	2026	0.00	486.00	2678.00	2271.00	411.71	74.64
37	2027	0.00	486.00	2678.00	2271.00	392.18	67.79
38	2028	0.00	486.00	2678.00	2271.00	373.43	61.41
39	2029	0.00	536.00	2678.00	2140.00	335.14	52.48
40	2030	0.00	486.00	2678.00	2271.00	338.72	50.52
41	2031	0.00	486.00	2678.00	2271.00	322.59	45.82
42	2032	0.00	486.00	2678.00	2271.00	307.22	41.56
43	2033	0.00	486.00	2678.00	2271.00	292.59	37.79
44	2034	0.00	4827.00	2678.00	-2151.00	-263.94	-32.39
45	2035	0.00	486.00	2678.00	2271.00	285.39	31.81
46	2036	0.00	536.00	2678.00	2140.00	238.17	26.51
47	2037	0.00	486.00	2678.00	2271.00	240.72	25.52
48	2038	0.00	486.00	2678.00	2271.00	229.26	23.14
49	2039	0.00	486.00	2678.00	2271.00	218.34	20.99
50	2040	0.00	486.00	2678.00	2271.00	207.94	19.04
	TOTAL	33387.00	38522.00	119939.00	56110.00	937.46	-11154.45
	(US $)	14456.16	13247.42	52056.85	24353.38	406.85	-4845.68

EIRR= 5.22%

4. EIRR= 5.22%
5. BENEFIT-COST(B/C) RATIO: 1.02 (5%), 0.62 (10%), 0.53 (12%), 0.49 (13%), 0.42 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
I) BASE CASE	5.22%
II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	4.34%
III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	3.35%
IV) BENEFIT MINUS TEN PERCENT	4.32%
V) COST PLUS TEN PERCENT	4.39%
VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	5.12%
VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	4.95%

Table I.23.5 Financial Internal Rate of Return

(Case 5, Government Subsidy in O/M Cost = 40%)

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	5 % INC.BENEFIT	6 % INC.BENEFIT
1	1991	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1992	327.00	0.00	0.00	-327.00	-311.43	-296.60
3	1993	4252.00	0.00	0.00	-4252.00	-3856.69	-3498.13
4	1994	15605.00	139.00	0.00	-15745.00	-13681.12	-11740.16
5	1995	12795.00	347.00	856.00	-12286.00	-10187.72	-8315.85
6	1996	0.00	347.00	2141.00	1794.00	1495.65	1181.36
7	1997	0.00	347.00	2141.00	1794.00	1339.71	998.97
8	1998	0.00	347.00	2409.00	2062.00	1465.42	1041.45
9	1999	0.00	347.00	2676.00	2329.00	1576.36	1066.94
10	2000	0.00	347.00	2676.00	2329.00	1581.29	967.75
11	2001	0.00	460.00	2676.00	2216.00	1360.43	835.19
12	2002	0.00	347.00	2676.00	2329.00	1361.72	796.17
13	2003	0.00	347.00	2676.00	2329.00	1296.97	722.15
14	2004	0.00	1247.00	2676.00	1429.00	757.83	401.89
15	2005	0.00	347.00	2676.00	2329.00	1176.30	594.11
16	2006	0.00	347.00	2676.00	2329.00	1120.29	538.88
17	2007	0.00	347.00	2676.00	2329.00	1066.94	488.78
18	2008	0.00	460.00	2676.00	2216.00	966.83	421.83
19	2009	0.00	347.00	2676.00	2329.00	967.75	402.12
20	2010	0.00	347.00	2676.00	2329.00	921.66	364.73
21	2011	0.00	347.00	2676.00	2329.00	877.78	330.82
22	2012	0.00	347.00	2676.00	2329.00	835.99	300.07
23	2013	0.00	347.00	2676.00	2329.00	796.17	272.17
24	2014	0.00	4137.00	2676.00	-1461.00	-475.66	-154.86
25	2015	0.00	460.00	2676.00	2216.00	687.11	213.85
26	2016	0.00	347.00	2676.00	2329.00	687.76	203.18
27	2017	0.00	347.00	2676.00	2329.00	655.01	184.22
28	2018	0.00	347.00	2676.00	2329.00	623.82	167.09
29	2019	0.00	347.00	2676.00	2329.00	594.11	151.55
30	2020	0.00	347.00	2676.00	2329.00	565.82	137.48
31	2021	0.00	347.00	2676.00	2329.00	538.88	124.68
32	2022	0.00	460.00	2676.00	2216.00	488.32	107.61
33	2023	0.00	347.00	2676.00	2329.00	488.78	102.58
34	2024	0.00	1247.00	2676.00	1429.00	285.62	57.09
35	2025	0.00	347.00	2676.00	2329.00	443.34	84.39
36	2026	0.00	347.00	2676.00	2329.00	422.23	76.55
37	2027	0.00	347.00	2676.00	2329.00	402.12	69.43
38	2028	0.00	347.00	2676.00	2329.00	382.97	62.97
39	2029	0.00	460.00	2676.00	2216.00	347.04	54.35
40	2030	0.00	347.00	2676.00	2329.00	347.37	51.81
41	2031	0.00	347.00	2676.00	2329.00	330.82	46.99
42	2032	0.00	347.00	2676.00	2329.00	315.07	42.62
43	2033	0.00	347.00	2676.00	2329.00	300.07	38.66
44	2034	0.00	4137.00	2676.00	-1461.00	-178.27	-22.00
45	2035	0.00	347.00	2676.00	2329.00	272.17	31.81
46	2036	0.00	460.00	2676.00	2216.00	246.63	27.45
47	2037	0.00	347.00	2676.00	2329.00	246.87	26.17
48	2038	0.00	347.00	2676.00	2329.00	235.11	23.73
49	2039	0.00	347.00	2676.00	2329.00	223.91	21.53
50	2040	0.00	347.00	2676.00	2329.00	213.25	19.53
TOTAL		33387.00	26159.00	119939.00	62473.00	2279.28	-10591.62
(US $)		14456.16	11353.73	52856.86	26246.96	989.27	-4597.08

EIRR= 5.52%

4. EIRR= 5.52%
5. BENEFIT-COST(B/C) RATIO: 1.06 (5%), 0.83 (10%), 0.54 (12%), 0.50 (13%), 0.43 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
(I) BASE CASE	5.52%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	4.63%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	3.63%
(IV) BENEFIT MINUS TEN PERCENT	4.63%
(V) COST PLUS TEN PERCENT	4.71%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	5.43%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	5.27%

Table I.23.6 Financial Internal Rate of Return

(Case 6, Government Subsidy in o/M Cost = 50%)

1. PROJECT NAME; Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.20 Z$ (1990)
3. UNIT; Thousand Z$
4. CALCULATION; SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	5 % INC.BENEFIT	6 % INC.BENEFIT
1	1991	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1992	327.00	0.00	0.00	-327.00	-311.43	-296.60
3	1993	4252.00	0.00	0.00	-4252.00	-3856.69	-3498.13
4	1994	15606.00	116.00	0.00	-15722.00	-13581.25	-11732.00
5	1995	12795.00	290.00	856.00	-12229.00	-10060.83	-9277.07
6	1996	0.00	290.00	2141.00	1851.00	1450.31	1136.35
7	1997	0.00	290.00	2141.00	1851.00	1381.24	1030.71
8	1998	0.00	290.00	2409.00	2119.00	1505.03	1070.24
9	1999	0.00	290.00	2676.00	2386.00	1614.94	1093.05
10	2000	0.00	290.00	2676.00	2386.00	1638.04	991.43
11	2001	0.00	383.00	2676.00	2293.00	1407.72	864.21
12	2002	0.00	290.00	2676.00	2386.00	1395.04	815.65
13	2003	0.00	290.00	2676.00	2386.00	1328.61	739.82
14	2004	0.00	1040.00	2676.00	1636.00	867.61	458.11
15	2005	0.00	290.00	2676.00	2386.00	1206.89	628.65
16	2006	0.00	290.00	2676.00	2386.00	1147.71	552.07
17	2007	0.00	290.00	2676.00	2386.00	1093.05	520.74
18	2008	0.00	383.00	2676.00	2293.00	1000.43	436.48
19	2009	0.00	290.00	2676.00	2386.00	991.43	411.96
20	2010	0.00	290.00	2676.00	2386.00	944.22	373.66
21	2011	0.00	290.00	2676.00	2386.00	899.25	338.92
22	2012	0.00	290.00	2676.00	2386.00	856.44	307.41
23	2013	0.00	290.00	2676.00	2386.00	815.65	278.83
24	2014	0.00	3448.00	2676.00	-772.00	-251.34	-81.83
25	2015	0.00	383.00	2676.00	2293.00	710.99	220.45
26	2016	0.00	290.00	2676.00	2386.00	704.59	208.07
27	2017	0.00	290.00	2676.00	2386.00	671.04	198.72
28	2018	0.00	290.00	2676.00	2386.00	639.09	171.18
29	2019	0.00	290.00	2676.00	2386.00	608.65	155.26
30	2020	0.00	290.00	2676.00	2386.00	579.67	140.83
31	2021	0.00	290.00	2676.00	2386.00	552.07	127.74
32	2022	0.00	383.00	2676.00	2293.00	505.29	111.34
33	2023	0.00	290.00	2676.00	2386.00	500.74	105.09
34	2024	0.00	1040.00	2676.00	1636.00	326.99	65.36
35	2025	0.00	290.00	2676.00	2386.00	454.19	86.46
36	2026	0.00	290.00	2676.00	2386.00	432.56	78.42
37	2027	0.00	290.00	2676.00	2386.00	411.95	71.13
38	2028	0.00	290.00	2676.00	2386.00	392.34	64.52
39	2029	0.00	383.00	2676.00	2293.00	359.12	56.24
40	2030	0.00	290.00	2676.00	2386.00	355.87	53.00
41	2031	0.00	290.00	2676.00	2386.00	338.92	48.14
42	2032	0.00	290.00	2676.00	2386.00	322.79	43.67
43	2033	0.00	290.00	2676.00	2386.00	307.41	39.61
44	2034	0.00	3448.00	2676.00	-772.00	-94.73	-11.62
45	2035	0.00	290.00	2676.00	2386.00	278.83	32.58
46	2036	0.00	383.00	2676.00	2293.00	255.22	28.40
47	2037	0.00	290.00	2676.00	2386.00	252.91	25.81
48	2038	0.00	290.00	2676.00	2386.00	240.85	24.32
49	2039	0.00	290.00	2676.00	2386.00	229.42	22.85
50	2040	0.00	290.00	2676.00	2386.00	218.47	20.82
	TOTAL	33307.00	21830.00	119939.00	64802.00	3629.35	-12024.49
	(US $)	14456.16	9474.83	52056.05	28125.87	1576.55	-4358.91

EIRR= 5.81%

4. EIRR= 5.81%
5. BENEFIT-COST(B/C) RATIO: 1.10 (5%), 0.85 (10%), 0.55 (12%), 0.52 (13%), 0.44 (15%)
6. SENSITIVITY ANALYSIS:

	-- EIRR --
(I) BASE CASE	5.81%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	4.91%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	3.89%
(IV) BENEFIT MINUS TEN PERCENT	4.94%
(V) COST PLUS TEN PERCENT	5.02%
(VI) TWO-YEAR DELAY IN PROJECT COMMENCEMENT	5.73%
(VII) FIVE-YEAR DELAY IN PROJECT COMMENCEMENT	5.58%

Table I.23.7 Financial Internal Rate of Return

(Case 7, Government Subsidy in O/M Cost = 52.9%)

1. PROJECT NAME: Zimbabwe, Nyakomba Project
2. EXCHANGE RATE: 1US $= 2.30 Z$ (1990)
3. UNIT: Thousand Z$
4. CALCULATION: SHOWN AS FOLLOWS.

	YEAR	C.COST	O/M COST	BENEFIT	INC.BENEFIT	5 % INC.BENEFIT	8 % INC.BENEFIT
1	1981	327.00	0.00	0.00	-327.00	-327.00	-327.00
2	1982	327.00	0.00	0.00	-327.00	-311.43	-296.60
3	1983	4252.00	0.00	0.00	-4252.00	-3858.69	-3498.13
4	1984	15606.00	109.00	0.00	-15715.00	-13575.21	-11726.77
5	1985	12795.00	273.00	956.00	-12212.00	-10048.84	-8265.56
6	1986	0.00	273.00	2141.00	1868.00	1463.63	1146.79
7	1987	0.00	273.00	2141.00	1868.00	1303.93	1040.17
8	1988	0.00	273.00	2409.00	2136.00	1518.82	1078.83
9	1989	0.00	273.00	2676.00	2403.00	1626.44	1100.94
10	2000	0.00	273.00	2676.00	2403.00	1549.00	998.50
11	2001	0.00	361.00	2676.00	2315.00	1421.21	872.60
12	2002	0.00	273.00	2676.00	2403.00	1404.98	821.47
13	2003	0.00	273.00	2676.00	2403.00	1338.00	745.09
14	2004	0.00	979.00	2676.00	1697.00	899.96	477.27
15	2005	0.00	273.00	2676.00	2403.00	1213.60	612.99
16	2006	0.00	273.00	2676.00	2403.00	1155.00	556.00
17	2007	0.00	273.00	2676.00	2403.00	1100.04	504.31
18	2008	0.00	361.00	2676.00	2315.00	1010.03	440.67
19	2009	0.00	273.00	2676.00	2403.00	998.50	414.90
20	2010	0.00	273.00	2676.00	2403.00	950.95	376.32
21	2011	0.00	273.00	2676.00	2403.00	905.67	341.34
22	2012	0.00	273.00	2676.00	2403.00	862.54	309.68
23	2013	0.00	273.00	2676.00	2403.00	821.47	280.82
24	2014	0.00	3249.00	2676.00	-572.00	-186.23	-58.63
25	2015	0.00	361.00	2676.00	2315.00	717.81	222.57
26	2016	0.00	273.00	2676.00	2403.00	709.51	209.55
27	2017	0.00	273.00	2676.00	2403.00	675.92	198.87
28	2018	0.00	273.00	2676.00	2403.00	643.64	172.40
29	2019	0.00	273.00	2676.00	2403.00	612.99	156.37
30	2020	0.00	273.00	2676.00	2403.00	583.80	141.83
31	2021	0.00	273.00	2676.00	2403.00	556.00	128.65
32	2022	0.00	361.00	2676.00	2315.00	510.13	112.41
33	2023	0.00	273.00	2676.00	2403.00	504.31	105.84
34	2024	0.00	979.00	2676.00	1697.00	339.18	67.79
35	2025	0.00	273.00	2676.00	2403.00	457.42	87.87
36	2026	0.00	273.00	2676.00	2403.00	435.64	78.98
37	2027	0.00	273.00	2676.00	2403.00	414.90	71.63
38	2028	0.00	273.00	2676.00	2403.00	395.14	64.97
39	2029	0.00	361.00	2676.00	2315.00	362.54	56.79
40	2030	0.00	273.00	2676.00	2403.00	358.40	53.46
41	2031	0.00	273.00	2676.00	2403.00	341.34	48.49
42	2032	0.00	273.00	2676.00	2403.00	325.08	43.96
43	2033	0.00	273.00	2676.00	2403.00	309.60	39.89
44	2034	0.00	3249.00	2676.00	-572.00	-70.19	-8.81
45	2035	0.00	273.00	2676.00	2403.00	280.82	32.82
46	2036	0.00	361.00	2676.00	2315.00	257.65	28.69
47	2037	0.00	273.00	2676.00	2403.00	254.71	27.00
48	2038	0.00	273.00	2676.00	2403.00	242.58	24.49
49	2039	0.00	273.00	2676.00	2403.00	231.03	22.21
50	2040	0.00	273.00	2676.00	2403.00	220.03	20.15
	TOTAL	33307.00	28557.00	119039.00	56975.00	4081.38	-9856.86
	(US $)	14456.18	8922.31	52056.86	28678.39	1736.71	-4278.15

EIRR= 5.89%

4. EIRR= 5.89%
5. BENEFIT-COST(B/C) RATIO: 1.11 (5%), 0.65 (10%), 0.55 (12%), 0.51 (13%), 0.44 (15%)
6. SENSITIVITY ANALYSIS;

	-- EIRR --
(I) BASE CASE	5.89%
(II) TWO-YEAR DELAY IN BENEFIT ACCRUAL	4.99%
(III) FIVE-YEAR DELAY IN BENEFIT ACCRUAL	3.97%
(IV) BENEFIT MINUS TEN PERCENT	5.03%
(V) COST PLUS TEN PERCENT	5.11%

Table I.24 Financial Analysis on Model Farmer

No.	Cost Item	Unit	Without Project	With Project
①	Farming Area	ha	1.89	1.75
	Dry	ha	1.89	0.75
	Irrigated	ha	0	1.00
②	Number of Family	person	7	7
	Farming Adult	person	2	2
	Non-farming Adult	person	1	1
	Children	person	4	4
③	Gross Production Value of Agricultural Output	z$	1668.4	7441.5
	Maize	z$	626.1	735.3
	Cotton	z$	1004.4	1276.1
	Tobacco	z$	0	2211.1
	Sugarbean	z$	0	465.5
	Wheat	z$	0	907.7
	Ground Nuts	z$	0	145.8
	Onion	z$	0	1700.0
	Sunflower	z$	37.9	0
④	Food Retention	z$	404.8	511.7
	Maize	z$	356.9	356.9
	Sugarbean	z$	47.9	47.9
	Ground Nuts	z$	0	106.9
⑤	Marketed Gross Production Value of Agricultural Output	z$	1263.6	6929.8
⑥	Agricultural Cost	z$	848.6	2079.1
	Seed	z$	96.8	338.9
	Fertilizer	z$	369.4	1022.1
	Chemical	z$	219.0	385.4
	Machinery & Equipment Depriciation & Lental	z$	94.4	252.5
	Hired Labour	z$	42.6	47.7
	Charges	z$	15.8	13.9
	Interest	z$	10.6	18.6
⑦	Marketed Net Production Value of Agricultural Output	z$	415.0	4850.7
⑧	Sales of Live Stock	z$	63.9	63.9
⑨	Off-farm Income	z$	379.4	0
⑩	Total Income	z$	858.3	4914.6
⑪	Living Expense	z$	550.7	1658.3
⑫	Disposable Income	z$	307.6	3256.3

Table I.25 Project Loan Disbursements and Repayments

(Unit : thousand Z$)

Calendar Year	Project Year	Foreign Loan	Accumulated Foreign Loan	1)Interest Payment	2)Capital Payment	Total Payment
1991	1	170	170	5		5
1992	2	169	339	10		10
1993	3	2665	3004	90		90
1994	4	10032	13036	391		391
1995	5	8205	21241	637		637
1996	6		21241	637		637
1997	7		21241	637		637
1998	8		21241	637		637
1999	9		21241	637		637
2000	10		21241	637		637
2001	11		20178	605	1063	1668
2002	12		19115	573	1063	1636
2003	13		18052	542	1063	1605
2004	14		16989	510	1063	1573
2005	15		15926	478	1063	1541
2006	16		14863	446	1063	1509
2007	17		13800	414	1063	1477
2008	18		12737	382	1063	1445
2009	19		11674	350	1063	1413
2010	20		10611	318	1063	1381
2011	21		9548	286	1063	1349
2012	22		8485	255	1063	1318
2013	23		7422	223	1063	1286
2014	24		6359	191	1063	1254
2015	25		5296	159	1063	1222
2016	26		4233	127	1063	1190
2017	27		3170	95	1063	1158
2018	28		2107	63	1063	1126
2019	29		1044	31	1063	1094
2020	30		0	0	1044	1044

NOTES : 1) 3.0 percent interest rate per annum
2) Grace period of 10 years, counted from the first disbursement

Table I.26 Net Government Budgetary Position by the Project

(Unit : thousand Z$)

Calendar Year	Project Year	1)Budget for Investment Cost	Budget for O&M, Replacement	2)Foreign Loan Repayment	Total Budget Requirement	Reveues from GMB,CMB&TMB	Reveues from Water Charges	Total Budget Contribution	Net Budgetary Position
1991	1	157		5	162			0	▲162
1992	2	158		10	168			0	▲168
1993	3	1587		90	1677			0	▲1677
1994	4	5574	231	391	6196			0	▲6196
1995	5	4590	579	637	5806	40	231	271	▲5535
1996	6		579	637	1216	99	579	678	▲538
1997	7		579	637	1216	99	579	678	▲538
1998	8		579	637	1216	111	579	690	▲526
1999	9		579	637	1216	123	579	702	▲514
2000	10		579	637	1216	123	579	702	▲514
2001	11		766	1668	2434	123	579	702	▲1732
2002	12		579	1636	2215	123	766	889	▲1326
2003	13		579	1605	2184	123	579	702	▲1482
2004	14		2079	1573	3652	123	579	702	▲2950
2005	15		579	1541	2120	123	2079	2202	82

NOTES : 1) Local Currency Portion of Investment Cost
2) Refer to Table I .25

Table I.27 Net Foreign Exchange Position by the Project

(Unit : thousand Z$)

Calendar Year	Project Year	Foreign Loan Repayment for Investment	Foreign Exchange Requirement for O/M & Replacement Cost	Total Foreign Exchange Requirement	Foreign Loan Disbursement	Foreign Exchange Contribution by Traded Outputs	Total Foreign Exchange Contribution	Net Foreign Exchange Contribution	Accumulated Net foreign Exchange Contribution
1991	1	5		5	170		170	165	165
1992	2	10		10	169		169	159	324
1993	3	90		90	2665		2665	2575	2899
1994	4	391	94	485	10032		10032	9547	12446
1995	5	637	235	872	8205		8205	7333	19779
1996	6	637	235	872		356	356	▲516	19263
1997	7	637	235	872		890	890	▲18	19245
1998	8	637	235	872		890	890	▲18	19227
1999	9	637	235	872		1002	1002	130	19357
2000	10	637	235	872		1113	1113	241	19598
2001	11	1668	391	2059		1113	1113	▲946	18652
2002	12	1636	235	1871		1113	1113	▲758	17894
2003	13	1605	235	1840		1113	1113	▲727	17167
2004	14	1573	1585	3158		1113	1113	▲2045	15122
2005	15	1541	235	1776		1113	1113	▲663	14459

ANNEX J

OTHERS

ANNEX J OTHERS

1. Scope of Works
2. Assignment Schedule
3. Minutes of Meeting on the submitting the PROGRESS REPORT (I)
   / Harare, 10 November 1989.
4. Minutes of Meeting on the submitting the INTERIM REPORT
   / Harare, 24 January 1990.
5. Minutes of Meeting on the submitting the PROGRESS REPORT (II)
   / Harare, 9 March 1990.
6. Minutes of Meeting on the submitting the DRAFT FINAL REPORT
   / Harare, 14 August 1990.
7. Field Pictures

ANNEX 1.- Scope of Works (8 March, 1989)

1. S／W

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
THE NYAKOMBA IRRIGATION DEVELOPMENT PROJECT
IN
THE REPUBLIC OF ZIMBABWE

AGREED UPON

BETWEEN

THE MINISTRY OF LANDS, AGRICULTURE AND RURAL RESETTLEMENT
REPUBLIC OF ZIMBABWE

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

HARARE, 8 MARCH, 1989

S. PAZVAKAVAMBWA
DIRECTOR OF DEP. OF AGRITEX
FOR THE MINISTRY OF
LANDS, AGRICULTURE
AND RURAL RESETTLEMENT
REPUBLIC OF ZIMBABWE

古賀英祐

EISUKE KOGA
LEADER OF
THE PRELIMINARY SURVEY TEAM,
THE JAPAN INTERNATIONAL
COOPERATION AGENCY, JAPAN

I. INTRODUCTION

In response to the request of the Government of the Republic of Zimbabwe (hereinafter referred to as "the Government of Zimbabwe"), the Government of Japan has decided to conduct the Feasibility Study on Nyakomba Irrigation Development Project (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Zimbabwe.

The present document sets forth the scope of work with regard to the the Study.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to conduct the Feasibility Study on Nyakomba Irrigation Development Project in Manicaland Province.

III. OUTLINE OF THE STUDY

1. Study Area

The Study Area shall cover the Nyakomba Irrigation Development Project area of 3,000ha which is located in the Sawunyama Communal Lands in Manicaland Province.

2. Scope of The Study

The Study will be divided into the following two phases.

1) Phase I. Topographical mapping, data collection and field survey

1)-1. Topographical mapping of the Study Area on a scale of 1:5,000 with 1m contour intervals.

1)-2. Data collection and necessary field survey relevant to the Study on the following items:

A. Natural condition

a) Topography

b) Meteorology and Hydrology

c) Geology and soil

B. Agriculture

a) Farm management

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b) Land use and land classification

c) Agricultural inputs

d) Agricultural production

e) Farmers' organization

f) Marketing system

g) Farmers' income and productivity

h) Supporting services

i) Agro-economy and institution

C. Agricultural infrastructure

a) Irrigation and drainage system

b) Farm road

D. Social condition

a) Population

b) Socio-economy and social institution

c) Related development plan

E. Others

1)-3. Preliminary Study and Analysis

Based on the result of the above-mentioned survey, the preliminary study and analysis will be conducted.

2) Phase II. Formulation of the Nyakomba Irrigation Development Project

2)-1. Supplementary field survey and additional data collection on the items mentioned in Phase I 1)-2.

EK.

2)-2. Formulation of the Irrigation Development Project concerning the following items:

A. Formulation of the following plans

a) Land use and classification

b) Cropping pattern and crop diversification

c) Supporting services

d) Agricultural infrastructure

.Irrigation and drainage facilities

.Farm road

.Marketing facilities

e) Water management

f) Farmers' organization

g) Farm settlement

h) Others

B. Preliminary designs on the recommended projects

C. Operation and maintenance

D. Estimation of the project cost and benefits

2)-3. Project evaluation

2)-4. Recommendation

IV. STUDY SCHEDULE

The study will be executed in accordance with the attached tentative work schedule.

V. REPORTS

JICA will prepare and submit the following reports in English to the Government of Zimbabwe.

(1) Inception Report

Twenty (20) copies at the commencement of the field work in the Phase I.

(2) Progress Report (I)

Twenty (20) copies at the end of the field work in the Phase I.

(3) Interim Report

Twenty (20) copies at the commencement of the field work in the Phase II.

(4) Progress Report (II)

Twenty (20) copies at the end of the field work in the Phase II.

(5) Draft Final Report

Twenty (20) copies at the end of the Phase II.
The Government of Zimbabwe provides JICA with its comments on the Draft Final Report through the Embassy of Japan within one (1) month after the receipt of the Draft Final Report.

(6) Final Report

Fifty (50) copies within two (2) months after receiving the comments on the Draft Final Report.

EK.

VI. UNDERTAKING OF THE GOVERNMENT OF ZIMBABWE

1. To facilitate smooth conduct of the Study, the Government of Zimbabwe will take necessary measures:

(1) to secure the safety of the Japanese study team.

(2) to permit the members of the Japanese study team to enter, leave and sojourn in Zimbabwe for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees.

(3) to exempt the members of the Japanese study team from taxes, duties, and any other charges on equipment, machinery and other materials brought into Zimbabwe for the conduct of the Study.

(4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emolument or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study.

(5) to provide necessary facilities to the Japanese study team for remittance as well as utilization of funds introduced into Zimbabwe from Japan in connection with the implementation of the Study.

EK.

(6) to secure permission for entry into private properties or restricted areas for the conduct of the Study.

(7) to secure permission for the Japanese study team to take necessary data documents related to the Study including photographs out of Zimbabwe to Japan.

(8) to provide medical services as needed.
Its expenses will be chargeable on members of the Japanese study team.

2. The Government of Zimbabwe shall bear claims, if any arises against the members of the Japanese study team resulting from, occuring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the members of the Japanese study team.

3. The Ministry of Lands, Agriculture and Rural Resettlement (hereinafter referred to as "MLARR") shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organization concerned for the smooth implementation of the Study.

4. MLARR shall, at its own expense, provide the Japanese study team with the following in cooperation with other agencies concerned;

1) available data and information related to the Study,
2) additional survey related to the Study, if necessary,
3) counterpart personnel to assist in the various activities for the Study,
4) suitable office with necessary furniture in Harare the Study Area,
5) arrangements for the Study Team to hire vehicles with drivers, and
6) credentials or identification cards to the members of the study team.

VII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expenses, study team to Zimbabwe.
2. to pursue technology transfer to the Zimbabwean counterpart personnel in the course of the Study,

VIII. CONSULTATION

JICA and MLARR will consult with each other in respect of any matter that may arise from or in connection with the Study.

APPENDIX

TENTATIVE WORK SCHEDULE

DESCRIPTION	MONTH												
	1	2	3	4	5	6	7	8	9	10	11	12	13
I. Phase I	▨	▨	▨										
II. Phase II						▨	▨						
III. Explanation of Draft Final Report										▨			
IV. Reports	△ IC/R			△ P/R(I) Map		△ IT/R		△ P/R(II)		△ DF/R			△ F/R

IC/R: Inception Report

Map: Topographic Map

DF/R : Draft Final Report

P/R : Progress Report

IT/R : Interim Report

F/R : Final Report

▨ Work in Zimbabwe

□ Work in Japan

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