TABLES

TABLE J.3.1 LABOR WAGES

Unit : Bs

Labor	Specification	Unit Price	
		Hour	Day
Operator Class A	Bulldozer	18.62	149.00
Operator Class B	Shovel , Grador , Macadam , Buck Hoe	17.31	138.00
Operator Class C	Tire Roller	15.37	123.00
Operator Class D	Concrete Plant	13.53	108.00
Driver Class A	Dump Truck	12.46	100.00
Driver Class B	Truck	10.85	87.00
Foreman		10.62	85.00
Helper Class A	Heavy	9.56	76.00
Helper Class B	Light	4.90	39.00
Steel Bending Worker		4.90	39.00
Bulding Worker		9.70	78.00
Plant Operator		15.37	123.00
Prompter		12.9	103.00

TABLE J.3.2 UNIT PRICE OF TYPICAL MATERIAL

Unit : Bs

Item	Specification	Unit	Unit Price	Reference
Kerosene		Liter	1.13	
Diesel		Liter	1.54	
Gasoline		Liter	1.85	
Asphalt Concrete		Ton	326.00	67$US
Asphalt Emulsion		Liter	1.41	
Aggregate		M3	35.00	
Cement		Kg	0.58	
Sand		M3	25.00	
Crushed Gravel		M3	35.00	
Crushed Stone		M3	33.00	
Forming Wood		M2	2.20	
Steel Bar		Ton	2,916.00	
Nail		Kg	5.80	
Wire		Kg	5.00	
Corrugated S.P D=36"		M	572.00	
Corrugated S.P D=42"		M	683.00	
Corrugated S.P D=48"		M	834.00	
Gabion Mat	t=30cm	M2	7.00	
Transportation	Sand ,Gravel, Aggregates	M3	121.50	L=100km
Transportation	Sand ,Gravel, Aggregates	M3	36.00	L=30km
Transportation	Steel bar	Ton	50.00	L=100km
Transportation	Asphalt Concrete	Ton	83.00	0.17$US/km, L=100km

TABLE J.3.3 CONSTRUCTION EQUIPMENT PRICE

Unit : Bs/Day

Specification	H.P	Unit Price
1. Bulldozer		
Bulldozer Cat D18 32T	289	204.00
Bulldozer Cat D7 21T	200	186.00
Bulldozer Cat D6 15T	165	112.00
Bulldozer Cat D6 11T	100	94.00
2. Shovel		
Shovel Cat 930 1.4m3	105	94.00
Shovel Cat 966E 1.8m3	170	147.0
3. Motor Grader		
Motor Grader Cat 120G 3.1m	125	77.00
Motor Grader Komatzu 3.7m	166	107.00
Motor Grader JD 770B 3.7m		107.00
4. Macadam Roller		
Macadam Roller	75	39.00
M.R.Dynapac CA-15T	79	42.00
M.R.Dynapac CA-15T	115	58.00
5. Water Truck		
Water Truck 10.0m3	290	31.00
Water Truck 30.0m3m3		75.00
6. Buck Hoe		
Buck Hoe 0.35m3	80	63.00
Buck Hoe 0.60m3	99	90.00
7. Dump Truck		
Dump Truck 5m3		30.00
Dump Truck 8m3		37.00
Dump Truck 10m3		40.00
Dump Truck 12m3		67.00
Dump Truck 25m3		72.00
8. Rubber Tire Roller		
R.T.R.Dynapac CP-30T	100	60.00
R.T.R.Dynapac CP-27T	100	52.00
9. Asphalt Finisher 2.4-5.0m		160.00
10.Asphalt Truck Sprayer		

TABLE J.3.4 SUMMERY OF UNIT COST - (1)

Unit : Bs

N.O	Item	Specification	Unit	Unit Cost			Reference
				L/P	F/P	Total	
UC-1	Truck Operation	10T	hour	35.10	34.00	69.10	L.L 17.85(0.51)
UC-2	Concrete Mixing	180kg/cm2	m3	317.66	15.77	333.43	L.L 7.35(0.02)
UC-3	Concrete Mixing	240kg/cm2	m3	388.36	29.37	417.37	L.L 7.35(0.02)
UC-4	Concrete Mixing	350kg/cm2	m3	447.15	54.87	502.02	L.L 7.35(0.02)
UC-5	Concrete Pump Truck	90-110m3/H	hour	47.63	345.42	393.07	L.L 21.00(0.44)
UC-6	Concrete Plant Operation	30M3	m3	9.13	15.77	24.90	L.L 7.35(0.81)
UC-7	Tractor Shovel	1.8m3	hour	31.29	147.00	178.29	L.L 28.98(0.93)
UC-8	Water Truck	10.0m3	hour	31.22	31.00	62.22	L.L 18.27(0.59)
UC-9	Macadam Roller	10.0T	hour	44.84	39.00	83.84	L.L 28.98(0.65)
UC-10	Motor Grader	3.1M	hour	43.30	77.00	120.30	L.L 28.97(0.67)
UC-11	Concrete Curing		m3	4.29	0.00	4.29	L.L 3.90(0.91)
UC-12	Buck Hoe	0.6m3	hour	57.12	90.00	147.12	L.L 28.98(0.51)
UC-13	Dump Truck	11T	hour	36.67	37.00	73.67	L.L 15.00(0.41)
UC-14	Rubber Tire Roller	8-20T	hour	37.47	48.00	85.47	L.L 25.83(0.69)
UC-15	Tamper Operation	60kg	day	40.52	25.00	65.52	L.L 39.00(0.96)
UC-16	Bulldozer	15T	hour	62.82	87.00	149.82	L.L 31.29(0.50)
UC-17	Clamshell	0.60m3	hour	54.64	184.00	238.64	L.L 28.98(0.53)
UC-18	Truck Crane	15T	hour	34.74	87.00	121.74	L.L 21.00(0.60)
UC-19	Filling	Tamper	m3	12.71	6.78	19.49	L.L 10.98(0.86)
UC-20	Buck Hoe Loading	0.6m3	m3	1.50	2.36	3.85	L.L 0.76(0.51)
UC-21	Excavation	Bulldozer 15T	m3	0.82	1.14	1.96	L.L 0.46(0.50)
UC-22	Road Subbase Course	t=20cm	m2	39.19	0.52	39.71	Okinawa L.L 0.52(0.01)
UC-22	Road Subbase Course	t=20cm	m2	17.66	0.52	18.18	San Juan L.L 0.52(0.03)
UC-23	Road Base Course	t=15cm	m2	35.53	0.87	36.40	Okinawa L.L 0.37(0.01)
UC-23	Road Base Course	t=15cm	m2	17.29	0.87	18.16	San Juan L.L 0.37(0.02)

* L.L.: Total Labor Cost of Local Portion

TABLE J.3.4 SUMMERY OF UNIT COST - (2)

Unit : Bs

N.O	Item	Specification	Unit	Unit Cost			Reference
				L/P	F/P	Total	
UC-24	Asphalt Pavement	Surface t=5cm	m2	54.14	0.98	55.12	L.L 0.31(0.01)
UC-25	Asphalt Pavement	Binder t=5cm	m2	55.27	0.98	56.25	L.L 0.31(0.01)
UC-26	Asphalt Finisher	2.4-5.0M	hour	57.31	160.00	217.31	L.L 48.84(0.85)
UC-27	Concrete Placing	180kg/cm2	m3	358.16	48.66	406.82	L.L 9.58(0.03)
UC-28	Concrete Placing	240kg/cm2	m3	414.08	45.26	459.34	L.L 20.20(0.05)
UC-29	Concrete Placing	350kg/cm2	m3	474.64	71.53	546.17	L.L 20.20(0.04)
UC-30	Slope Forming		m2	3.39	2.88	6.27	L.L 2.49(0.73)
UC-31	Roadbed Compaction	Bulldozer 15T	m3	2.28	1.81	4.10	L.L 1.63(0.71)
UC-32	Soil Transportation	L=1km	m3	2.32	2.34	4.65	L.L 0.84(0.36)
UC-32	Soil Transportation	L=2km	m3	2.85	2.87	5.72	L.L 0.95(0.33)
UC-32	Soil Transportation	L=3km	m3	3.38	3.41	6.80	L.L 1.17(0.35)
UC-32	Soil Transportation	L=4km	m3	3.92	3.95	7.87	L.L 1.38(0.35)
UC-32	Soil Transportation	L=5km	m3	4.45	4.49	8.94	L.L 1.60(0.36)
UC-32	Soil Transportation	L=0.5km	m3	2.05	2.07	4.12	L.L 1.82(0.89)
UC-33	Excavation-Transportation	L=1km	m3	4.64	5.84	10.48	L.L 1.77(0.38)
UC-34	Base-Layer Placing		m2	0.44	0.43	0.87	L.L 0.36(0.81)
UC-35	Steel Bar Bend & Placing		kg	0.65	3.14	3.79	L.L 0.64(0.98)
UC-36	Forming		m2	47.74	0.00	47.74	L.L 43.79(0.92)
UC-37	Gabion Mat	t=30cm	m2	52.6	11.05	63.65	L.L 27.00(0.51)
UC-38	Foundation Bed Stone	Crushed	m3	207.11	0.00	207.11	L.L 24.57(0.12)
UC-39	Excavation	Buck Hoe 0.6m3	m3	1.57	2.47	4.04	L.L 0.80(0.51)
UC-40	Clearing & Grubbing	Dozer & Buckhoe	m2	0.92	0.94	1.87	L.L 0.59(0.63)
UC-41	Embankment	dozer 15T t=20	m3	1.89	1.98	3.87	L.L 1.17(0.62)

TABLE J.3.5 UNIT COST - (1)

UC- 1 TRUCK OPERATION (11T) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Operator	Truck 11T	person	0.21	85.00	17.85	0	0	17.85	
Fuel	Light Oil	liter	11.20	1.54	17.25	0	0	17.25	311*0.036=11.20
Other Oil		lump	1	0	0.00	0	0	0.00	
Equipment	Truck 311HP	hour	1	0	0.00	34.00	34.00	34.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					35.10		34.00	69.10	
%					0.51		0.49	1.00	

UC-2 CONCRETE MIXING (180kg/m2) Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Cement	Poltland	kg	222.00	0.58	128.76	0	0	128.76	
Aggregate		m3	0.69	156.50	107.99	0	0	107.99	
Sand		m3	0.49	146.50	71.79	0	0	71.79	
Plant	Operation	m3	1	9.13	9.13	15.77	15.77	24.90	UC-6
Admixture	Cement	m3	0	0	0.00	17.00	0.00	0.00	
Total					317.66		15.77	333.43	
%					0.95		0.05	1.00	

UC-3 CONCRETE MIXING (240kg/m2) Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Cement	Poltland	kg	323.00	0.58	187.34	0	0	187.34	
Aggregate		m3	0.73	156.50	114.25	0	0	114.25	
Sand		m3	0.53	146.50	77.65	0	0	77.65	
Plant	Operation	m3	1	9.13	9.13	15.77	15.77	24.90	UC-6
Admixture	Cement	m3	0.80	0	0.00	17.00	13.6	13.60	
Total					388.36		29.37	417.73	
%					0.93		0.07	1.00	

UC-4 CONCRETE MIXING (350kg/cm2) Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Cement	Poltland	kg	455.00	0.58	263.90	0	0	263.90	
Aggregate		m3	0.71	156.50	111.12	0	0	111.12	
Sand		m3	0.43	146.50	63.00	0	0	63.00	
Plant	Operation	m3	1	9.13	9.13	15.77	15.77	24.90	UC-6
Admixture	Cement	m3	2.30	0	0.00	17.00	39.10	39.10	
Total					447.15		54.87	502.02	
%					0.89		0.11	1.00	

UC-5 CONCRETE PUMP TRUCK Unit: Bs/hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Driver		Person	0.21	100.00	21.00	0	0	21.00	
Fuel	Light Oil	liter	17.00	1.54	26.18	0	0	26.18	
Pump Truck		Hour	1	0	0.00	342.00	342.00	342.00	
Sundries	1%	lump	1	0	0.47	0.00	3.42	3.89	
Total	1hour				47.65		345.42	393.07	
%					0.12		0.88	1.00	

TABLE J.3.5 UNIT COST - (2)

UC- 6 CONCRETE PLANT OPERATION (30M3) Unit: Bs/M3

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	Person	0.77	85.00	65.45	0.00	0.00	65.45	
Operator		Person	0.21	123.00	25.83	0.00	0.00	25.83	
Labor		Person	2.57	39.00	100.23	0.00	0.00	100.23	
Fuel	Light Oil	liter	13.00	1.54	20.02	0.00	0.00	20.02	
Plant	Concrete	hour	1	0	0.00	295.00	295.00	295.00	
Tractor Shovel	1.8 m3	hour	1	31.29	31.29	147.00	147.00	178.29	UC-7
Water Truck	10.0m3	hour	1	31.22	31.22	31.00	31.00	62.22	
Total	30 m3				274.04		473.00	747.04	
	1 m3				9.13		15.77	24.90	
%					0.37		0.63	1.00	

UC- 7 TRACTOR SHOVEL (1.8m3) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		Person	0.21	138.00	28.98	0	0	28.98	
Fuel	Light Oil	liter	1.50	1.54	2.31	0	0	2.31	
Other Oil		lump	0	0	0.00	0	0	0.00	
Tractor Shovel	1.8m3	hour	1	0	0.00	147.00	147.00	147.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total	1 hour				31.29		147.00	178.29	
%					0.18		0.82	1.00	

UC- 8 WATER TRUCK (10.0M3) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator	Truck	person	0.21	87.00	18.27	0	0	18.27	
Fuel	Light Oil	liter	8.41	1.54	12.95	0	0	12.95	290*0.029
Other Oil		lump	1	0	0.00	0	0	0.00	
Equipment	Truck 290HP	hour	1	0	0.00	31.00	31.00	31.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					31.22		31.00	62.22	
%					0.50		0.50	1.00	

UC- 9 MACADAM ROLLER (10 T) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator	Truck 11T	person	0.21	138.00	28.98	0	0	28.98	
Fuel	Light Oil	liter	10.30	1.54	15.86	0	0	15.86	
Other Oil		lump	1	0	0.00	0	0	0.00	
Equipment		hour	1	0	0.00	39.00	39.00	39.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					44.84		39.00	83.84	
%					0.53		0.47	1.00	

TABLE J.3.5 UNIT COST - (3)

UC- 10 MOTOR GRADER (3.1M) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		person	0.21	138.00	28.98	0	0	28.98	
Fuel	Light Oil	liter	9.30	1.54	14.32	0	0	14.32	
Other Oil		lump	1	0	0.00	0	0	0.00	
Equipment	3.1M	hour	1	0	0.00	77.00	77.00	77.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					43.30		77.00	120.30	
%					0.36		0.64	1.00	

UC- 11 CONCRETE CURING Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor		person	0.10	39.00	3.90	0	0	3.90	
Sundries	10%*laor	lump	1.00		0.39	0	0	0.39	
Total					4.29		0.00	4.29	
%					1.00		0.00	1.00	

UC- 12 BUCK HOE(0.6M) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		person	0.21	138.00	28.98	0	0	28.98	
Fuel	Light Oil	liter	17.40	1.54	26.80	0	0	26.80	
Other Oil	5%*Fuel	lump	1	0	1.34	0	0	1.34	
Equipment	Buck hoe	hour	1	0	0.00	90.00	90.00	90.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					57.12		90.00	147.12	
%					0.39		0.61	1.00	

UC- 13 DUMP TRUCK OPERATION (11T) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator	Truck 11T	person	0.15	100.00	15.00	0	0	15.00	
Fuel	Light Oil	liter	13.40	1.54	20.64	0	0	20.64	
Other Oil	5%*Fuel	lump	1		1.03	0	0	1.03	
Equipment	D.Truck 11T	hour	1	0	0	37.00	37.00	37.00	
Sundries		lump	1	0	0	0	0	0.00	
Total					36.67		37.00	73.67	
%					0.50		0.50	1.00	

UC- 14 RUBBER TIRED ROLLER (8-20T) Unit: Bs/Hour

Item	Specification	Unit	Volum	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		person	0.21	123.00	25.83	0	0	25.83	
Fuel	Light Oil	liter	7.20	1.54	11.09	0	0	11.09	
Other Oil	5%*Fuel	lump	1		0.55	0	0	0.55	
Equipment	8-20T	hour	1	0	0	48.00	48.00	48.00	
Sundries		lump	1	0	0	0	0	0.00	
Total					37.47		48.00	85.47	
%					0.44		0.56	1.00	

TABLE J.3.5 UNIT COST - (4)

UC- 15 TAMPER OPERATION (60Kg) Unit: Bs/Day

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor		person	1	39.00	39.00	0	0	39.00	
Fuel	Gasoline	liter	0.90	1.54	1.39	0	0	1.39	
Other Oil	10%*Fuel	lump	1		0.14	0	0	0.14	
Equipment	60kg	day	1	0	0.00	25.00	25.00	25.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					40.52		25.00	65.52	
%					0.62		0.38	1.00	

UC- 16 BULLDOZER (15T) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		person	0.21	149.00	31.29	0	0	31.29	
Fuel	Light Oil	liter	19.50	1.54	30.03	0	0	30.03	
Other Oil	5%*Fuel	lump	1		1.50	0	0	1.50	
Equipment	15T	hour	1	0	0.00	87.00	87.00	87.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					62.82		87.00	149.82	
%					0.42		0.58	1.00	

UC- 17 CLAMSHELL (0.6M3) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		person	0.21	138.00	28.98	0	0	28.98	
Fuel	Light Oil	liter	15.87	1.54	24.44	0	0	24.44	
Other Oil	5%*Fuel	lump	0.05		1.22	0	0	1.22	
Equipment	0.6m3	hour	1	0	0.00	184.00	184.00	184.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					54.64		184.00	238.64	
%					0.23		0.77	1.00	

UC- 18 TRUCK CRANE (15T) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Operator		person	0.21	100.00	21.00	0	0	21.00	
Fuel	Light Oil	liter	8.50	1.54	13.09	0	0	13.09	
Other Oil	5%*Fuel	lump	0.05		0.65	0	0	0.65	
Equipment	15T	hour	1	0	0.00	87.00	87.00	87.00	
Sundries		lump	1	0	0.00	0	0	0.00	
Total					34.74		87.00	121.74	
%					0.29		0.71	1.00	

UC- 19 FILLING (MANPOWER) Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor		person	0.90	39.00	35.10	0.00	0.00	35.10	
Tamper	60Kg	day	0.27	40.52	10.94	51.00	13.77	24.71	UC-15
Buck Hoe	0.6m3	hour	0.60	57.12	34.27	90.00	54.00	88.27	UC-12
Labor		person	1.20	39.00	46.80	0.00	0.00	46.80	
total	10.0m3				127.11		67.77	194.88	
	1.0m3				12.71		6.78	19.49	
%					0.65		0.35	1.00	

TABLE J.3.5 UNIT COST - (5)

UC- 20 BUCK HOE LOADING(0.6M3) Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Buck Hoe	0.6m3	hour	1	57.12	57.12	90.00	90.00	147.12	UC-12
Total	38.19m3				57.12		90.00	147.12	
	1.00m3				1.50		2.36	3.85	
%					0.39		0.61	1.00	

Buck Hoe 0.6m3

Q=3600*q*f*E/Cm
q=0.59m3
f=1/1.2=0.83
E=0.65
Cm=30Sec
Q=3600*0.59*0.83*0.65/30=38.19m3/hour

UC- 21 EXCAVATION (BULLDOZER 15T) Unit: Bs/m3

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Bulldozer	15T	hour	1	62.82	62.82	87.00	87.00	149.82	UC-16
Total	76.39m3				62.82		87.00	149.82	
	1.0m3				0.82		1.14	1.96	
%					0.42		0.58	1.00	

Bulldozer 15T (Extrusion)

Q=60*q*f*e/Cm
q=1.73
f=1.0
E=0.80
Cm=0.27*L+0.79=0.27*11m+0.79=1.087

Q=60*1.73*1.0*0.80/1.087=76.39 (m3/H)

UC- 22 SUBBASE COURSE (t=20cm) Unit: Bs/m2

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Labor	Mecanical	person	0.51	39.00	19.89	0	0		
Crushed Gravel		m3	24.6	156.50	3849.90	0	0		
Motor Grader	3.1m	hour	0.32	43.3	13.86	77.00	24.64		UC-10
Tired Roller	8-20T	hour	0.34	37.47	12.74	48.00	16.32		UC-14
Water Truck	10.0m3	hour	0.23	31.22	7.18	31.00	7.13		UC-8
Road Roller	10T	hour	0.34	44.84	15.25	83.84	28.51		UC-9
Total	100.0m2				3918.81		51.96	3970.77	
	1.0m2				39.19		0.52	39.71	
%					0.99		0.01	1.00	

TABLE J.3.5 UNIT COST - (6)

UC- 23 BASE COURSE (t=15cm) Unit: Bs/m2

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor		person	0.66	39.00	25.74	0	0		
Crushed	Mecanical						0		
Stone	Stabilization	m3	20.85	166.50	3471.53	0	0		45+121.50=166.50
Motor							0		
Grader	3.1m	hour	0.32	43.3	13.86	77.00	24.64		UC-10
Rubber							0		
Tired Roller	8-20T	hour	0.41	37.47	15.36	48.00	19.68		UC-14
Water Truck	10.0m3	hour	0.27	31.22	8.43	31.00	8.37		UC-8
Road Roller	10T	hour	0.41	44.84	18.38	83.84	34.3744		UC-9
Total	100.0m2				3553.30		87.06	3640.36	
	1.0m2				35.53		0.87	36.40	
%					0.98		0.02	1.00	

UC- 24 ASPHALT PAVEMENT (SURFACE COURSE t=5cm) Unit: Bs/m²

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.12	85.00	10.20	0	0.00		
Labor		person	0.63	76.00	47.88	0	0.00		
Labor	Helper	person	0.63	39.00	24.57	0	0.00		
Asphalt Concrete		ton	12.42	409.00	5079.78	0	0.00		
Asphalt Emulsion		liter	42.80	2.40	102.72	0	0.00		
Asphalt Finisher	2.4-5.0m	hour	0.33	47.11	15.55	160.00	52.80		UC-26
Road Roller	10T	hour	0.33	44.84	14.80	83.84	27.67		UC-9
Rubber Tired Roller	8-20T	hour	0.33	37.47	12.37	48.00	15.84		UC-14
Subtotal					5307.86		96.31		
Sundries	Subtotal*0.02	lump	1		106.16		1.93		
Total	100.0m²				5414.02		98.23	5512.25	
	1.0m²				54.14		0.98	55.12	
%					0.98		0.02	1.00	

UC- 25 ASPHALT PAVEMENT (BINDER COURSE t=5cm) Unit: Bs/m²

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.12	85.00	10.20	0	0.00		
Labor		person	0.63	76.00	47.88	0	0.00		
Labor	Helper	person	0.63	39.00	24.57	0	0.00		
Asphalt Concrete		ton	12.69	409.00	5190.21	0	0.00		
Asphalt Emulsion		liter	42.8	2.40	102.72	0	0.00		
Asphalt Finisher	2.4-5.0m	hour	0.33	47.11	15.55	160.00	52.80		UC-26
Road Roller	10T	hour	0.33	44.8	14.78	83.84	27.67		UC-9
Rubber Tired Roller	8-20T	hour	0.33	37.47	12.37	48.00	15.84		UC-14
Subtotal					5418.28		96.31		
Sundries	Subtotal*0.02	lump	1		108.37		1.93		
Total	100.0m²				5526.64		98.23	5624.87	
	1.0m²				55.27		0.98	56.25	
%					0.98		0.02	1.00	

UC- 26 ASPHALT FINISHER (2.4-5.0M) Unit: Bs/Hour

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.12	85.00	10.20	0	0.00		
Operator		person	0.28	138.00	38.64	0	0	38.64	
Fuel	Light Oil	liter	5.50	1.54	8.47	0	0	8.47	
Equipment	Finisher	hour	1	0	0.00	160.00	160.00	160.00	
Sundries		lump	1	0	0.00	0.00	0	0.00	
Total					57.31		160.00	207.11	
%					0.28		0.77	1.00	

TABLE J.3.5 UNIT COST - (7)

UC- 27 CONCRETE PLACING (180kg/cm²) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.45	85.00	38.25	0	0		
Labor		person	1.26	76.00	95.76	0	0		
Labor	Helper	person	1.92	39.00	74.88	0	0		
Concrete		m³	10.40	316.67	3293.37	15.77	164.01		UC- 2
Concrete Pump		hour	0.92	47.65	43.84	345.42	317.79		UC-5
Subtotal					3546.10		481.79		
Sundries	1%	lump			35.46		4.82		
Total	10.0m³				3581.56		486.61	4068.17	
	1.0m³				358.16		48.66	406.82	
%					0.88		0.12	1.00	

UC- 28 CONCRETE PLACING (240kg/cm²) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.21	85.00	17.85	0	0		
Labor		person	0.84	76.00	63.84	0	0		
Labor	Helper	person	0.93	39.00	36.27	0	0		
Concrete		m³	10.2	388.37	3961.37	29.37	299.57		UC- 3
Concret Pump		hour	0.43	47.65	20.49	345.42	148.53		UC-5
Subtotal					4099.82		448.10		
Sundries	1%	lump			41.00		4.48		
Total	10.0m³				4140.82		452.59	4593.41	
	1.0m³				414.08		45.26	459.34	
%					0.90		0.10	1.00	

UC- 29 CONCRETE PLACING (350kg/cm²) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.21	85.00	17.85	0	0		
Labor		person	0.84	76.00	63.84	0	0		
Labor	Helper	person	0.93	39.00	36.27	0	0		
Concrete		m³	10.20	447.15	4560.93	54.87	559.67		UC- 4
Concret Pump		hour	0.43	47.65	20.49	345.42	148.53		UC- 5
Subtotal					4699.38		708.20		
Sundries	1%	lump			46.99		7.08		
Total	10.0m³				4746.37		715.29	5461.66	
	1.0m³				474.64		71.53	546.17	
%					0.87		0.13	1.00	

UC- 30 SLOPE FORMING Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.60	85.00	51.00	0	0		
Labor		person	2.70	39.00	105.30	0	0		
Buck Hoe	0.6m³	hour	3.20	57.12	182.78	90.00	288.00		UC-12
Total	100.0m³				339.08		288.00	627.08	
	1.0m³				3.39		2.88	6.27	
%					0.54		0.46	1.00	

TABLE J.3.5 UNIT COST - (8)

UC-31 ROADBED COMPACTION (t-20cm) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Bulldozer	15T	hour	1	62.82	62.82	87.00	87.00		UC-16
Labor		person	1.20	39.00	46.80	0	0.00		
Total	48.0m³				109.62		87.00	196.62	
	1.0m³				2.28		1.81	4.10	
%					0.56		0.44	1.00	

Bulldozer (15T) Q=3500*W*D*E/N
W=0.80m
D=0.20m
E=0.6
N=7

Q=3500*0.80*0.20*0.6/7=48.00m³/hour

UC-32 SOIL TRANSPORTATION (D.TRUCK 11T) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
D.Truck 11T	0.5 km	1.0m3	17.90	36.67	2.05	37.00	2.07	4.12	UC-13
	1.0 km	1.0m3	15.84	36.67	2.32	37.00	2.34	4.65	UC-13
	2.0 km	1.0m3	12.87	36.67	2.85	37.00	2.87	5.72	UC-13
	3.0 km	1.0m3	10.84	36.67	3.38	37.00	3.41	6.80	UC-13
	4.0 km	1.0m3	9.36	36.67	3.92	37.00	3.95	7.87	UC-13
	5.0 km	1.0m3	8.24	36.67	4.45	37.00	4.49	8.94	UC-13

D.Truck (11T) Q=60*q*f*E/Cm q=6.1m³, f=1.0, E=0.9,
Cm=4.8*L+16.0 (min)

0.5 km	Q=60*6.1*1.0*0.9/18.4=17.90 (m³/hour)	Cm=4.8*0.5+16=18.40
1.0 km	Q=60*6.1*1.0*0.9/20.8=15.84	Cm=4.8*1.0+16=20.80
2.0 km	Q=60*6.1*1.0*0.9/25.6=12.87	Cm=4.8*2.0+16=25.60
3.0 km	Q=60*6.1*1.0*0.9/30.4=10.84	Cm=4.8*3.0+16=30.40
4.0 km	Q=60*6.1*1.0*0.9/35.2= 9.36	Cm=4.8*4.0+16=35.20
5.0 km	Q=60*6.1*1.0*0.9/40.0= 8.24	Cm=4.8*5.0+16=40.00

UC-33 EXCAVATION - TRANSPORTATION (L_t=1.0km) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Bulldozer	Excavation	m3	1.00	0.82	0.82	1.14	1.14		UC-21
Buck Hoe	Loader	m3	1.00	1.50	1.50	2.36	2.36		UC-20
D. Truck	1.0 km	m3	1.00	2.32	2.32	2.34	2.34		UC-32
Total					4.64		5.84	10.48	
%					0.44		0.56	1.00	

UC-34 BASE-LAYER PLACING Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Labor		person	0.45	39.00	17.55	0	0.00		
Motor Grader	3.1M	hour	0.40	43.00	17.20	77.00	30.80		UC-10
Tired Roller	8-20T	hour	0.25	37.47	9.37	48.00	12.00		UC-14
Total	100.0 m³				44.12		42.80	86.92	
	1.0 m³				0.44		0.43	0.87	
%					0.51		0.49	1.00	

TABLE J.3.5 UNIT COST - (9)

UC- 35 STEEL-BAR BENDING and PLACING Unit: Bs/kg

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.60	85.00	51.00	0.00	0.00		
Labor		person	2.70	39.00	105.30	0.00	0.00		
Labor	Helper	person	1.80	39.00	70.20	0.00	0.00		
Sundries	2%	lump	1		4.53	0.00	0.00		
Sub-total					231.03		0.00		
Labor	Foreman	person	0.90	85.00	76.5	0.00	0.00		
Labor		person	4.50	39.00	175.5	0.00	0.00		
Labor	Helper	person	3.90	39.00	152.1	0.00	0.00		
Sundries	3%	lump	1		12.12	0.00	0.00		
Sub-total					416.22		0.00		
Steel Bar		ton	1.06	0.00	0	2966.00	3143.96		
Total	1Ton				647.25		3143.96	3791.21	
	1kg				0.65		3.14	3.79	
%					0.17		0.83	1.00	

UC- 36 FORMING Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	10.80	87.00	939.60	0	0.00		
Labor		person	54.60	39.00	2129.40	0	0.00		
Labor	Helper	person	33.60	39.00	1310.40	0	0.00		
Sundries	0.09*Labor	lump	1		394.15	0.00	0.00		Inc.nail, woods,oil
Total	100.0m³				4773.55		0.00	4773.55	
	1.0 m³				47.74		0.00	47.74	
%					1.00		0.00	1.00	

UC- 37 GABION MAT (t=30cm) Unit: Bs/m²

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor	Foreman	person	0.60	85.00	51.00	0.00	0.00		
Labor		person	2.40	39.00	93.60	0.00	0.00		
Labor	Helper	person	2.10	39.00	81.90	0.00	0.00		
Buck Hoe	0.6m³	hour	1.50	57.12	85.68	90.00	135.00		UC-12
Gabion Mat	t=30cm	m²	33.30	0.00	0.00	7.00	233.10		
Crushed Stone		m³	9.50	151.50	1439.25	0.00	0.00		
Total	10.0m²	(33.3m²)			1751.43		368.10	2119.53	
	1.0 m²				52.60		11.05	63.65	
%					0.83		0.17	1.00	

UC- 38 FOUNDATION BED CRUSHED STONE Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Summary
				Price	Cost	Price	Cost		
Labor		person	0.90	39.00	35.10	0.00	0.00		
Labor	Helper	person	5.40	39.00	210.60	0.00	0.00		
(Subtotal)					245.70		0.00		
Sundries	3%*labor	lump	1.00		7.37	0.00	0.00		
Crushed Stone		m³	12.00	151.50	1818.00	0.00	0.00		
Total	10.0m³				2071.07		0.00	2071.07	
	1.0 m³				207.11		0.00	207.11	
%					1.00		0.00	1.00	

TABLE J.3.5 UNIT COST - (10)

UC- 39 EXCAVATION (BUCK HOE 0.6m³) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Buck hoe	0.6m³	hour	1	57.12	57.12	90.00	90.00		UC-12
Total	36.41m³				57.12		90.00	147.12	
	1.0 m³				1.57		2.47	4.04	
%					0.39		0.61	1.00	
	Buck Hoe (0.6m³)			Q=3600*q*f*E/Cm					
				q=0.59m³					
				f=1.0					
				E=0.6					
				Cm=35 sec					
				Q=3600*0.59*1.0*0.6/35=36.41m³/hour					

UC- 40 CLEARING and GRUBBING Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Labor	Foreman	person	0.59	85.00	50.15	0.00	0.00		
Labor		person	2.13	39.00	83.07	0.00	0.00		
Labor	Helper	person	1.19	39.00	46.41	0.00	0.00		
Sundries	8%*Labor	lump	1		14.37	0.00	0.00		
(Subtotal)					194.00		0.00		
Labor	foreman	person	0.17	85.00	14.45	0.00	0.00		
Labor	helper	person	0.88	76.00	66.88	0.00	0.00		
Bulldozer	15T	hour	6.40	62.82	402.05	87.00	556.80		UC-16
Buckhoe	0.6m³	hour	4.30	57.12	245.62	90.00	387.00		UC-12
(Subtotal)					728.99		943.80		
Total	1000.0m³				922.99		943.80	1866.79	
	1.0 m³				0.92		0.94	1.87	
%					0.49		0.51	1.00	

UC- 41 EMBANKMENT (BULLDOZER 15T , t=20cm) Unit: Bs/m³

Item	Specification	Unit	Volume	Local Portion Price	Local Portion Cost	Foreign Portion Price	Foreign Portion Cost	Total	Summary
Bulldozer	15T	hour	2.28	62.82	143.23	87.00	198.36		UC-16
Labo	helper	person	0.60	76.00	45.60	0.00	0		
Sundries		lump	1	0.00	0.00	0.00	0		
Total	100.0m³				188.83		198.36	387.19	
	1.0m3				1.89		1.98	3.87	
%					0.49		0.51	1.00	

TABLE J.3.6 SUMMARY OF CONSTRUCTION COST - (1)

(ALTERNATIVE I)

CHANE - PAILON — UNIT : 1000Bs

Sub Project / Works	Width (m)	Depth (m)	Length (km)	Construction Cost L/p	F/P	Total	Land Acquisition
1. Rio Chane							
Rio Chane Improvement	100~45	6.00~4.50	27.00	62,111	71,549	133,660	324
Sub total				62,111	71,549	133,660	324
2. Rrio Pailon							
Rio Pilon Improvement	70~65	5.00	32.00	99,955	99,477	199,432	433
MainDrainage	30~18	3.50~3.00	6.50	4,092	5,933	10,025	79
Secondary Drainage	12	3.00	16.00	5,508	5,882	11,390	23
Sub Total				109,555	111,292	220,847	535
3. Chane Chacras							
Queb. Las Chacras Improvement	45~37	3.00	36.50	35,440	30,183	65,623	365
Main Drainage	35~25	3.50~3.00	21.50	18,538	20,111	38,649	284
Secondary Drainage	12	3.00	42.00	29,605	31,618	61,223	125
Sub total				83,583	81,912	165,495	774
4. Quebrada Chane							
Queb. Chane Improvement	45~33	4.50~3.50	18.00	13,518	8,159	21,677	165
Queb. El Tolo Improvement	55	4.00	16.00	35,404	34,601	70,005	128
Main Drainage	25	3.00	8.00	2,068	2,193	4,261	47
Sub Total				50,990	44,953	95,943	340
5. Okinawa Drainage							
Main Drainage	35~16	4.00~3.00	21.00	18,174	18,783	36,957	239
Secondary Drainage	12	3.00	46.00	15,835	16,912	32,747	67
Sub Total				34,009	35,695	69,704	306
Total				340,248	345,401	685,649	2,279

SAN JUAN - ANTOFAGASTA — UNIT : 1000Bs

Sub Project / Works	Width (m)	Depth (m)	Length (km)	Construction Cost L/p	F/P	Total	Land Acquisition
6. San Juan							
Arro. Yapacanicito Improvement	35~30	3.00	14.10	7,561	6,895	14,456	118
Main Drainage(S.Juan Q. Tejeria)	21~14	4.00~3.00	41.30	10,160	12,360	22,520	76
Secondary Drainage	14	3.00	34.00	13,953	15,029	28,982	60
Sub Total				31,674	34,284	65,958	254
7. Antofagasta							
Arro. Tacuaral Improvement	26	4.00	7.70	6,010	6,356	12,366	51
Arro. Jochi Improvement	30~22	3.50	12.60	7,261	6,787	14,048	120
Road (San Juan-Antofagasta)	9.1	-	9.00	4,945	2,177	7,122	198
Main Drainage(Antofagasta)	28~25	4.00	10.00	5,768	7,179	12,947	98
Secondary Drainage	14	3.00	38.00	14,102	15,530	29,632	67
Sub Total				38,086	38,029	76,115	534
Total				69,760	72,313	142,073	788
(Alternative I) Total				410,008	417,714	827,722	3,067

TABLE J.3.6 SUMMARY OF CONSTRUCTION COST - (2)
(ALTERNATIVE II)

CHANE - PAILON — UNIT : 1000Bs

Sub Project / Works	Width (m)	Depth (m)	Length (km)	Construction Cost L/p	F/P	Total	Land Acquisition
1. Rio Chane							
Rio Chane Improvement	100~45	6.00~4.50	27.00	0	0	0	0
Sub total				0	0	0	0
2. Rrio Pailon							
Rio Pilon Improvement	70~65	5.00	32.00	99,955	99,477	199,432	433
MainDrainage	30~18	3.50~3.00	6.50	4,092	5,933	10,025	79
Secondary Drainage	12	3.00	16.00	5,508	5,882	11,390	23
Sub Total				109,555	111,292	220,847	535
3. Chane Chacras							
Queb. Las Chacras Improvement	45~37	3.00	36.50	35,440	30,183	65,623	365
Main Drainage	35~25	3.50~3.00	21.50	18,538	20,111	38,649	284
Secondary Drainage	12	3.00	42.00	29,605	31,618	61,223	125
Sub total				83,583	81,912	165,495	774
4. Quebrada Chane							
Queb. Chane Improvement	45~33	4.50~3.50	18.00	13,518	8,159	21,677	165
Queb. El Tolo Improvement	55	4.00	16.00	35,404	34,601	70,005	128
Main Drainage	25	3.00	8.00	2,068	2,193	4,261	47
Sub Total				50,990	44,953	95,943	340
5. Okinawa Drainage							
Main Drainage	35~16	4.00~3.00	21.00	18,174	18,783	36,957	239
Secondary Drainage	12	3.00	46.00	15,835	16,912	32,747	67
Sub Total				34,009	35,695	69,704	306
Total				278,137	273,852	551,989	1,955

SAN JUAN - ANTOFAGASTA — UNIT : 1000Bs

Sub Project / Works	Width (m)	Depth (m)	Length (km)	Construction Cost L/p	F/P	Total	Land Acquisition
6. San Juan							
Arro. Yapacanicito Improvement	35~30	3.00	14.10	7,130	6,418	13,548	118
Main Drainage(S.Juan Q. Tejeria)	21~14	4.00~3.00	41.30	14,838	17,377	32,215	76
Secondary Drainage	14	3.00	34.00	13,953	15,029	28,982	60
Sub Total				35,921	38,824	74,745	254
7. Antofagasta							
Arro. Tacuaral Improvement	26	4.00	7.70	6,010	6,356	12,366	51
Arro. Jochi Improvement	30~22	3.50	12.60	7,261	6,787	14,048	120
Road (San Juan-Antofagasta)	9.1	-	9.00	4,945	2,177	7,122	198
Main Drainage(Antofagasta)	28~25	4.00	10.00	5,768	7,179	12,947	98
Secondary Drainage	14	3.00	38.00	14,102	15,530	29,632	67
Sub Total				38,086	38,029	76,115	534
Total				74,007	76,853	150,860	788
(Alternative II) Total				352,144	350,705	702,849	2,743

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I) - (1)

1.Rio Chane (W=100-45m, D=6-4.5m, L=27.00km) - RIO CHANE

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	540,000	0.92	0.94	497	508	1,004	UC-40
Soil Excavation	Bulldozer 15T	m3	3,526,300	0.82	1.14	2,892	4,020	6,912	UC-21
Buck Hoe Loading		m3	3,526,300	1.50	2.36	5,289	8,322	13,612	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	3,526,300	2.32	2.34	8,181	8,252	16,433	UC-32
Excavated Soil Filling	Bulldozer15T	m3	3,526,300	2.28	1.81	8,040	6,383	14,423	UC-31
Slope Forming		m2	445,900	3.39	2.88	1,512	1,284	2,796	UC-30
Operation Road B=3m	C.Gravel, t=20cm	m2	162,000	39.19	0.52	6,349	84	6,433	UC-22
Sub-total (1)						32,759	28,852	61,611	
Bridge Construction		m2	772			2,555	4,745	7,300	R303-105.0m
Bridge Construction		m2	588			2,030	3,770	5,800	R304-80.0m
Bridge Construction		m2	588			2,030	3,770	5,800	R308-80.0m
Bridge Construction		m2	588			2,030	3,770	5,800	R310-80.0m
Bridge Construction		m2	588			2,030	3,770	5,800	R312-80.0m
Sub-total (2)						10,675	20,800	31,475	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			4,343	4,965	9,309	
Sub-total (3)						4,343	4,965	9,309	
Direct Cost	Sub-total (1)+(2)+(3)					47,778	54,617	102,395	
Unforeseen	Direct Cost*5%	lump	1			2,389	3,277	5,666	
Overhead	Direct Cost*10%	lump	1			4,778	5,462	10,240	
Profit	Direct Cost*15%	lump	1			7,167	8,192	15,359	
Indirect Cost						14,333	16,931	31,265	
Construction Cost						62,111	71,549	133,660	
Land Acquisition Cost		ha	222	1,458.00	0.00	324	0	324	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (2)

2.Queb. Chane (W=45-33m, D=4.5-3.5m, L=18.0 km) - QUEB. CHANE

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	360,000	0.92	0.94	331	338	670	UC-40
Soil Excavation	Bulldozer 15T	m3	629,000	0.82	1.14	516	717	1,233	UC-21
Buck Hoe Loading		m3	629,000	1.50	2.36	944	1,484	2,428	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	629,000	2.32	2.34	1,459	1,472	2,931	UC-32
Excavated Soil Filling	Bulldozer15T	m3	629,000	2.28	1.81	1,434	1,138	2,573	UC-31
Slope Forming		m2	158,300	3.39	2.88	537	456	993	UC-30
Operation Road B=3m	C.Gravel, t=. :m	m2	108,000	39.19	0.52	4,233	56	4,289	UC-22
Sub-total (1)						9,453	5,662	15,115	
Bridge Construction		m2	0						
Bridge Construction		m2	0						
Bridge Construction		m2	0						
Sub-total (2)									
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			945	566	1,512	
Sub-total (3)						945	566	1,512	
Direct Cost	**Sub-total (1)+(2)+(3)**					10,398	6,229	16,627	
Unforeseen	Direct Cost*5%	lump	1			520	374	894	
Overhead	Direct Cost*10%	lump	1			1,040	623	1,662	
Profit	Direct Cost*15%	lump	1			1,560	934	2,494	
Indirect Cost						3,120	1,931	5,050	
Construction Cost						13,518	8,159	21,677	
Land Acquisition Cost		ha	113	1,458.00	0.00	165	0	165	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (3)

3. Rio Pailon (W=70-65m, D=5m, L=32.0 km) - RIO PAILON

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	2,560,000	0.92	0.94	2,355	2,406	4,762	UC-40
Soil Excavation	Bulldozer 15T	m3	8,037,700	0.82	1.14	6,591	9,163	15,754	UC-21
Buck Hoe Loading		m3	8,037,700	1.50	2.36	12,057	18,969	31,026	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	8,037,700	2.32	2.34	18,647	18,808	37,456	UC-32
Excavated Soil Filling	Bulldozer15T	m3	8,037,700	2.28	1.81	18,326	14,548	32,874	UC-31
Slope Forming		m2	760,400	3.39	2.88	2,578	2,190	4,768	UC-30
Operation Road B=3m	C.Gravel, t=20cm	m2	192,000	39.19	0.52	7,524	100	7,624	UC-22
Sub-total (1)						68,078	66,185	134,263	U.Cost
Bridge Construction		m2	515			1,820	3,380	5,200	R202-70.00
Bridge Construction		m2							
Bridge Construction		m2							
Sub-total (2)						1,820	3,380	5,200	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			6,990	6,956	13,946	
Sub-total (3)						6,990	6,956	13,946	
Direct Cost	Sub-total (1)+(2)+(3)					76,888	76,521	153,409	
Unforeseen	Direct Cost*5%	lump	1			3,844	3,826	7,670	
Overhead	Direct Cost*10%	lump	1			7,689	7,652	15,341	
Profit	Direct Cost*15%	lump	1			11,533	11,478	23,011	
Indirect Cost						23,066	22,956	38,352	
Construction Cost						99,955	99,477	199,432	
Land Acquisition Cost		ha	313	1,458.00	0.00	433	0	433	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (4)

4. Quebrada El Toro (W=55m, D=4m, L=16.0 km) - QUEB. CHANE

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	480,000	0.92	0.94	442	451	893	UC-40
Soil Excavation	Bulldozer 15T	m3	2,603,600	0.82	1.14	2,135	2,968	5,103	UC-21
Buck Hoe Loading		m3	2,603,600	1.50	2.36	3,905	6,144	10,050	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	2,603,600	2.32	2.34	6,040	6,092	12,133	UC-32
Excavated Soil Filling	Bulldozer15T	m3	2,603,600	2.28	1.81	5,936	4,713	10,649	UC-31
Slope Forming		m2	273,600	3.39	2.88	928	788	1,715	UC-30
Operation Road B=3m	C.Gravel, t=20cm	m2	96,000	39.19	0.52	3,762	50	3,812	UC-22
Sub-total (1)						23,148	21,207	44,355	
Bridge Construction		m2	441			1,610	2,990	4,600	T03-60.0m
Bridge Construction									
Sub-total (2)						1,610	2,990	4,600	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			2,476	2,420	4,895	
Sub-total (3)						2,476	2,420	4,895	
Direct Cost	Sub-total (1)+(2)+(3)					27,234	26,616	53,850	
Unforeseen	Direct Cost*5%	lump	1			1,362	1,331	2,693	
Overhead	Direct Cost*10%	lump	1			2,723	2,662	5,385	
Profit	Direct Cost*15%	lump	1			4,085	3,992	8,078	
Indirect Cost						8,170	7,985	16,155	
Construction Cost						35,404	34,601	70,005	
Land Acquisition Cost		ha	145	1,458.00	0.00	128	0	128	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (5)

5. Quebrada Las Chacras (W=45-37m, D=3m, L=36.5 km) - CHANE CHACRAS

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	525,000	0.92	0.94	483	494	977	UC-40
Soil Excavation	Bulldozer 15T	m3	1,407,000	0.82	1.14	1,154	1,604	2,758	UC-21
Buck Hoe Loading		m3	1,407,000	1.50	2.36	2,111	3,321	5,431	UC-20
Soil Transportation	D. Truck 11T.L=1km	m3	1,407,000	2.32	2.34	3,264	3,292	6,557	UC-32
Excavated Soil Filling	Bulldozer15T	m3	1,407,000	2.28	1.81	3,208	2,547	5,755	UC-31
Slope Forming		m2	401,500	3.39	2.88	1,361	1,156	2,517	UC-30
Operation Road B=3m	C.Gravel, t=20cm	m2	219,000	39.19	0.52	8,583	114	8,696	UC-22
Sub-total (1)						20,163	12,527	32,690	
Bridge Construction	309m2	lump	2	1,225.00	2,275.00	2,450	4,550	7,000	
Bridge Construction	368m2	lump	2	1,085.00	2,015.00	2,170	4,030	6,200	
Sub-total (2)						4,620	8,580	13,200	
Preparatory Works	Sub-total((1)+(2))*10%	lump				2,478	2,111	4,589	
Sub-total (3)						2,478	2,111	4,589	
Direct Cost	Sub-total (1)+(2)+(3)					27,261	23,218	50,479	
Unforeseen	Direct Cost*5%	lump				1,363	1,161	2,524	
Overhead	Direct Cost*10%	lump				2,726	2,322	5,048	
Profit	Direct Cost*15%	lump				4,089	3,483	7,572	
Indirect Cost						8,178	6,965	15,144	
Construction Cost						35,440	30,183	65,623	
Land Acquisition Cost		ha	250	1,458.00	0.00	365	0	365	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I) - (6)

6.Arroyo Yapacanicito (W=35-30m, D=3m, L=14.1 km) - SAN JUAN

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	564,000	0.92	0.94	519	530	1,049	UC-40
Soil Excavation	Bulldozer 15T	m3	289,700	0.82	1.14	238	330	568	UC-21
Buck Hoe Loading		m3	289,700	1.50	2.36	435	684	1,118	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	289,700	2.32	2.34	672	678	1,350	UC-32
Excavated Soil Filling	Bulldozer15T	m3	289,700	2.28	1.81	661	524	1,185	UC-31
Slope Forming		m2	95,900	3.39	2.88	325	276	601	UC-30
Operation Road	C.Gravel t=20cm	m2	84,600	17.66	0.52	1,494	44	1,538	UC-22
Sub-total (1)						4,343	3,067	7,409	
Bridge Construction	257m2	m2	1	945.00	1,755.00	945	1,755	2,700	A305-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	A306-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	A307-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	A308-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	
Sub-total (2)						945	1,755	2,700	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			529	482	1,011	
Sub-total (3)						529	482	1,011	
Direct Cost	**Sub-total (1)+(2)+(3)**					5,817	5,304	11,120	
Unforeseen	Direct Cost*5%	lump	1			291	265	556	
Overhead	Direct Cost*10%	lump	1			582	530	1,112	
Profit	Direct Cost*15%	lump	1			872	796	1,668	
Indirect Cost						1,745	1,591	3,336	
Construction Cost						7,561	6,895	14,456	
Land Acquisition Cost		ha	81	1,458.00	0.00	118	0	118	

TABLE J.3.7 COST ESTIMATION OF RIVER DRAINAGE (ALTERNATIVE I) - (7)

7.Arroyo Yapacanicito (W=35-30m, D=3m, L=14.1 km) - SAN JUAN

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe&Bulldozer	m2	564,000	0.92	0.94	519	530	1,049	UC-40
Soil Excavation	Bulldozer 15T	m3	246,100	0.82	1.14	202	281	482	UC-21
Buck Hoe Loading		m3	246,100	1.50	2.36	369	581	950	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	246,100	2.32	2.34	571	576	1,147	UC-32
Excavated Soil Filling	Bulldozer15T	m3	246,100	2.28	1.81	561	445	1,007	UC-31
Slope Forming		m2	95,900	3.39	2.88	325	276	601	UC-30
Operation Road	C.Gravel t=20cm	m2	84,600	17.66	0.52	1,494	44	1,538	UC-22
Sub-total (1)						4,041	2,733	6,774	
Bridge Construction	257m2	m2	1	945.00	1,755.00	945	1,755	2,700	A305-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	A306-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	A307-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	A308-35.0m
Bridge Construction	257m2	m2	0	945.00	1,755.00	0	0	0	
Sub-total (2)						945	1,755	2,700	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			499	449	947	
Sub-total (3)						499	449	947	
Direct Cost	Sub-total (1)+(2)+(3)					5,485	4,937	10,421	
Unforeseen	Direct Cost*5%	lump	1			274	247	521	
Overhead	Direct Cost*10%	lump	1			548	494	1,042	
Profit	Direct Cost*15%	lump	1			823	741	1,563	
Indirect Cost						1,645	1,481	3,126	
Construction Cost						7,130	6,418	13,548	
Land Acquisition Cost		ha	81	1,458.00	0.00	118	0	118	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (8)

8. Arroyo Jochi (W=30-22m, D=3.5m, L=12.6 km) - ANTOFAGASTA

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	252,000	0.92	0.94	232	237	469	UC-40
Soil Excavation	Bulldozer 15T	m3	302,200	0.82	1.14	248	345	592	UC-21
Buck Hoe Loading		m3	302,200	1.50	2.36	453	713	1,166	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	302,200	2.32	2.34	701	707	1,408	UC-32
Roadbed Compaction	Bulldozer15T	m3	302,200	2.28	1.81	689	547	1,236	UC-31
Slope Forming		m2	139,900	3.39	2.88	474	403	877	UC-30
Operation Road B=3m	C.Gravel t=20cm	m2	75,600	17.66	0.52	1,335	39	1,374	
Sub-total (1)						4,132	2,991	7,123	
Bridge Construction		m2						0	A206-35.0m
Bridge Construction		m2	257			945	1,755	3,000	A209-35.0m
Bridge Construction		m2							A209+2.3km-35.0m
Bridge Construction		m2							
Bridge Construction		m2							
Bridge Construction		m2							
Sub-total (2)						945	1,755	2,700	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			508	475	982	
Sub-total (3)						508	475	982	
Direct Cost	**Sub-total (1)+(2)+(3)**					5,585	5,221	10,806	
Unforeseen	Direct Cost*5%	lump	1			279	261	540	
Overhead	Direct Cost*10%	lump	1			559	522	1,081	
Profit	Direct Cost*15%	lump	1			838	783	1,621	
Indirect Cost						1,676	1,566	3,242	
Construction Cost						7,261	6,787	14,047	
Land Acquisition Cost		ha	82	1,458.00	0.00	120	0	120	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (9)

9. Arroyo Tacuaral (W=26m, D=4m, L=7.7 km) - ANTOFAGASTA

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	154,000	0.92	0.94	142	145	286	UC-40
Soil Excavation	Bulldozer 15T	m3	260,200	0.82	1.14	213	297	510	UC-21
Buck Hoe Loading		m3	260,200	1.50	2.36	390	614	1,004	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	260,200	2.32	2.34	604	609	1,213	UC-32
Excavated Soil Filling	Bulldozer15T	m3	260,200	2.28	1.81	593	471	1,064	UC-31
Slope Forming		m2	116,500	3.39	2.88	395	336	730	UC-30
Operation Road	C.Gravel B=3m	m2	46,200	17.66	0.52	816	24	840	UC-22
Sub-total (1)						3,153	2,495	5,648	
Bridge Construction		m2	221			1,050	1,950	3,000	AT03-30.0m
Bridge Construction									
Sub-total (2)						1,050	1,950	3,000	
Preparatory Works	Sub-total((1)+(2))*10%	lump	1			420	444	865	
Sub-total (3)						420	444	865	
Direct Cost	Sub-total (1)+(2)+(3)					4,623	4,889	9,513	
Unforeseen	Direct Cost*5%	lump	1			231	244	476	
Overhead	Direct Cost*10%	lump	1			462	489	951	
Profit	Direct Cost*15%	lump	1			694	733	1,427	
Indirect Cost						1,387	1,467	2,854	
Construction Cost						**6,010**	**6,356**	**12,367**	
Land Acquisition Cost		ha	50	1,458.00	0.00	51	0	51	

TABLE J.3.7 COST ESTIMATION OF RIVER IMPROVEMENT (ALTERNATIVE I,II) - (10)

10. Okinawa Main Drainage (W=35-16m, D=3.5-3m, L=21.0km) - OKINAWA DRAINAGE

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0	0	UC-40
Soil Excavation	Bulldozer 15T	m3	1,575,900	0.82	1.14	1,292	1,797	3,089	UC-21
Buck Hoe Loading		m3	1,575,900	1.50	2.36	2,364	3,719	6,083	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	1,575,900	2.32	2.34	3,656	3,688	7,344	UC-32
Surplus Soil Filling	Bulldozer15T	m3	1,575,900	2.28	1.81	3,593	2,852	6,445	UC-31
Slope Forming		m2	354,600	3.39	2.88	1,202	1,021	2,223	UC-30
Sub-total (1)						12,107	13,077	25,184	
Bridge Construction	L=40m	lump	0	1,155	2,145	0	0	0	
Bridge Construction	L=30m	lump	2	945	1,755	2	4	5	
Sub-total (2)						2	4	5	
Box Culvert	3m*3m*3Battery	lump	0	200,000	200,000	0	0	0	
Box Culvert	2.5m*2m*2Battery	lump	4	150,000	150,000	600	600	1,200	
Sub-total (3)						600	600	1,200	
Preparatory Work	Sub-total((1)+(2)+(3))*10%					1,271	1,368	2,639	
Sub-total (4)						1,271	1,368	2,639	
Direct Cost	Sub-total (1)+(2)+(3)+(4)					13,980	14,448	28,429	
Unforeseen	Direct Cost*5%					699	722	1,421	
Overhead	Direct Cost*10%					1,398	1,445	2,843	
Profit	Direct Cost*15%					2,097	2,167	4,264	
Indirect Cost						4,194	4,335	8,529	
Construction Cost						18,174	18,783	36,957	
Land Acquisition Cost		ha	164	1,458.00	0	239	0	239	

TABLE J.3.8 COST ESTIMATION OF MAIN DRAINAGE (ALTERNATIVE I,II) - (1)

1. El EmpalmeII, Chaco, Rancho Chico (W=30-18m,D=3.5-3m, L=6.50km) - RIO PAILON

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0	0	UC-40
Soil Excavation	Bulldozer 15T	m3	367,500	0.82	1.14	301	419	720	UC-21
Buck Hoe Loading		m3	367,500	1.50	2.36	551	867	1,419	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	367,500	2.32	2.34	853	860	1,713	UC-32
Surplus Soil Filling	Bulldozer15T	m3	367,500	2.28	1.81	838	665	1,503	UC-31
Slope Forming		m2	94,000	3.39	2.88	319	271	589	UC-30
Sub-total (1)						2,862	3,082	5,944	
Bridge Construction		lump							
Bridge Construction		lump							
Sub-total (2)									
Box Culvert		lump							
Box Culvert		lump							
Sub-total (3)									
Preparatory Work	Sub-total((1)+(2)+(3))*10%					286	308	594	
Sub-total (4)						286	308	594	
Direct Cost	Sub-total (1)+(2)+(3)+(4)					3,148	3,390	6,538	
Unforeseen	Direct Cost*5%					157	1,695	1,853	
Overhead	Direct Cost*10%					315	339	654	
Profit	Direct Cost*15%					472	509	981	
Indirect Cost						944	2,543	3,487	
Construction Cost						4,092	5,933	10,025	
Land Acquisition Cost		ha	54	1,458.00	0	79	0	79	

TABLE J.3.8 COST ESTIMATION OF MAIN DRAINAGE (ALTERNATIVE I,II) - (2)

2. Las Maras (W=25m, D=3m, L=8.0 km) - QUEB. CHANE

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0	0	UC-40
Soil Excavation	Bulldozer 15T	m3	172,424	0.82	1.14	141	197	338	UC-21
Buck Hoe Loading		m3	172,424	1.50	2.36	259	407	666	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	172,424	2.32	2.34	400	403	803	UC-32
Surplus Soil Filling	Bulldozer15T	m3	172,424	2.28	1.81	393	312	705	UC-31
Slope Forming		m2	74,600	3.39	2.88	253	215	468	UC-30
Sub-total (1)						1,446	1,534	2,980	
Bridge Construction		lump							
Bridge Construction		lump							
Sub-total (2)									
Box Culvert		lump							
Box Culvert		lump							
Sub-total (3)									
Preparatory Work	Sub-total((1)+(2)+(3))*10%					145	153	298	
Sub-total (4)						145	153	298	
Direct Cost	**Sub-total (1)+(2)+(3)+(4)**					1,591	1,687	3,278	
Unforeseen	Direct Cost*5%					80	84	164	
Overhead	Direct Cost*10%					159	169	328	
Profit	Direct Cost*15%					239	253	492	
Indirect Cost						477	506	983	
Construction Cost						**2,068**	**2,193**	**4,261**	
Land Acquisition Cost		ha	32	1,458.00	0	47	0	47	

TABLE J.3.8 COST ESTIMATION OF MAIN DRAINAGE (ALTERNATIVE I,II) - (3)

3. Chane Main Drainage (W=35-16m, D=3.5-3m, L=21.50km) - CHANE CHACRAS

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0	0	UC-40
Soil Excavation	Bulldozer 15T	m3	1,717,500	0.82	1.14	1,408	1,958	3,366	UC-21
Buck Hoe Loading		m3	1,717,500	1.50	2.36	2,576	4,053	6,630	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	1,717,500	2.32	2.34	3,985	4,019	8,004	UC-32
Surplus Soil Filling	Bulldozer15T	m3	1,717,500	2.28	1.81	3,916	3,109	7,025	UC-31
Slope Forming		m2	315,700	3.39	2.88	1,070	909	1,979	UC-30
Sub-total (1)						12,955	14,048	27,003	
Bridge Construction	L=40m	lump	4	1,155	2,145	5	9	13	
Bridge Construction	L=30m	lump	4	945	1,755	4	7	11	
Sub-total (2)						8	16	24	
Box Culvert	3m*3m*3Battery	lump	0	200,000	200,000	0	0	0	
Box Culvert	2.5m*2m*2Battery	lump	0	150,000	150,000	0	0	0	
Sub-total (3)						0	0	0	
Preparatory Work	Sub-total((1)+(2)+(3))*10%					1,296	1,406	2,703	
Sub-total (4)						1,296	1,406	2,703	
Direct Cost	Sub-total (1)+(2)+(3)+(4)					14,260	15,470	29,730	
Unforeseen	Direct Cost*5%					713	774	1,487	
Overhead	Direct Cost*10%					1,426	1,547	2,973	
Profit	Direct Cost*15%					2,139	2,321	4,460	
Indirect Cost						4,278	4,641	8,919	
Construction Cost						18,538	20,111	38,649	
Land Acquisition Cost		ha	195	1,458.00	0	284	0	284	

TABLE J.3.8 COST ESTIMATION OF MAIN DRAINAGE (ALTERNATIVE I) - (4)

4. San Juan, Quebrada Tejeria (W=22-14m, D=4-3m, L=41.3km) - SAN JUAN

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	142,000	0.92	0.94	131	133	264	UC-40
Soil Excavation	Bulldozer 15T	m3	543,500	0.82	1.14	446	620	1,065	UC-21
Buck Hoe Loading		m3	543,500	1.50	2.36	815	1,283	2,098	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	543,500	2.32	2.34	1,261	1,272	2,533	UC-32
Surplus Soil Filling	Bulldozer15T	m3	543,500	2.28	1.81	1,239	984	2,223	UC-31
Slope Forming		m2	473,000	3.39	2.88	1,603	1,362	2,966	UC-30
Sub-total (1)						5,495	5,653	11,149	
Bridge Construction		lump				0	0	0	
Bridge Construction	L=25.0m 184m≤	lump	1			840	1,560	2,400	
Bridge Construction	L=21.0m 154m≤	lump	1			770	1,430	2,200	
Sub-total (2)						1,610	2,990	4,600	
Box Culvert	3m*3m*3battery 27m≤	lump	0	200,000	200,000	0	0	0	400,000 Bs.
Box Culvert	3.5m*3m*3battery 32m≤	lump	0	225,000	225,000	0	0	0	450,000 Bs.
Sub-total (3)						0	0	0	
Preparatory Work	Sub-total((1)+(2)+(3))*10%					711	864	1,575	
Sub-total (4)						711	864	1,575	
Direct Cost	Sub-total (1)+(2)+(3)+(4)					7,816	9,508	17,323	
Unforeseen	Direct Cost*5%					391	475	866	
Overhead	Direct Cost*10%					782	951	1,732	
Profit	Direct Cost*15%					1,172	1,426	2,599	
Indirect Cost						2,345	2,852	5,197	
Construction Cost						10,160	12,360	22,521	
Land Acquisition Cost		ha	52	1,458.00	0.00	76	0	76	

TABLE J.3.8 COST ESTIMATION OF MAIN DRAINAGE (ALTERNATIVE II) - (5)

5. San Juan, Quebrada Tejeria (W=22-14m, D=4-3m, L=41.3km) - SAN JUAN

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	142,000	0.92	0.94	131	133	264	UC-40
Soil Excavation	Bulldozer 15T	m3	868,100	0.82	1.14	712	990	1,701	UC-21
Buck Hoe Loading		m3	868,100	1.50	2.36	1,302	2,049	3,351	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	868,100	2.32	2.34	2,014	2,031	4,045	UC-32
Surplus Soil Filling	Bulldozer15T	m3	868,100	2.28	1.81	1,979	1,571	3,551	UC-31
Slope Forming		m2	473,000	3.39	2.88	1,603	1,362	2,966	UC-30
Sub-total (1)						7,741	8,137	15,878	
Bridge Construction		lump				0	0	0	
Bridge Construction	L=25.0m 184m≤	lump	1			840	1,560	2,400	
Bridge Construction	L=21.0m 154m≤	lump	1			770	1,430	2,200	
Sub-total (2)						1,610	2,990	4,600	
Box Culvert	3m*3m*3battery 27m≤	lump	4	200,000	200,000	800	800	1,600	400,000 Bs.
Box Culvert	3.5m*3m*3battery 32m≤	lump	1	225,000	225,000	225	225	450	450,000 Bs.
Sub-total (3)						1,025	1,025	2,050	
Prepratory Work	Sub-total((1)+(2)+(3))*10%					1,038	1,215	2,253	
Sub-total (4)						1,038	1,215	2,253	
Direct Cost	**Sub-total (1)+(2)+(3)+(4)**					11,414	13,367	24,781	
Unforeseen	Direct Cost*5%					571	668	1,239	
Overhead	Direct Cost*10%					1,141	1,337	2,478	
Profit	Direct Cost*15%					1,712	2,005	3,717	
Indirect Cost						3,424	4,010	7,434	
Construction Cost						**14,838**	**17,377**	**32,215**	
Land Acquisition Cost		ha	52	1,458.00	0.00	76	0	76	

TABLE J.3.8 COST ESTIMATION OF MAIN DRAINAGE (ALTERNATIVE I,II) - (6)

6. Antofagasta (W=28-25m, D=4m, L=10.0km.) - ANTOFAGASTA

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	200,000	0.92	0.94	184	188	372	UC-40
Soil Excavation	Bulldozer 15T	m3	344,400	0.82	1.14	282	393	675	UC-21
Buck Hoe Loading		m3	344,400	1.50	2.36	517	813	1,329	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	344,400	2.32	2.34	799	806	1,605	UC-32
Surplus Soil Filling	Bulldozer15T	m3	344,400	2.28	1.81	785	623	1,409	UC-31
Slope Forming		m2	153,700	3.39	2.88	521	443	964	UC-30
Sub-total (1)						3,088	3,265	6,354	
Bridge Construction	L=30.0m 220m≤	lump	1			945	1,755	2,700	
Bridge Construction									
Bridge Construction									
Sub-total (2)						945	1,755	2,700	
Box Culvert									
Box Culvert									
Sub-total (3)						0	0	0	
Prepratory Work	Sub-total((1)+(2)+(3))*10%					403	502	905	
Sub-total (4)						403	502	905	
Direct Cost	Sub-total (1)+(2)+(3)+(4)					4,437	5,522	9,959	
Unforeseen	Direct Cost*5%					222	276	498	
Overhead	Direct Cost*10%					444	552	996	
Profit	Direct Cost*15%					665	828	1,494	
Indirect Cost						1,331	1,657	2,988	
Construction Cost						5,768	7,179	12,947	
Land Acquisition Cost		ha	67	1,458.00	0.00	98	0	98	

TABLE J.3.9 COST ESTIMATION OF ROAD-CUM-EMBANKMENT (ALTERNATIVE I,II)

1. San Juan ~ Antofagasta (W=9.1m, L=9.0km) - ANTOFAGASTA

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Base-Layer Placing		m2	135,900	0.44	0.43	60	58	118	UC-34
Soil Excavation	Bulldozer 15T	m3	163,400	0.82	1.14	134	186	320	UC-21
Buck Hoe Roading	0.6m3,	m3	163,400	1.50	2.36	245	386	631	UC-20
Soil Transportation	D.Truck , L=0.5km	m3	163,400	2.05	2.07	335	338	673	UC-32
Roadbed Compaction	Bulldozer 15T	m3	163,400	2.28	1.81	373	296	668	UC-31
Subbase Course	C.Gravel, t=20cm	m3	60,300	17.66	0.52	1,065	31	1,096	UC-22 W6.7m*9.0km
Base Course	C.Gravel, t=15cm	m3	60,300	17.28	0.87	1,042	52	1,094	UC-23
Slope Forming		m2	60,400	3.39	2.88	205	174	379	UC-30
Sub-total (1)						3,458	1,522	4,980	
Preparatory Work	Sub-toyal(1)*10%	lump				346	152	498	
Sub-total (2)						346	152	498	
Direct Cost	Sub-total (1)+(2)					3,804	1,674	5,478	
Unforeseen	Direct Cost*5%	lump				190	84	274	
Overhead	Direct Cost*10%	lump				380	167	548	
Profit	Direct Cost*15%	lump				571	251	822	
Indirect Cost						1,141	502	1,643	
Construction Cost						4,945	2,177	7,122	
Land Acquisition Cost		ha	68	1,458	0	99	0	198	

TABLE J.3.10 COST ESTIMATION OF SECONDARY DRAINAGE (ALTERNATIVE I,II) - (1)

1.Arro. Tejeria, S.J.-Yapacani, S.J. (115.0km2) - SAN JUAN

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0		UC-40 East Part
Soil Excavation	Buck Hoe 0.6m3	m3	693,600	1.57	2.47	1,089	1,713	2,802	UC-39
Buck Hoe Loading		m3	693,600	1.50	2.36	1,040	1,637	2,677	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	693,600	2.32	2.34	1,609	1,623	3,232	UC-32
Surplus Soil Filling	Bulldozer15T	m3	693,600	2.28	1.81	1,581	1,255	2,837	UC-31
Slope Forming		m2	306,000	3.39	2.88	1,037	881	1,919	UC-30
Sub-total (1)	(L=34.0km)					6,357	7,110	13,467	
Box Culvert									
Box Culvert	3m*3m*3=27m2	lump	17	200,000	200,000	3,400	3,400	6,800	400,000Bs
Sub-total (2)						3,400	3,400	6,800	
Preparatory Work	Sub-total((1)+(2))*10%					976	1,051	2,027	
Sub-total (3)						976	1,051	2,027	
Direct Cost	Sub-total(1)+(2)+(3)					10,733	11,561	22,294	
Unforeseen	Direct Cost*5%					537	578	1,115	
Overhead	Direct Cost*10%					1,073	1,156	2,229	
Profit	Direct Cost*15%					1,610	1,734	3,344	
Indirect Cost						3,220	3,468	6,688	
Construction Cost						13,953	15,029	28,982	
Land Acquisition Cost		ha	41	1,458.00	0.00	60	0	60	

TABLE J.3.10 COST ESTIMATION OF SECONDARY DRAINAGE (ALTERNATIVE I,II) - (2)

2. Jochi , Tacaral (121.0 km2) - ANTOFAGASTA

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0		UC-40 East Part
Soil Excavation	Buck Hoe 0.6m3	m3	775,200	1.57	2.47	1,217	1,915	3,132	UC-39
Buck Hoe Loading		m3	775,200	1.50	2.36	1,163	1,829	2,992	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	775,200	2.32	2.34	1,798	1,814	3,612	UC-32
Surplus Soil Filling	Bulldozer15T	m3	775,200	2.28	1.81	1,767	1,403	3,171	UC-31
Slope Forming		m2	34,200	3.39	2.88	116	98	214	UC-30
Sub-total (1)	(L=44.0km)					6,062	7,060	13,122	
Box Culvert									
Box Culvert	3m*3m*3=27m2	lump	19	200,000	200,000	3,800	3,800	7,600	400,000Bs
Sub-total (3)						3,800	3,800	7,600	
Preparatory Work	Sub-total((1)+(2))*10%					986	1,086	2,072	
Sub-total (4)						986	1,086	2,072	
Direct Cost	Sub-total(1)+(2)+(3)					10,848	11,946	22,794	
Unforeseen	Direct Cost*5%					542	597	1,140	
Overhead	Direct Cost*10%					1,085	1,195	2,279	
Profit	Direct Cost*15%					1,627	1,792	3,419	
Indirect Cost						3,254	3,584	6,838	
Construction Cost						14,102	15,530	29,632	
Land Acquisition Cost		ha	46	1,458.00	0.00	67	0	67	

TABLE J.3.10 COST ESTIMATION OF SECONDARY DRAINAGE (ALTERNATIVE I,II) - (3)

3. Okinawa Main (147.0 km2) - OKINAWA DRAINAGE

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0		UC-40 East Part
Soil Excavation	Buck Hoe 0.6m3	m3	736,000	1.57	2.47	1,156	1,818	2,973	UC-39
Buck Hoe Loading		m3	736,000	1.50	2.36	1,104	1,737	2,841	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	736,000	2.32	2.34	1,708	1,722	3,430	UC-32
Surplus Soil Filling	Bulldozer15T	m3	736,000	2.28	1.81	1,678	1,332	3,010	UC-31
Slope Forming		m2	414,000	3.39	2.88	1,403	1,192	2,596	UC-30
Sub-total (1)	(L=46.0km)					7,049	7,802	14,850	
Box Culvert	3.5m*3m*2=21m2	lump	23	175,000	175,000	4,025	4,025	8,050	350,000Bs
Sub-total (2)						4,025	4,025	8,050	
Preparatory Work	Sub-total((1)+(2))*10%					1,107	1,183	2,290	
Sub-total (3)						1,107	1,183	2,290	
Direct Cost	Sub-total(1)+(2)+(3)					12,181	13,009	25,190	
Unforeseen	Direct Cost*5%					609	650	1,260	
Overhead	Direct Cost*10%					1,218	1,301	2,519	
Profit	Direct Cost*15%					1,827	1,951	3,779	
Indirect Cost						3,654	3,903	7,557	
Construction Cost						15,835	16,912	32,747	
Land Acquisition Cost		ha	46	1,458.00	0.00	67	0	67	

TABLE J.3.10 COST ESTIMATION OF SECONDARY DRAINAGE (ALTERNATIVE I,II) - (4)

4.Rio Pailon (50.0 km2) - RIO PAILON

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0		UC-40 East Part
Soil Excavation	Buck Hoe 0.6m3	m3	256,000	1.57	2.47	402	632	1,034	UC-39
Buck Hoe Loading		m3	256,000	1.50	2.36	384	604	988	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	256,000	2.32	2.34	594	599	1,193	UC-32
Surplus Soil Filling	Bulldozer15T	m3	256,000	2.28	1.81	584	463	1,047	UC-31
Slope Forming		m2	144,000	3.39	2.88	488	415	903	UC-30
Sub-total (1)	(L=16.0km)					2,452	2,714	5,165	
Box Culvert	3.5m*3m*2=21m2	lump	8	175,000	175,000	1,400	1,400	2,800	350,000Bs
Sub-total (2)						1,400	1,400	2,800	
Preparatory Work	Sub-total((1)+(2))*10%					385	411	797	
Sub-total (3)						385	411	797	
Direct Cost	Sub-total(1)+(2)+(3)					4,237	4,525	8,762	
Unforeseen	Direct Cost*5%					212	226	438	
Overhead	Direct Cost*10%					424	452	876	
Profit	Direct Cost*15%					636	679	1,314	
Indirect Cost						1,271	1,357	2,629	
Construction Cost						5,508	5,882	11,390	
Land Acquisition Cost		ha	16	1,458.00	0.00	23	0	23	

TABLE J.3.10 COST ESTIMATION OF SECONDARY DRAINAGE (ALTERNATIVE I,II) - (5)

5.Chane D.M., Q. Chacras (284.0 km2) - CHANE CHACRAS

Item	Specification	Unit	Volume	Unit Cost(Bs)		Volume*Unit Cost (1000Bs)			Reference
				L/P	F/P	L/P	F/P	Total	
Clearing & Grubbing	Buck Hoe & Bulldozer	m2	0	0.92	0.94	0	0		UC-40 East Part
Soil Excavation	Buck Hoe 0.6m3	m3	1,376,000	1.57	2.47	2,160	3,399	5,559	UC-39
Buck Hoe Loading		m3	1,376,000	1.50	2.36	2,064	3,247	5,311	UC-20
Soil Transportation	D. Truck 11T,L=1km	m3	1,376,000	2.32	2.34	3,192	3,220	6,412	UC-32
Surplus Soil Filling	Bulldozer15T	m3	1,376,000	2.28	1.81	3,137	2,491	5,628	UC-31
Slope Forming		m2	774,000	3.39	2.88	2,624	2,229	4,853	UC-30
Sub-total (1)	(L=86.0km)					13,178	14,586	27,763	
Box Culvert	3.5m*3m*2=21m2	lump	43	175,000	175,000	7,525	7,525	15,050	350,000Bs
Sub-total (2)						7,525	7,525	15,050	
Preparatory Work	Sub-total((1)+(2))*10%					2,070	2,211	4,281	
Sub-total (3)						2,070	2,211	4,281	
Direct Cost	Sub-total(1)+(2)+(3)					22,773	24,322	47,095	
Unforeseen	Direct Cost*5%					1,139	1,216	2,355	
Overhead	Direct Cost*10%					2,277	2,432	4,709	
Profit	Direct Cost*15%					3,416	3,648	7,064	
Indirect Cost						6,832	7,296	14,128	
Construction Cost						29,605	31,618	61,223	
Land Acquisition Cost		ha	86	1,458.00	0.00	125	0	125	

TABLE J.3.11 CONSTRUCTION SCHEDULE OF CHANE-PAILON

ALTERNATIVE I

Sub-Project	Const. Volume	Year 1	2	3	4	5	6	7	8	9	10
1.RIO CHANE BASIN											
Rio Chane	27.0km										
2. RIO PAILON BASIN											
Rio Pailon	32.0km										
Main Drainage	6.5km										
Secondary Drainage	50.0km2										
3. CHANE CHACRAS BASIN											
Queb. Las Chacras	36.5 km										
Main Drainage	21.5 km										
Secondary Drainage	284.0km2										
4. QUEBRADA CHANE BASIN											
Queb. Chane	18.0km										
Queb. El Toro	16.0km										
Main Drainage	8.0km										
5. OKINAWA DRAINAGE BASIN											
Main Drainage	21.0km										
Secondary Drainage	147.0km2										

TABLE J.3.12 CONSTRUCTION SCHEDULE OF SAN JUAN-ANTOFAGASTA

ALTERNATIVE I

Sub-Project	Const. Volume	Year 1	2	3	4	5	6	7	8	9	10
1.SAN JUAN BASIN											
Arroyo Yapacanicito	14.1km										
Main Drainage	41.3km										
Secondary Drainage	115.0km2										
2. ANTOFAGASTA BASIN											
Arroyo Tacuaral	7.7km										
Arroyo Jochi	12.6km										
Road	9.0km										
Main Drainage	10.0km										
Secondary Drainage	121.0km										

TABLE J.3.13 CONSTRUCTION SCHEDULE OF CHANE-PAILON

ALTERNATIVE II

Sub-Project	Const. Volume	Year 1	2	3	4	5	6	7	8	9	10
2. RIO PAILON BASIN											
Rio Pailon	32.0km										
Main Drainage	6.5km										
Secondary Drainage	50.0km2										
3. CHANE CHACRAS BASIN											
Queb. Las Chacras	36.5 km										
Main Drainage	21.5 km										
Secondary Drainage	284.0km2										
4. QUEBRADA CHANE BASIN											
Queb. Chane	18.0km										
Queb. El Toro	16.0km										
Main Drainage	8.0km										
5. OKINAWA DRAINAGE BASIN											
Main Drainage	21.0km										
Secondary Drainage	147.0km2										

TABLE J.3.14 CONSTRUCTION SCHEDULE OF SAN JUAN-ANTOFAGASTA

ALTERNATIVE II

Sub-Project	Const. Volume	Year 1	2	3	4	5	6	7	8	9	10
1.SAN JUAN BASIN											
Arroyo Yapacanicito	14.1km										
Main Drainage	41.3km										
Secondary Drainage	115.0km2										
2. ANTOFAGASTA BASIN											
Arroyo Tacuaral	7.7km										
Arroyo Jochi	12.6km										
Road	9.0km										
Main Drainage	10.0km										
Secondary Drainage	121.0km										

TABLE J.3.15 PROJECT COST OF CHANE - PAILON
(ALTERNATIVE I)

UNIT : 1000Bs

Sub-Project	Work Item	L/C	F/C	Total
I. Direct Cost		**340,248**	**345,401**	**685,649**
1. Rio Chane	River Improvement of Rio Chane	62,111	71,549	133,660
2. Rio Pailon	River Improvement of Rio Pailon	99,955	99,477	199,432
	Improvement of Main Drainage	4,092	5,933	10,025
	Improvement of Secondary Drainage	5,508	5,882	11,390
	Sub Total	109,555	111,292	220,847
3.Chane Chacras	River Improvement of Queb. Las Chacras	35,440	30,183	65,623
	Improvement of Main Drainage	18,538	20,111	38,649
	Improvement of Secondary Drainage	29,605	31,618	61,223
	Sub Total	83,583	81,912	165,495
4. Quebrada Chane	River Improvement of Quebrada Chane	13,518	8,159	21,677
	River Improvement of Quebrada El Toro	35,404	34,601	70,005
	Improvement of Main Drainage	2,068	2,193	4,261
	Sub Total	50,990	44,953	95,943
5. Okinawa Drainage	Improvement of Main Drainage	18,174	18,783	36,957
	Improvement of Secondary Drainage	15,835	16,912	32,747
	Sub Total	34,009	35,695	69,704
II.Land Acquisition Coat		**2,279**	**0**	**2,279**
1. Rio Chane		324	0	324
2. Rio Pailon		535	0	535
3. Chane Chacras		774	0	774
4. Quebrada Chane		340	0	340
5. Okinawa Drainage		306	0	306
III. Administration Cost		**34,396**	**0**	**34,396**
IV. Engineering Cost		**13,713**	**48,544**	**62,257**
V. Physical Contingency		**58,595**	**59,092**	**117,687**
VI Sub-Total		**449,231**	**453,037**	**902,268**
VII. Price Contingency		**530,722**	**251,743**	**782,465**
VIII. Grand Total		**979,953**	**704,780**	**1,684,733**

TABLE J.3.16 PROJECT COST OF SAN JUAN - ANTOFAGASTA
(ALTERNATIVE I)

UNIT : 1000Bs

Sub-Project	Work Item	L/C	F/C	Total
I. Direct Cost		**69,760**	**72,313**	**142,073**
1. Sun Juan	River Improvement of Arroyo Yapacanicito	7,561	6,895	14,456
	Rehabilitation of Main Drainage	10,160	12,360	22,520
	Improvement of Secondary Drainage	13,953	15,029	28,982
	Sub Total	31,674	34,284	65,958
2. Antofagasta	River Improvement of Arro. Tacuaral	6,010	6,356	12,366
	Construction of Road	7,261	6,787	14,048
	River Improvement of Arro.Jochi	4,945	2,177	7,122
	Improvement of Main Drainage	5,768	7,179	12,947
	Improvement of Secondary Drainage	14,102	15,530	29,632
	Sub Total	38,086	38,029	76,115
II.Land Acquisition Coat		**788**	**0**	**788**
1. San Juan		254	0	254
2. Antofagasta		534	0	534
III. Administration Cost		**7,143**	**0**	**7,143**
IV. Engineering Cost		**2,841**	**10,059**	**12,900**
V. Physical Contingency		**12,080**	**12,356**	**24,436**
VI. Sub-Total		**92,612**	**94,728**	**187,340**
VII. Price Contingency		**61,286**	**32,127**	**93,413**
VIII. Grand Total		**153,898**	**126,855**	**280,753**

TABLE J.3.17 PROJECT COST OF CHANE - PAILON
(ALTERNATIVE II)

UNIT : 1000Bs

Sub-Project	Work Item	L/C	F/C	Total
I. Direct Cost		**278,137**	**273,852**	**551,989**
1. Rio Chane	River Improvement of Rio Chane	0	0	0
2. Rio Pailon	River Improvement of Rio Pailon	99,955	99,477	199,432
	Improvement of Main Drainage	4,092	5,933	10,025
	Improvement of Secondary Drainage	5,508	5,882	11,390
	Sub Total	109,555	111,292	220,847
3.Chane Chacras	River Improvement of Queb. Las Chacras	35,440	30,183	65,623
	Improvement of Main Drainage	18,538	20,111	38,649
	Improvement of Secondary Drainage	29,605	31,618	61,223
	Sub Total	83,583	81,912	165,495
4. Quebrada Chane	River Improvement of Quebrada Chane	13,518	8,159	21,677
	River Improvement of Quebrada El Toro	35,404	34,601	70,005
	Improvement of Main Drainage	2,068	2,193	4,261
	Sub Total	50,990	44,953	95,943
5. Okinawa Drainage	Improvement of Main Drainage	18,174	18,783	36,957
	Improvement of Secondary Drainage	15,835	16,912	32,747
	Sub Total	34,009	35,695	69,704
II.Land Acquisition Coat		**1,955**	**0**	**1,955**
1. Rio Chane		0	0	0
2. Rio Pailon		535	0	535
3. Chane Chacras		774	0	774
4. Quebrada Chane		340	0	340
5. Okinawa Drainage		306	0	306
III. Administration Cost		**27,697**	**0**	**27,697**
IV. Engineering Cost		**11,040**	**39,081**	**50,121**
V. Physical Contingency		**47,824**	**46,940**	**94,764**
VI. Sub-Total		**366,653**	**359,873**	**726,526**
VII. Price Contingency		**369,823**	**174,077**	**543,900**
VIII. Grand Total		**736,476**	**533,950**	**1,270,426**

TABLE J.3.18 PROJECT COST OF SAN JUAN - ANTOFAGASTA
(ALTERNATIVE II)

UNIT : 1000Bs

Sub-Project	Work Item	L/C	F/C	Total
I. Direct Cost		**74,007**	**76,853**	**150,860**
1. Sun Juan	River Improvement of Arroyo Yapacanicito	7,130	6,418	13,548
	Improvement of Main Drainage	14,838	17,377	32,215
	Improvement of Secondary Drainage	13,953	15,029	28,982
	Sub Total	35,921	38,824	74,745
2. Antofagasta	River Improvement of Arro. Tacuaral	6,010	6,356	12,366
	Construction of Road	7,261	6,787	14,048
	River Improvement of Arro.Jochi	4,945	2,177	7,122
	Improvement of Main Drainage	5,768	7,179	12,947
	Improvement of Secondary Drainage	14,102	15,530	29,632
	Sub Total	38,086	38,029	76,115
II.Land Acquisition Coat		**788**	**0**	**788**
1. San Juan		254	0	254
2. Antofagasta		534	0	534
III. Administration Cost		**7,582**	**0**	**7,582**
IV. Engineering Cost		**3,017**	**10,681**	**13,698**
V. Physical Contingency		**12,809**	**13,130**	**25,939**
VI. Sub-Total		**98,203**	**100,664**	**198,867**
VII. Price Contingency		**64,339**	**33,814**	**98,153**
VIII. Grand Total		**162,542**	**134,478**	**297,020**

TABLE J.3.19 DISBURSEMENT SCHEDULE - CHANE PAILON (ALTERNATIVE I)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
I. Construcion Cost	Total	685,649	0	45,210	45,211	50,771	50,772	50,773	77,754	110,561	78,112	88,139	88,346
	L/C	340,248	0	21,438	21,438	24,375	24,376	24,378	39,055	56,086	39,697	44,672	44,733
	F/C	345,401	0	23,772	23,773	26,396	26,396	26,395	38,699	54,475	38,415	43,467	43,613
II.Land Acquisition	Total	2,279	183	185	160	160	161	342	405	191	271	221	0
	L/C	2,279	183	185	160	160	161	342	405	191	271	221	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	34,396	9	2,270	2,269	2,547	2,547	2,556	3,908	5,538	3,919	4,418	4,417
(5% of Item I to II)	L/C	34,396	9	2,270	2,269	2,547	2,547	2,556	3,908	5,538	3,919	4,418	4,417
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	62,257	2,464	4,105	4,408	4,610	4,610	6,081	8,848	8,270	7,639	8,014	3,207
(10% of Item I)	L/C	13,713	543	904	971	1,015	1,015	1,339	1,949	1,822	1,683	1,765	707
(L.C.20%,F.C.=80%)	F/C	48,544	1,921	3,201	3,437	3,595	3,595	4,741	6,899	6,449	5,956	6,249	2,500
V. Sub Total	Total	784,581	2,656	51,770	52,048	58,088	58,090	59,751	90,915	124,560	89,941	100,792	95,970
(Item I to IV)	L/C	390,636	735	24,797	24,837	28,097	28,099	28,615	45,317	63,636	45,570	51,076	49,857
	F/C	393,945	1,921	26,973	27,210	29,991	29,991	31,136	45,598	60,924	44,371	49,716	46,113
VI. Physical	Total	117,687	398	7,765	7,807	8,713	8,713	8,963	13,637	18,684	13,491	15,119	14,396
Contingency	L/C	58,595	110	3,720	3,726	4,215	4,215	4,292	6,798	9,545	6,835	7,661	7,479
(15% of Item V)	F/C	59,092	288	4,046	4,082	4,499	4,499	4,670	6,840	9,139	6,656	7,457	6,917
VII. Sub Total	Total	902,269	3,055	59,535	59,855	66,801	66,803	68,714	104,552	143,244	103,432	115,911	110,366
(Item V+VI)	L/C	449,232	845	28,517	28,563	32,312	32,314	32,907	52,114	73,182	52,405	58,738	57,336
	F/C	453,037	2,210	31,019	31,292	34,489	34,489	35,807	52,438	70,062	51,027	57,173	53,030
VIII.Price	Total	782,465	819	22,509	27,189	35,917	41,694	49,022	85,866	133,747	107,820	134,552	143,329
Contingency	L/C	530,722	340	14,279	17,303	23,206	27,094	31,826	57,578	91,638	73,883	92,719	100,855
(L.C. 7%, F.C. 4%)	F/C	251,743	479	8,230	9,886	12,712	14,600	17,196	28,288	42,110	33,937	41,832	42,474
IX. Grand Total	Total	1,684,734	3,873	82,044	87,044	102,718	108,497	117,736	190,419	276,991	211,252	250,463	253,695
(Item VII+VIII)	L/C	979,954	1,185	42,796	45,866	55,517	59,408	64,734	109,693	164,820	126,288	151,457	158,191
	F/C	704,780	2,688	39,249	41,178	47,201	49,089	53,003	80,726	112,172	84,964	99,006	95,504
O.M.Cost (1%*Item I)	Total	81,217	0	0	726	1,554	2,596	3,776	5,109	7,218	10,388	13,129	16,480
1. O.M. Cost	L/C	32,552	0	0	452	904	1,412	1,920	2,427	3,205	4,311	5,092	5,973
2. Price Contingency	L/C	48,665	0	0	274	649	1,184	1,857	2,682	4,013	6,077	8,037	10,507

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.20 DISBURSEMENT SCHEDULE - SAN JUAN~ANTOFACASTA (ALTERNATIVE I)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	142,073	0	43,160	30,797	33,870	24,368	9,878	0	0	0	0	0
	L/C	69,760	0	21,272	15,086	16,558	11,901	4,943	0	0	0	0	0
	F/C	72,313	0	21,888	15,711	17,312	12,467	4,935	0	0	0	0	0
II.Land Acquisition	Total	788	316	265	132	52	23	0	0	0	0	0	0
	L/C	788	316	265	132	52	23	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	7,143	16	2,171	1,546	1,696	1,220	494	0	0	0	0	0
(5% of Item I to II)	L/C	7,143	16	2,171	1,546	1,696	1,220	494	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	12,900	2,352	3,245	2,964	2,558	1,423	359	0	0	0	0	0
(10% of Item I)	L/C	2,841	518	715	653	563	313	79	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	10,059	1,834	2,530	2,311	1,994	1,109	280	0	0	0	0	0
V. Sub Total	Total	162,904	2,684	48,841	35,439	38,176	27,033	10,730	0	0	0	0	0
(Item I to IV)	L/C	80,533	850	24,423	17,417	18,869	13,457	5,516	0	0	0	0	0
	F/C	82,372	1,834	24,418	18,022	19,306	13,576	5,215	0	0	0	0	0
VI. Physical	Total	24,436	403	7,326	5,316	5,726	4,055	1,610	0	0	0	0	0
Contingency	L/C	12,080	127	3,663	2,613	2,830	2,019	827	0	0	0	0	0
(15% of Item V)	F/C	12,356	275	3,663	2,703	2,896	2,036	782	0	0	0	0	0
VII. Sub Total	Total	187,340	3,087	56,168	40,755	43,902	31,088	12,340	0	0	0	0	0
(Item V+VI)	L/C	92,612	977	28,087	20,030	21,700	15,476	6,343	0	0	0	0	0
	F/C	94,728	2,109	28,081	20,725	22,202	15,613	5,997	0	0	0	0	0
VIII.Price	Total	93,413	850	21,514	18,682	23,768	19,585	9,015	0	0	0	0	0
Contingency	L/C	61,286	393	14,064	12,134	15,585	12,976	6,135	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	32,127	457	7,450	6,548	8,183	6,609	2,880	0	0	0	0	0
IX. Grand Total	Total	280,753	3,937	77,682	59,437	67,670	50,673	21,355	0	0	0	0	0
(Item VII+VIII)	L/C	153,898	1,371	42,150	32,164	37,284	28,451	12,478	0	0	0	0	0
	F/C	126,855	2,566	35,531	27,273	30,385	22,222	8,877	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	27,938	0	0	693	1,271	1,982	2,600	2,990	3,200	3,424	3,663	3,920
1. O.M. Cost	L/C	12,096	0	0	432	740	1,078	1,322	1,421	1,421	1,421	1,421	1,421
2. Price Contingency	L/C	15,842	0	0	261	531	904	1,279	1,570	1,779	2,003	2,243	2,499

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.21 DISBURSEMENT SCHEDULE - CHANE PAILON (ALTERNATIVE II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
I. Construcion Cost	Total	551,989	0	58,364	58,365	63,925	73,952	75,318	37,868	70,675	38,226	38,227	37,069
	L/C	278,137	0	28,802	28,802	31,739	36,714	37,392	19,269	36,300	19,911	19,912	19,296
	F/C	273,852	0	29,562	29,563	32,186	37,238	37,926	18,599	34,375	18,315	18,315	17,773
II.Land Acquisition	Total	1,955	205	206	182	261	206	256	319	104	105	111	0
	L/C	1,955	205	206	182	261	206	256	319	104	105	111	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	27,697	10	2,929	2,927	3,209	3,708	3,779	1,909	3,539	1,917	1,917	1,853
(5% of Item I to II)	L/C	27,697	10	2,929	2,927	3,209	3,708	3,779	1,909	3,539	1,917	1,917	1,853
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	50,121	3,181	5,300	5,603	6,351	6,789	4,798	5,226	4,649	3,471	3,408	1,346
(10% of Item I)	L/C	11,040	700	1,167	1,234	1,399	1,495	1,057	1,151	1,024	765	751	297
(L.C.20%,F.C.=80%)	F/C	39,081	2,480	4,132	4,369	4,952	5,294	3,741	4,075	3,625	2,706	2,657	1,049
V. Sub Total	Total	631,762	3,396	66,798	67,077	73,746	84,655	84,151	45,323	78,967	43,719	43,663	40,268
(Item I to IV)	L/C	318,829	916	33,104	33,145	36,608	42,123	42,484	22,648	40,967	22,697	22,691	21,446
	F/C	312,933	2,480	33,694	33,932	37,138	42,532	41,667	22,674	38,000	21,021	20,972	18,822
VI. Physical	Total	94,764	509	10,020	10,062	11,062	12,698	12,623	6,798	11,845	6,558	6,549	6,040
Contingency	L/C	47,824	137	4,966	4,972	5,491	6,318	6,373	3,397	6,145	3,405	3,404	3,217
(15% of Item V)	F/C	46,940	372	5,054	5,090	5,571	6,380	6,250	3,401	5,700	3,153	3,146	2,823
VII. Sub Total	Total	726,526	3,906	76,818	77,138	84,808	97,353	96,773	52,121	90,812	50,276	50,212	46,308
(Item V+VI)	L/C	366,653	1,053	38,069	38,117	42,099	48,442	48,856	26,046	47,112	26,102	26,094	24,663
	F/C	359,873	2,853	38,748	39,021	42,709	48,912	47,917	26,076	43,700	24,175	24,118	21,645
VIII.Price	Total	543,900	1,042	29,343	35,419	45,976	61,321	70,263	42,843	85,258	52,877	58,837	60,720
Contingency	L/C	369,823	424	19,062	23,091	30,235	40,617	47,251	28,777	58,993	36,799	41,190	43,383
(L.C. 7%, F.C. 4%)	F/C	174,077	618	10,281	12,328	15,741	20,705	23,012	14,067	26,265	16,078	17,647	17,337
IX. Grand Total	Total	1,270,426	4,947	106,161	112,557	130,784	158,675	167,036	94,964	176,070	103,154	109,049	107,028
(Item VII+VIII)	L/C	736,476	1,477	57,132	61,208	72,335	89,058	96,108	54,822	106,106	62,901	67,285	68,046
	F/C	533,950	3,471	49,029	51,349	58,450	69,617	70,929	40,142	69,965	40,253	41,765	38,982
O.M.Cost (1%*Item I)	Total	79,861	0	0	937	2,006	3,321	5,008	6,944	8,283	10,566	12,292	14,207
1. O.M. Cost	L/C	32,901	0	0	584	1,167	1,807	2,546	3,299	3,678	4,385	4,767	5,149
2. Price Contingency	L/C	46,959	0	0	354	838	1,515	2,462	3,645	4,605	6,182	7,525	9,058

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%, Construction Supervision 40%.

TABLE J.3.22 DISBURSEMENT SCHEDULE - SAN JUAN~ANTOFAGASTA (ALTERNATIVE II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	150,860	0	47,705	35,342	33,567	24,368	9,878	0	0	0	0	0
	L/C	74,007	0	23,462	17,277	16,419	11,906	4,943	0	0	0	0	0
	F/C	76,853	0	24,243	18,065	17,148	12,462	4,935	0	0	0	0	0
II.Land Acquisition	Total	788	316	265	132	52	23	0	0	0	0	0	0
	L/C	788	316	265	132	52	23	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	7,582	16	2,399	1,774	1,681	1,220	494	0	0	0	0	0
(5% of Item I to II)	L/C	7,582	16	2,399	1,774	1,681	1,220	494	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	13,698	2,600	3,658	3,112	2,547	1,423	359	0	0	0	0	0
(10% of Item I)	L/C	3,017	572	806	686	561	313	79	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	10,681	2,027	2,852	2,427	1,986	1,109	280	0	0	0	0	0
V. Sub Total	Total	172,928	2,932	54,026	40,360	37,846	27,033	10,730	0	0	0	0	0
(Item I to IV)	L/C	85,395	904	26,931	19,868	18,713	13,462	5,516	0	0	0	0	0
	F/C	87,534	2,027	27,095	20,492	19,134	13,571	5,215	0	0	0	0	0
VI. Physical	Total	25,939	440	8,104	6,054	5,677	4,055	1,610	0	0	0	0	0
Contingency	L/C	12,809	136	4,040	2,980	2,807	2,019	827	0	0	0	0	0
(15% of Item V)	F/C	13,130	304	4,064	3,074	2,870	2,036	782	0	0	0	0	0
VII. Sub Total	Total	198,868	3,371	62,130	46,414	43,523	31,088	12,340	0	0	0	0	0
(Item V+VI)	L/C	98,204	1,040	30,971	22,848	21,520	15,481	6,343	0	0	0	0	0
	F/C	100,664	2,332	31,159	23,566	22,004	15,607	5,997	0	0	0	0	0
VIII.Price	Total	98,152	924	23,775	21,286	23,565	19,587	9,015	0	0	0	0	0
Contingency	L/C	64,339	419	15,508	13,841	15,455	12,980	6,135	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	33,814	505	8,267	7,445	8,110	6,607	2,880	0	0	0	0	0
IX. Grand Total	Total	297,020	4,295	85,906	67,700	67,089	50,676	21,355	0	0	0	0	0
(Item VII+VIII)	L/C	162,542	1,459	46,479	36,690	36,975	28,462	12,478	0	0	0	0	0
	F/C	134,478	2,837	39,427	31,011	30,113	22,214	8,877	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	29,825	0	0	766	1,427	2,144	2,773	3,175	3,398	3,635	3,890	4,162
1. O.M. Cost	L/C	12,935	0	0	477	830	1,166	1,410	1,509	1,509	1,509	1,509	1,509
2. Price Contingency	L/C	16,890	0	0	289	596	978	1,364	1,667	1,889	2,127	2,381	2,654

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.23 DISBURSEMENT SCHEDULE OF RIO CHANE (ALTERNATIVE I)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	133,660	0	26,732	26,732	26,732	26,732	26,732	0	0	0	0	0
	L/C	62,111	0	12,422	12,422	12,422	12,422	12,423	0	0	0	0	0
	F/C	71,549	0	14,310	14,310	14,310	14,310	14,309	0	0	0	0	0
II.Land Acquisition	Total	324	64	65	65	65	65	0	0	0	0	0	0
	L/C	324	64	65	65	65	65	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	6,699	3	1,340	1,340	1,340	1,340	1,337	0	0	0	0	0
(5% of Item I to II)	L/C	6,699	3	1,340	1,340	1,340	1,340	1,337	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	12,136	1,457	2,427	2,427	2,427	2,427	970	0	0	0	0	0
(10% of Item I)	L/C	2,673	321	535	535	535	535	214	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	9,463	1,136	1,893	1,893	1,893	1,893	757	0	0	0	0	0
V. Sub Total	Total	152,820	1,524	30,564	30,564	30,564	30,564	29,039	0	0	0	0	0
(Item I to IV)	L/C	71,807	388	14,361	14,361	14,361	14,361	13,973	0	0	0	0	0
	F/C	81,012	1,136	16,203	16,203	16,203	16,203	15,066	0	0	0	0	0
VI. Physical	Total	22,923	229	4,585	4,585	4,585	4,585	4,356	0	0	0	0	0
Contingency	L/C	10,771	58	2,154	2,154	2,154	2,154	2,096	0	0	0	0	0
(15% of Item V)	F/C	12,152	170	2,430	2,430	2,430	2,430	2,260	0	0	0	0	0
VII. Sub Total	Total	175,742	1,753	35,149	35,149	35,149	35,149	33,395	0	0	0	0	0
(Item V+VI)	L/C	82,579	446	16,516	16,516	16,516	16,516	16,069	0	0	0	0	0
	F/C	93,164	1,307	18,633	18,633	18,633	18,633	17,325	0	0	0	0	0
VIII.Price	Total	93,894	463	13,214	15,892	18,729	21,735	23,862	0	0	0	0	0
Contingency	L/C	59,705	180	8,270	10,005	11,861	13,848	15,542	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	34,189	283	4,944	5,887	6,868	7,888	8,320	0	0	0	0	0
IX. Grand Total	Total	269,637	2,215	48,362	51,040	53,878	56,884	57,257	0	0	0	0	0
(Item VII+VIII)	L/C	142,284	626	24,786	26,521	28,377	30,363	31,611	0	0	0	0	0
	F/C	127,353	1,590	23,577	24,520	25,501	26,521	25,646	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	21,104	0	0	429	919	1,474	2,103	2,813	3,010	3,221	3,446	3,688
1. O.M. Cost	L/C	9,356	0	0	267	535	802	1,069	1,337	1,337	1,337	1,337	1,337
2. Price Contingency	L/C	11,748	0	0	162	384	672	1,034	1,477	1,674	1,884	2,110	2,351

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.24 DISBURSEMENT SCHEDULE OF RIO PAILON (ALTERNATIVE I)

UNIT: 1000Bs

Specification		Amaunt	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	220,847	0	0	0	0	0	0	39,886	39,886	39,886	49,912	51,277
	L/C	109,555	0	0	0	0	0	0	19,786	19,786	19,786	24,760	25,437
	F/C	111,292	0	0	0	0	0	0	20,100	20,100	20,100	25,152	25,840
II.Land Acquisition	Total	535	0	0	0	0	0	86	86	87	166	110	0
	L/C	535	0	0	0	0	0	86	86	87	166	110	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	11,069	0	0	0	0	0	4	1,999	1,999	2,003	2,501	2,564
(5% of Item I to II)	L/C	11,069	0	0	0	0	0	4	1,999	1,999	2,003	2,501	2,564
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	20,053	0	0	0	0	0	2,174	3,622	3,622	4,168	4,606	1,861
(10% of Item I)	L/C	4,417	0	0	0	0	0	479	798	798	918	1,015	410
(L.C.20%,F.C.=80%)	F/C	15,636	0	0	0	0	0	1,695	2,824	2,824	3,250	3,592	1,451
V. Sub Total	Total	252,504	0	0	0	0	0	2,264	45,592	45,593	46,223	57,130	55,702
(Item I to IV)	L/C	125,576	0	0	0	0	0	569	22,668	22,669	22,873	28,386	28,411
	F/C	126,928	0	0	0	0	0	1,695	22,924	22,924	23,350	28,744	27,291
VI. Physical	Total	37,876	0	0	0	0	0	340	6,839	6,839	6,933	8,569	8,355
Contingency	L/C	18,836	0	0	0	0	0	85	3,400	3,400	3,431	4,258	4,262
(15% of Item V)	F/C	19,039	0	0	0	0	0	254	3,439	3,439	3,503	4,312	4,094
VII. Sub Total	Total	290,380	0	0	0	0	0	2,604	52,431	52,432	53,156	65,699	64,058
(Item V+VI)	L/C	144,412	0	0	0	0	0	654	26,069	26,070	26,304	32,644	32,673
	F/C	145,967	0	0	0	0	0	1,949	26,363	26,363	26,853	33,055	31,385
VIII.Price	Total	306,349	0	0	0	0	0	1,569	43,023	48,489	54,943	75,715	82,610
Contingency	L/C	208,164	0	0	0	0	0	633	28,802	32,644	37,084	51,529	57,472
(L.C. 7%, F.C. 4%)	F/C	98,184	0	0	0	0	0	936	14,221	15,845	17,859	24,186	25,137
IX. Grand Total	Total	596,728	0	0	0	0	0	4,173	95,454	100,921	108,099	141,414	146,667
(Item VII+VIII)	L/C	352,577	0	0	0	0	0	1,287	54,870	58,714	63,387	84,173	90,145
	F/C	244,152	0	0	0	0	0	2,886	40,584	42,207	44,711	57,241	56,522
O.M.Cost (1%*Item I)	Total	10,585	0	0	0	0	0	0	0	898	1,922	3,085	4,678
1. O.M. Cost	L/C	4,089	0	0	0	0	0	0	0	399	798	1,197	1,696
2. Price Contingency	L/C	6,496	0	0	0	0	0	0	0	499	1,125	1,889	2,983

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.25 DISBURSEMENT SCHEDULE OF CHANE CHACRAS (ALTERNATIVE I , II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
I. Construcion Cost	Total	165,495	0	0	0	13,124	13,124	13,125	32,449	47,755	15,306	15,306	15,306
	L/C	83,583	0	0	0	6,628	6,628	6,629	16,389	24,119	7,730	7,730	7,730
	F/C	81,912	0	0	0	6,496	6,496	6,496	16,060	23,636	7,576	7,576	7,576
II.Land Acquisition	Total	774	0	0	73	73	73	215	246	31	31	32	0
	L/C	774	0	0	73	73	73	215	246	31	31	32	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	8,313	0	0	4	660	660	667	1,635	2,389	767	767	765
(5% of Item I to II)	L/C	8,313	0	0	4	660	660	667	1,635	2,389	767	767	765
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	15,027	0	0	715	1,192	1,192	2,245	3,781	2,568	1,390	1,390	556
(10% of Item I)	L/C	3,310	0	0	157	262	262	494	833	566	306	306	122
(L.C.20%,F.C.=80%)	F/C	11,717	0	0	558	929	929	1,751	2,948	2,002	1,084	1,084	433
V. Sub Total	Total	189,609	0	0	792	15,049	15,049	16,252	38,110	52,743	17,494	17,495	16,627
(Item I to IV)	L/C	95,980	0	0	234	7,623	7,623	8,005	19,102	27,105	8,834	8,835	8,618
	F/C	93,629	0	0	558	7,425	7,425	8,247	19,008	25,638	8,660	8,660	8,009
VI. Physical	Total	28,441	0	0	119	2,257	2,257	2,438	5,717	7,911	2,624	2,624	2,494
Contingency	L/C	14,397	0	0	35	1,143	1,144	1,201	2,865	4,066	1,325	1,325	1,293
(15% of Item V)	F/C	14,044	0	0	84	1,114	1,114	1,237	2,851	3,846	1,299	1,299	1,201
VII. Sub Total	Total	218,051	0	0	911	17,306	17,306	18,690	43,827	60,654	20,118	20,119	19,121
(Item V+VI)	L/C	110,377	0	0	269	8,767	8,767	9,206	21,968	31,171	10,159	10,160	9,910
	F/C	107,673	0	0	641	8,539	8,539	9,483	21,859	29,484	9,959	9,959	9,211
VIII.Price	Total	196,129	0	0	366	9,443	10,965	13,458	36,063	56,752	20,946	23,325	24,810
Contingency	L/C	133,810	0	0	163	6,296	7,351	8,904	24,271	39,032	14,323	16,038	17,433
(L.C. 7%, F.C. 4%)	F/C	62,318	0	0	203	3,147	3,615	4,554	11,792	17,721	6,623	7,286	7,377
IX. Grand Total	Total	414,180	0	0	1,276	26,749	28,271	32,148	79,890	117,407	41,064	43,444	43,931
(Item VII+VIII)	L/C	244,188	0	0	432	15,063	16,117	18,110	46,239	70,203	24,482	26,199	27,343
	F/C	169,992	0	0	844	11,686	12,154	14,038	33,651	47,204	16,582	17,245	16,588
O.M.Cost (1%*Item I)	Total	13,707	0	0	0	0	241	516	829	1,618	2,882	3,478	4,144
1. O.M. Cost	L/C	5,552	0	0	0	0	131	262	394	718	1,196	1,349	1,502
2. Price Contingency	L/C	8,155	0	0	0	0	110	254	435	899	1,686	2,129	2,642

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.26 DISBURSEMENT SCHEDULE OF QUEBRADA CHANE (ALTERNATIVE I , II)

UNIT : 1000 Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
I. Construcion Cost	Total	95,943	0	0	0	0	0	0	5,419	22,920	22,920	22,921	21,763
	L/C	50,990	0	0	0	0	0	0	2,880	12,181	12,181	12,182	11,566
	F/C	44,953	0	0	0	0	0	0	2,539	10,739	10,739	10,739	10,197
II.Land Acquisition	Total	340	0	0	0	0	0	41	73	73	74	79	0
	L/C	340	0	0	0	0	0	41	73	73	74	79	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	4,814	0	0	0	0	0	2	275	1,150	1,150	1,150	1,088
(5% of Item I to II)	L/C	4,814	0	0	0	0	0	2	275	1,150	1,150	1,150	1,088
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	8,712	0	0	0	0	0	295	1,446	2,081	2,081	2,018	790
(10% of Item I)	L/C	1,919	0	0	0	0	0	65	318	458	458	445	174
(L.C.20%,F.C.=80%)	F/C	6,793	0	0	0	0	0	230	1,127	1,623	1,623	1,574	616
V. Sub Total	Total	109,809	0	0	0	0	0	338	7,212	26,224	26,225	26,168	23,641
(Item I to IV)	L/C	58,063	0	0	0	0	0	108	3,546	13,862	13,863	13,856	12,828
	F/C	51,746	0	0	0	0	0	230	3,666	12,362	12,362	12,313	10,813
VI. Physical	Total	16,471	0	0	0	0	0	51	1,082	3,934	3,934	3,925	3,546
Contingency	L/C	8,709	0	0	0	0	0	16	532	2,079	2,079	2,078	1,924
(15% of Item V)	F/C	7,762	0	0	0	0	0	35	550	1,854	1,854	1,847	1,622
VII. Sub Total	Total	126,280	0	0	0	0	0	389	8,294	30,157	30,159	30,093	27,187
(Item V+VI)	L/C	66,772	0	0	0	0	0	124	4,078	15,941	15,943	15,934	14,752
	F/C	59,508	0	0	0	0	0	265	4,216	14,216	14,216	14,159	12,435
VIII.Price	Total	138,887	0	0	0	0	0	247	6,780	28,506	31,931	35,512	35,910
Contingency	L/C	98,166	0	0	0	0	0	120	4,505	19,962	22,477	25,152	25,950
(L.C. 7%, F.C. 4%)	F/C	40,721	0	0	0	0	0	127	2,275	8,544	9,455	10,360	9,960
IX. Grand Total	Total	265,167	0	0	0	0	0	637	15,074	58,663	62,090	65,606	63,097
(Item VII+VIII)	L/C	164,939	0	0	0	0	0	244	8,583	35,903	38,419	41,086	40,703
	F/C	100,228	0	0	0	0	0	392	6,491	22,760	23,671	24,520	22,394
O.M.Cost (1%*Item I)	Total	4,173	0	0	0	0	0	0	0	122	683	1,322	2,047
1. O.M. Cost	L/C	1,592	0	0	0	0	0	0	0	54	283	513	742
2. Price Contingency	L/C	2,581	0	0	0	0	0	0	0	68	400	809	1,305

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.27 DISBURSEMENT SCHEDULE OF OKINAWA DRAINAGE (ALTERNATIVE I , II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	69,703	0	18,478	18,478	10,915	10,916	10,916	0	0	0	0	0
	L/C	34,009	0	9,016	9,016	5,325	5,326	5,326	0	0	0	0	0
	F/C	35,694	0	9,462	9,462	5,590	5,590	5,590	0	0	0	0	0
II.Land Acquisition	Total	306	119	120	22	22	23	0	0	0	0	0	0
	L/C	306	119	120	22	22	23	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	3,500	6	930	925	547	547	546	0	0	0	0	0
(5% of Item I to II)	L/C	3,500	6	930	925	547	547	546	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	6,329	1,007	1,678	1,266	991	991	396	0	0	0	0	0
(10% of Item I)	L/C	1,394	222	370	279	218	218	87	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	4,935	785	1,308	987	773	773	309	0	0	0	0	0
V. Sub Total	Total	79,838	1,132	21,206	20,691	12,475	12,477	11,858	0	0	0	0	0
(Item I to IV)	L/C	39,210	347	10,435	10,242	6,112	6,114	5,959	0	0	0	0	0
	F/C	40,629	785	10,770	10,449	6,363	6,363	5,899	0	0	0	0	0
VI. Physical	Total	11,976	170	3,181	3,104	1,871	1,872	1,779	0	0	0	0	0
Contingency	L/C	5,881	52	1,565	1,536	917	917	894	0	0	0	0	0
(15% of Item V)	F/C	6,094	118	1,616	1,567	954	954	885	0	0	0	0	0
VII. Sub Total	Total	91,814	1,302	24,387	23,794	14,346	14,349	13,637	0	0	0	0	0
(Item V+VI)	L/C	45,091	399	12,001	11,778	7,029	7,031	6,853	0	0	0	0	0
	F/C	46,723	903	12,386	12,016	7,317	7,317	6,784	0	0	0	0	0
VIII.Price	Total	47,207	356	9,295	10,931	7,745	8,993	9,886	0	0	0	0	0
Contingency	L/C	30,876	160	6,009	7,135	5,048	5,896	6,628	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	16,330	196	3,286	3,796	2,697	3,097	3,258	0	0	0	0	0
IX. Grand Total	Total	139,021	1,658	33,682	34,725	22,091	23,342	23,523	0	0	0	0	0
(Item VII+VIII)	L/C	75,967	559	18,010	18,913	12,077	12,927	13,481	0	0	0	0	0
	F/C	63,054	1,099	15,672	15,812	10,014	10,415	10,042	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	11,405	0	0	297	635	880	1,156	1,467	1,570	1,680	1,797	1,923
1. O.M. Cost	L/C	5,106	0	0	185	370	479	588	697	697	697	697	697
2. Price Contingency	L/C	6,299	0	0	112	265	401	569	770	873	983	1,100	1,226

* 1) Price Level in October 1995. *2) Engineering Cost Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.28 DISBURSEMENT SCHEDULE OF SAN JUAN (ALTERNATIVE I)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	65,958	0	16,078	16,079	19,310	14,491	0	0	0	0	0	0
	L/C	31,674	0	7,721	7,721	9,273	6,959	0	0	0	0	0	0
	F/C	34,284	0	8,357	8,358	10,037	7,532	0	0	0	0	0	0
II.Land Acquisition	Total	254	77	77	70	30	0	0	0	0	0	0	0
	L/C	254	77	77	70	30	0	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	3,311	4	808	807	967	725	0	0	0	0	0	0
(5% of Item I to II)	L/C	3,311	4	808	807	967	725	0	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	5,989	876	1,460	1,636	1,491	526	0	0	0	0	0	0
(10% of Item I)	L/C	1,319	193	322	360	328	116	0	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	4,670	683	1,138	1,276	1,162	410	0	0	0	0	0	0
V. Sub Total	Total	75,512	957	18,423	18,593	21,798	15,742	0	0	0	0	0	0
(Item I to IV)	L/C	36,558	274	8,927	8,959	10,598	7,799	0	0	0	0	0	0
	F/C	38,954	683	9,495	9,634	11,199	7,942	0	0	0	0	0	0
VI. Physical	Total	11,327	144	2,763	2,789	3,270	2,361	0	0	0	0	0	0
Contingency	L/C	5,484	41	1,339	1,344	1,590	1,170	0	0	0	0	0	0
(15% of Item V)	F/C	5,843	102	1,424	1,445	1,680	1,191	0	0	0	0	0	0
VII. Sub Total	Total	86,838	1,101	21,186	21,381	25,067	18,103	0	0	0	0	0	0
(Item V+VI)	L/C	42,041	315	10,266	10,303	12,188	8,969	0	0	0	0	0	0
	F/C	44,797	786	10,920	11,079	12,879	9,133	0	0	0	0	0	0
VIII.Price	Total	42,963	297	8,038	9,741	13,500	11,387	0	0	0	0	0	0
Contingency	L/C	27,782	127	5,141	6,241	8,753	7,520	0	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	15,181	170	2,897	3,500	4,747	3,866	0	0	0	0	0	0
IX. Grand Total	Total	129,801	1,398	29,224	31,123	38,568	29,490	0	0	0	0	0	0
(Item VII+VIII)	L/C	69,824	442	15,407	16,544	20,941	16,490	0	0	0	0	0	0
	F/C	59,978	956	13,817	14,579	17,626	13,000	0	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	11,038	0	0	258	553	946	1,297	1,388	1,486	1,589	1,701	1,820
1. O.M. Cost	L/C	4,955	0	0	161	322	515	660	660	660	660	660	660
2. Price Contingency	L/C	6,084	0	0	97	231	432	638	729	826	930	1,041	1,160

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.29 DISBURSEMENT SCHEDULE OF ANTOFAGASTA (ALTERNATIVE I , II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	76,115	0	27,082	14,718	14,560	9,877	9,878	0	0	0	0	0
	L/C	38,086	0	13,551	7,365	7,285	4,942	4,943	0	0	0	0	0
	F/C	38,029	0	13,531	7,353	7,275	4,935	4,935	0	0	0	0	0
II.Land Acquisition	Total	534	239	188	62	22	23	0	0	0	0	0	0
	L/C	534	239	188	62	22	23	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	3,832	12	1,364	739	729	495	494	0	0	0	0	0
(5% of Item I to II)	L/C	3,832	12	1,364	739	729	495	494	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	6,911	1,476	1,785	1,328	1,067	897	359	0	0	0	0	0
(10% of Item I)	L/C	1,522	325	393	292	235	198	79	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	5,389	1,151	1,392	1,035	832	699	280	0	0	0	0	0
V. Sub Total	Total	87,393	1,727	30,419	16,847	16,378	11,292	10,730	0	0	0	0	0
(Item I to IV)	L/C	43,975	576	15,496	8,458	8,271	5,658	5,516	0	0	0	0	0
	F/C	43,418	1,151	14,923	8,388	8,107	5,634	5,215	0	0	0	0	0
VI. Physical	Total	13,109	259	4,563	2,527	2,457	1,694	1,610	0	0	0	0	0
Contingency	L/C	6,596	86	2,324	1,269	1,241	849	827	0	0	0	0	0
(15% of Item V)	F/C	6,513	173	2,238	1,258	1,216	845	782	0	0	0	0	0
VII. Sub Total	Total	100,502	1,986	34,982	19,374	18,835	12,986	12,340	0	0	0	0	0
(Item V+VI)	L/C	50,571	662	17,820	9,727	9,512	6,506	6,343	0	0	0	0	0
	F/C	49,931	1,324	17,161	9,647	9,323	6,479	5,997	0	0	0	0	0
VIII.Price	Total	50,450	553	13,476	8,940	10,267	8,198	9,015	0	0	0	0	0
Contingency	L/C	33,504	267	8,923	5,893	6,831	5,455	6,135	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	16,947	287	4,553	3,048	3,436	2,743	2,880	0	0	0	0	0
IX. Grand Total	Total	150,952	2,539	48,458	28,314	29,102	21,184	21,355	0	0	0	0	0
(Item VII+VIII)	L/C	84,075	929	26,743	15,620	16,343	11,961	12,478	0	0	0	0	0
	F/C	66,877	1,610	21,715	12,694	12,759	9,222	8,877	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	12,706	0	0	435	718	1,036	1,303	1,602	1,714	1,834	1,963	2,100
1. O.M. Cost	L/C	5,721	0	0	271	418	564	662	761	761	761	761	761
2. Price Contingency	L/C	6,985	0	0	164	300	473	641	841	953	1,073	1,202	1,339

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.30 DISBURSEMENT SCHEDULE OF RIO PAILON (ALTERNATIVE II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	220,847	0	39,886	39,886	39,886	49,912	51,277	0	0	0	0	0
	L/C	109,555	0	19,786	19,786	19,786	24,760	25,437	0	0	0	0	0
	F/C	111,292	0	20,100	20,100	20,100	25,152	25,840	0	0	0	0	0
II.Land Acquisition	Total	535	86	86	87	166	110	0	0	0	0	0	0
	L/C	535	86	86	87	166	110	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	11,069	4	1,999	1,999	2,003	2,501	2,564	0	0	0	0	0
(5% of Item I to II)	L/C	11,069	4	1,999	1,999	2,003	2,501	2,564	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	20,053	2,174	3,622	3,622	4,168	4,606	1,861	0	0	0	0	0
(10% of Item I)	L/C	4,417	479	798	798	918	1,015	410	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	15,636	1,695	2,824	2,824	3,250	3,592	1,451	0	0	0	0	0
V. Sub Total	Total	252,504	2,264	45,592	45,593	46,223	57,130	55,702	0	0	0	0	0
(Item I to IV)	L/C	125,576	569	22,668	22,669	22,873	28,386	28,411	0	0	0	0	0
	F/C	126,928	1,695	22,924	22,924	23,350	28,744	27,291	0	0	0	0	0
VI. Physical	Total	37,876	340	6,839	6,839	6,933	8,569	8,355	0	0	0	0	0
Contingency	L/C	18,836	85	3,400	3,400	3,431	4,258	4,262	0	0	0	0	0
(15% of Item V)	F/C	19,039	254	3,439	3,439	3,503	4,312	4,094	0	0	0	0	0
VII. Sub Total	Total	290,380	2,604	52,431	52,432	53,156	65,699	64,058	0	0	0	0	0
(Item V+VI)	L/C	144,412	654	26,069	26,070	26,304	32,644	32,673	0	0	0	0	0
	F/C	145,967	1,949	26,363	26,363	26,853	33,055	31,385	0	0	0	0	0
VIII.Price	Total	161,678	686	20,048	24,121	28,788	41,363	46,672	0	0	0	0	0
Contingency	L/C	106,970	263	13,053	15,793	18,891	27,370	31,599	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	54,708	422	6,994	8,329	9,897	13,993	15,072	0	0	0	0	0
IX. Grand Total	Total	452,057	3,289	72,479	76,554	81,944	107,062	110,729	0	0	0	0	0
(Item VII+VIII)	L/C	251,382	918	39,122	41,862	45,194	60,014	64,272	0	0	0	0	0
	F/C	200,675	2,372	33,357	34,691	36,750	47,048	46,457	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	34,279	0	0	640	1,371	2,200	3,336	4,649	4,974	5,322	5,695	6,093
1. O.M. Cost	L/C	15,131	0	0	399	798	1,197	1,696	2,208	2,208	2,208	2,208	2,208
2. Price Contingency	L/C	19,148	0	0	242	573	1,003	1,640	2,440	2,765	3,114	3,486	3,885

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

TABLE J.3.31 DISBURSEMENT SCHEDULE OF SAN JUAN (ALTERNATIVE II)

UNIT: 1000Bs

Specification		Amount	Year										
			0	1	2	3	4	5	6	7	8	9	10
1. Construcion Cost	Total	74,745	0	20,623	20,624	19,007	14,491	0	0	0	0	0	0
	L/C	35,921	0	9,911	9,912	9,134	6,964	0	0	0	0	0	0
	F/C	38,824	0	10,712	10,712	9,873	7,527	0	0	0	0	0	0
II.Land Acquisition	Total	254	77	77	70	30	0	0	0	0	0	0	0
	L/C	254	77	77	70	30	0	0	0	0	0	0	0
	F/C	0	0	0	0	0	0	0	0	0	0	0	0
III.Administration Cost	Total	3,750	4	1,035	1,035	952	725	0	0	0	0	0	0
(5% of Item I to II)	L/C	3,750	4	1,035	1,035	952	725	0	0	0	0	0	0
(L.C. Only)	F/C	0	0	0	0	0	0	0	0	0	0	0	0
IV.Engineering Cost	Total	6,787	1,124	1,873	1,785	1,480	526	0	0	0	0	0	0
(10% of Item I)	L/C	1,495	247	412	393	326	116	0	0	0	0	0	0
(L.C.20%,F.C.=80%)	F/C	5,292	876	1,460	1,391	1,154	410	0	0	0	0	0	0
V. Sub Total	Total	85,536	1,205	23,608	23,513	21,469	15,742	0	0	0	0	0	0
(Item I to IV)	L/C	41,420	328	11,435	11,410	10,442	7,804	0	0	0	0	0	0
	F/C	44,116	876	12,172	12,103	11,027	7,937	0	0	0	0	0	0
VI. Physical	Total	12,830	181	3,541	3,527	3,220	2,361	0	0	0	0	0	0
Contingency	L/C	6,213	49	1,715	1,711	1,566	1,171	0	0	0	0	0	0
(15% of Item V)	F/C	6,617	131	1,826	1,816	1,654	1,191	0	0	0	0	0	0
VII. Sub Total	Total	98,366	1,386	27,149	27,040	24,689	18,103	0	0	0	0	0	0
(Item V+VI)	L/C	47,633	378	13,151	13,121	12,008	8,975	0	0	0	0	0	0
	F/C	50,733	1,008	13,998	13,919	12,681	9,128	0	0	0	0	0	0
VIII.Price	Total	47,702	370	10,299	12,346	13,298	11,389	0	0	0	0	0	0
Contingency	L/C	30,835	152	6,585	7,949	8,624	7,525	0	0	0	0	0	0
(L.C. 7%, F.C. 4%)	F/C	16,867	218	3,714	4,397	4,674	3,864	0	0	0	0	0	0
IX. Grand Total	Total	146,068	1,756	37,448	39,386	37,987	29,492	0	0	0	0	0	0
(Item VII+VIII)	L/C	78,468	530	19,736	21,070	20,632	16,500	0	0	0	0	0	0
	F/C	67,601	1,226	17,712	18,316	17,355	12,992	0	0	0	0	0	0
O.M.Cost (1%*Item I)	Total	12,665	0	0	331	709	1,108	1,470	1,573	1,683	1,801	1,927	2,062
1. O.M. Cost	L/C	5,706	0	0	206	412	603	747	747	747	747	747	747
2. Price Contingency	L/C	6,959	0	0	125	296	505	723	826	936	1,054	1,180	1,315

* 1) Price Level in October 1995. *2) Engineering Cost: Detailed Design 60%,Construction Supervision 40%.

FIGURES

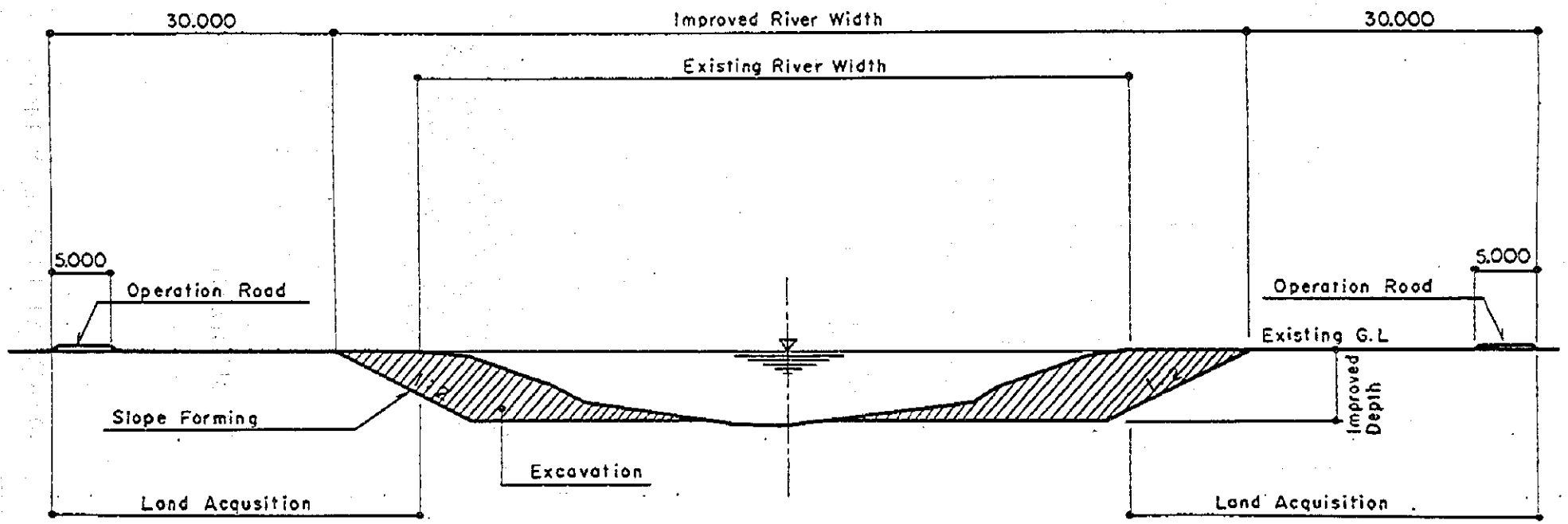
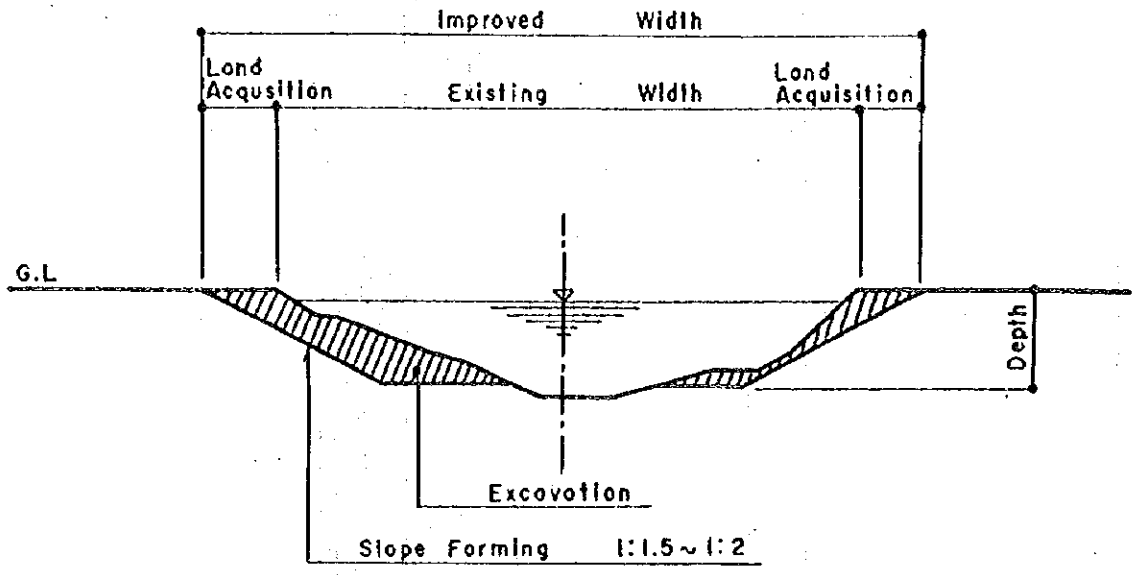
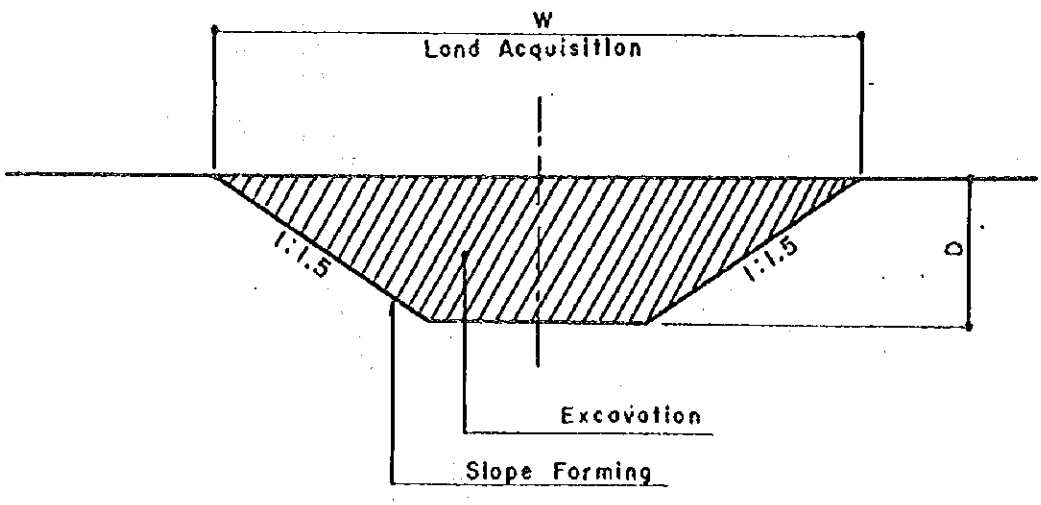


FIG.J.3.1 TYPICAL STRUCTURE OF RIVER IMPROVEMENT



MAIN DRAINAGE



SECONDARY DRAINAGE

FIG.J.3.2 TYPICAL STRUCTURE OF DRAINAGE IMPROVEMENT

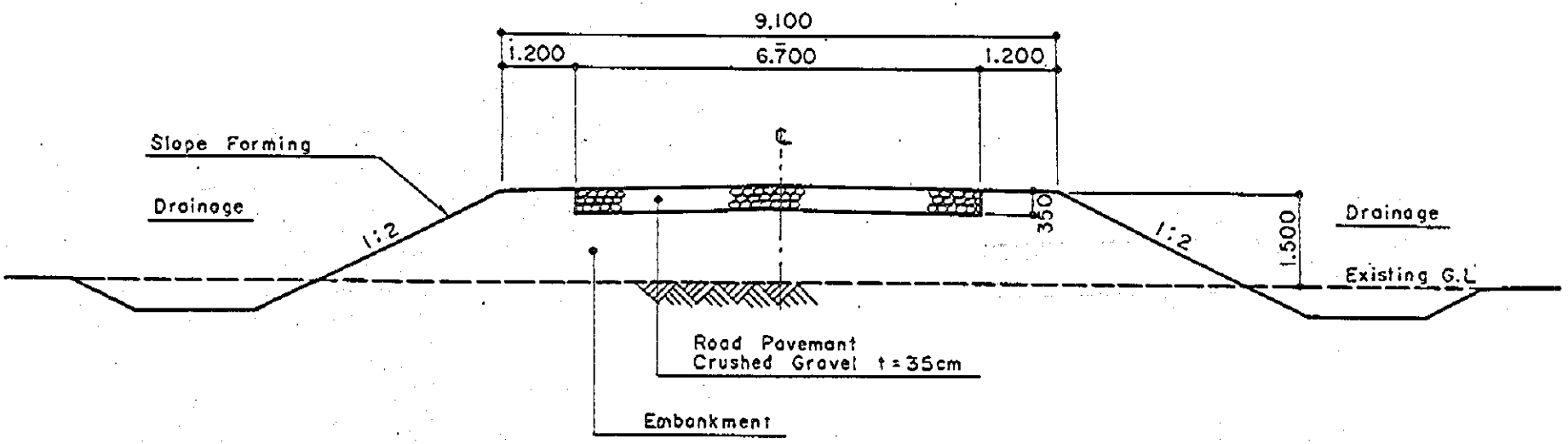


FIG.J.3.3 TYPICAL STRUCTURE OF ROAD-CUM-EMBANKMENT

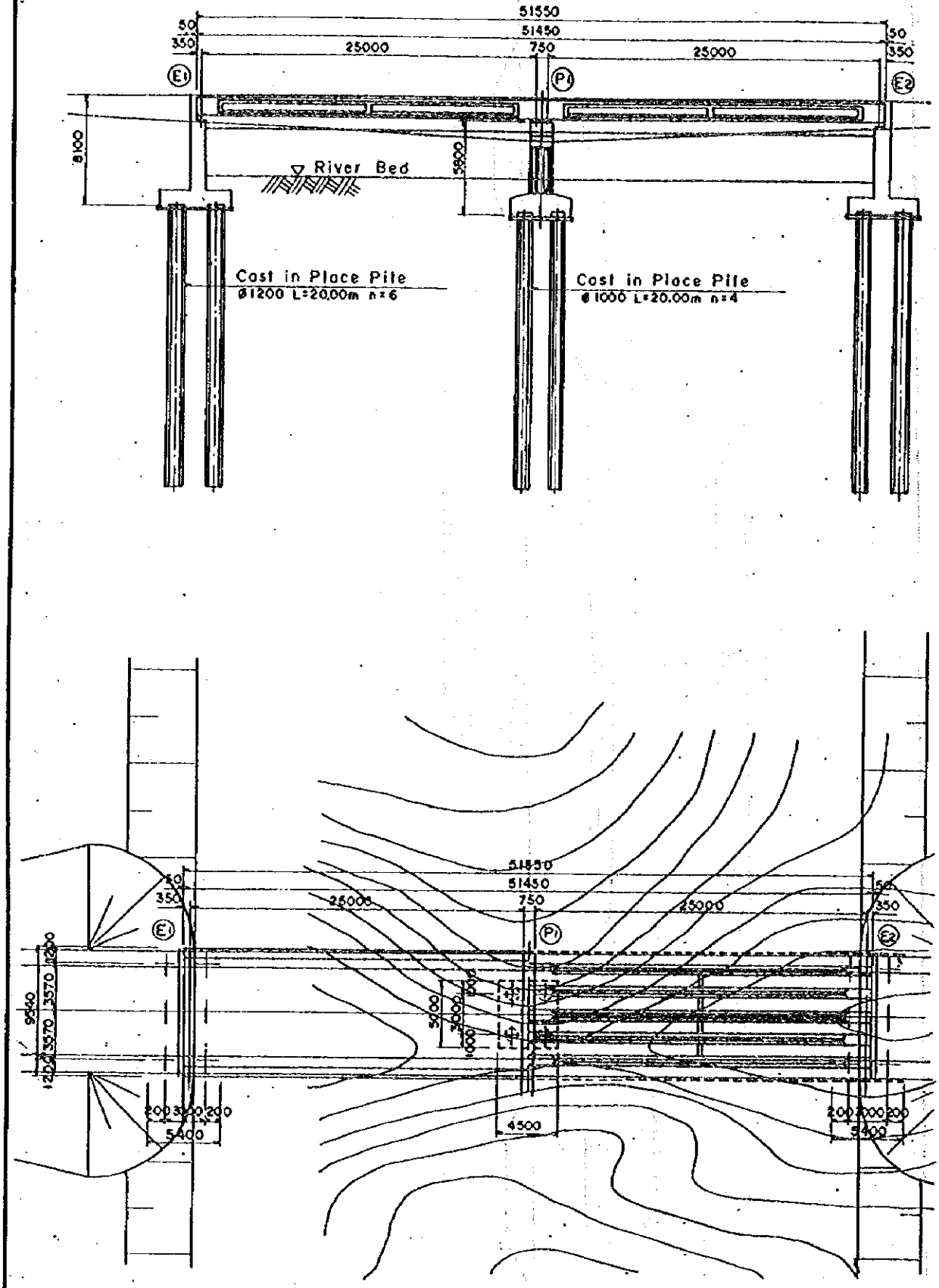


FIG.J.3.4 TYPICAL STRUCTURE OF BRIDGE

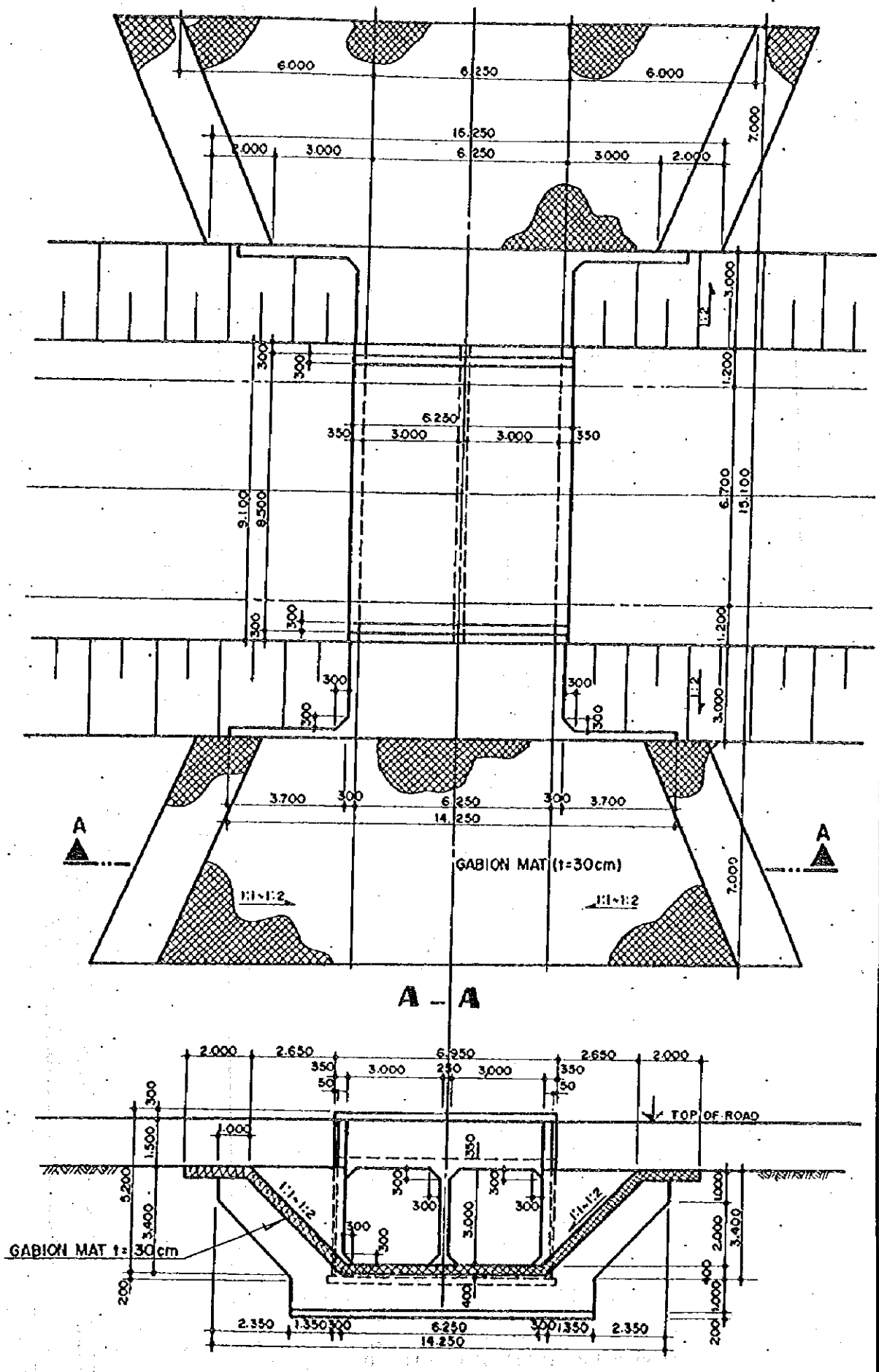


FIG.J.3.5 TYPICAL STRUCTURE OF BOX CULVERT

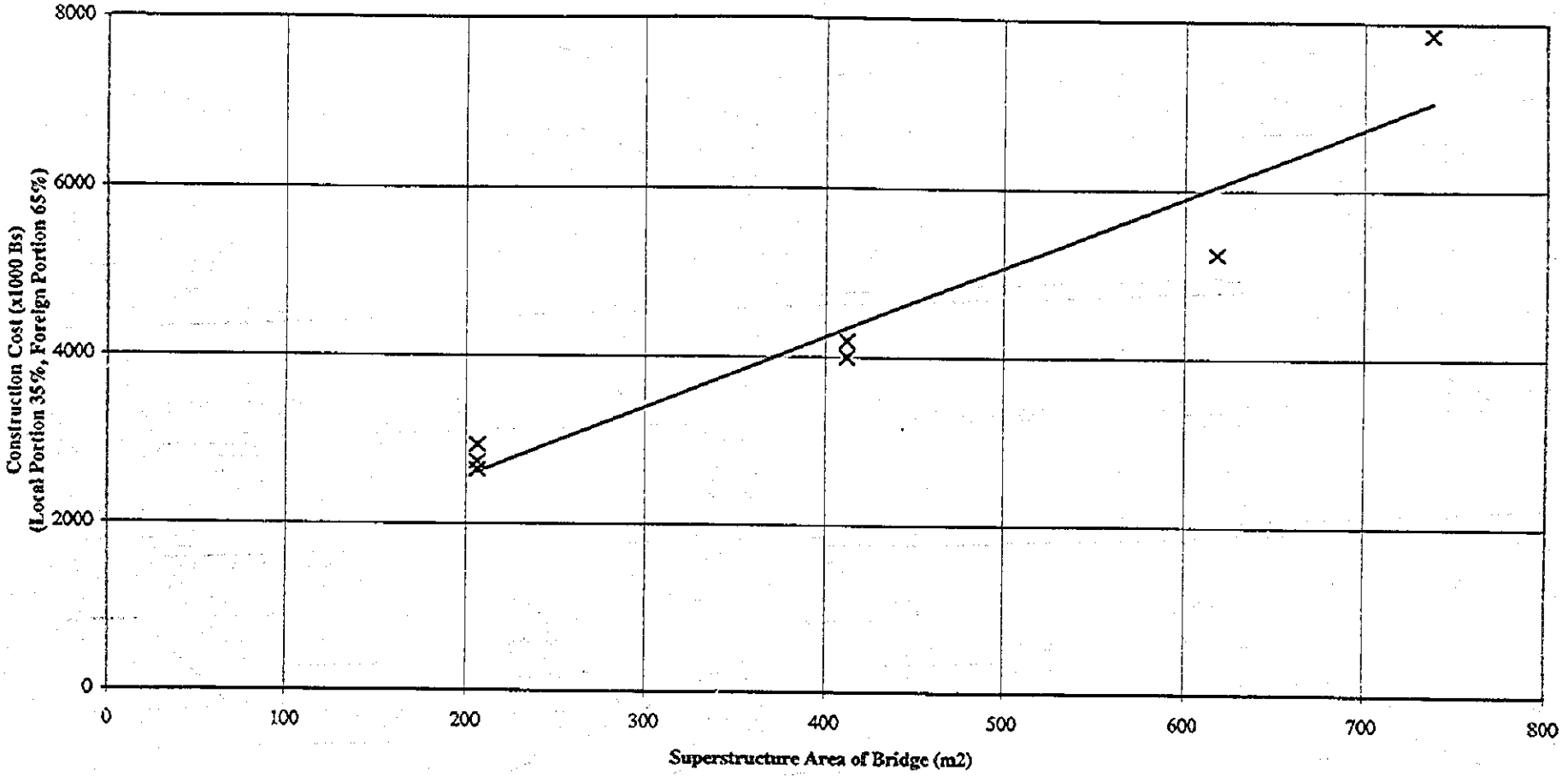


FIG.J.3.6 CONSTRUCTION COST OF BRIDGE (P.C.)
(INCLUDING FOUNDATION PILES)

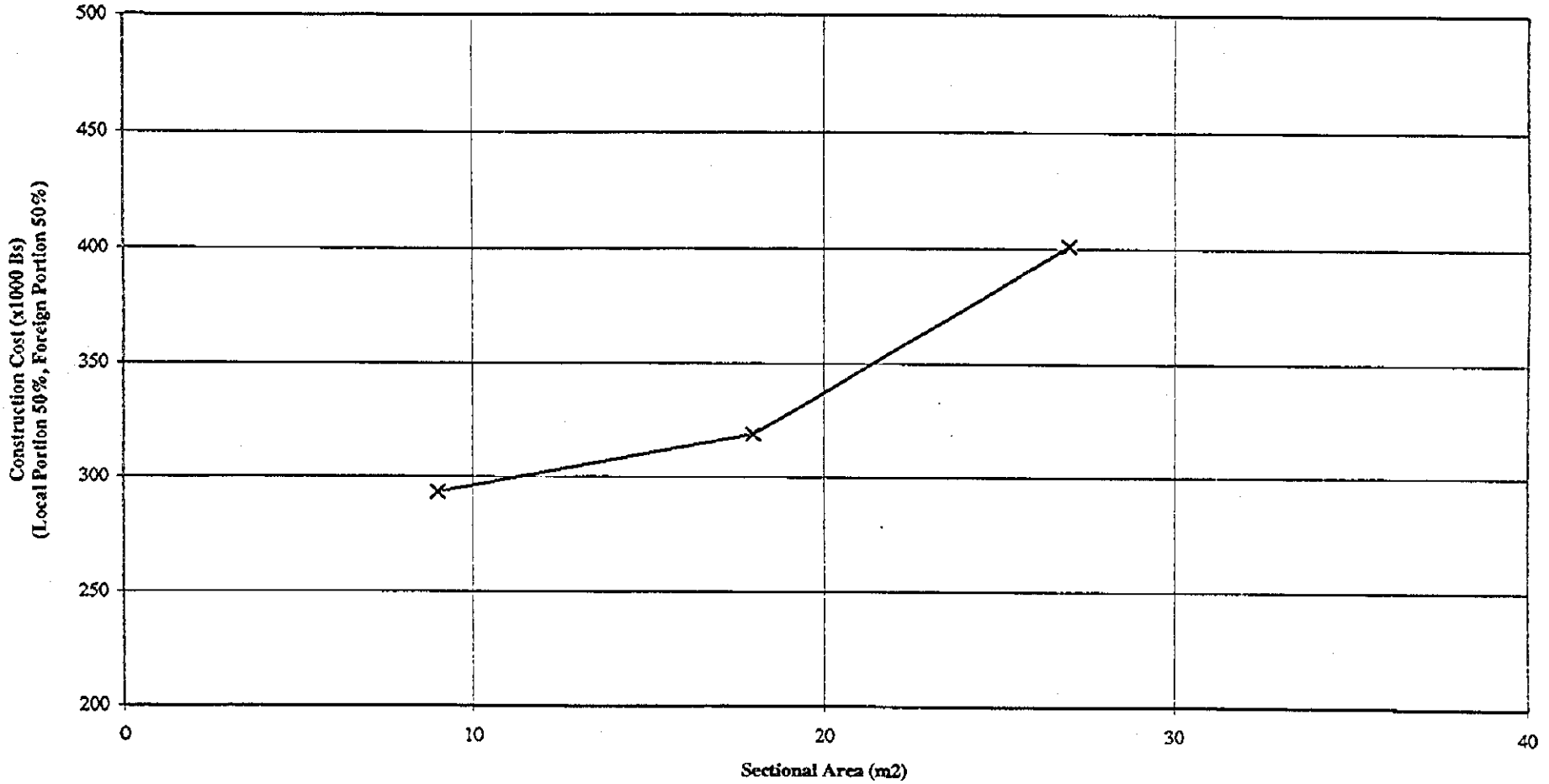


FIG.J.3.7 CONSTRUCTION COST OF BOX CULVERT (INCLUDING INDIRECT COST)

SUPPORTING REPORT K

PROJECT EVALUATION

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SUPPORTING REPORT K PROJECT EVALUATION

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SUPPORTING REPORT K

SUPPORTING REPORT K PROJECT EVALUATION

1. Introduction

The Study Area covers approximately 7,000 square km ranging between the Rio Grande and the Rio Yapacani located in the northern part of the Department of Santa Cruz. This area, according to the present flood mitigation and drainage improvement plan, is broadly divided into two areas; Chane-Pailon area and San Juan-Antofagasta area. The former has five projects of Rio Chane, Rio Pailon, Quebrada Chane, Chane Chacras and Okinawa Drainage, and the latter consists of two projects of San Juan and Antofagasta.

The project evaluation is carried out for each of the said seven projects and two combined projects of the eastern and western groups. The evaluation is mainly carried out from economic point of view, taking social and environmental aspects into account. The economic evaluation is indicated by the Economic Internal Rate of Return (EIRR) by using present values of economic cost and benefit of the project.

The economic prices, which are required to estimate the economic cost and benefit, are given under the conditions and assumptions as shown below:

(a) Transfer payments such as value added tax, income tax and corporation tax are not included in the economic cost and benefit;

(b) Standard conversion rate applied to equipment and materials procured locally is assumed to be 88 %, based on the external trade amount and duties of Bolivia in recent years shown in *Table K.1.1*;

(c) Opportunity cost of wages for unskilled laborers are taken as 80 % of their market prices, under their unemployment rate of approximately 20 % in recent years;

(d) Opportunity cost of land to be acquired for the project is assumed to be 70 %, taking into consideration the existing condition of land use in objective area; and

(e) Inflation factor is taken no account for the economic evaluation.

Economic life of the project (hereinafter referred to as the "project life") is taken as 30 years after the construction of facilities was completed, and the benefit and the operation

and maintenance cost (hereinafter referred to as the "OM cost") of the facilities are assumed to occur every year during the period of project life.

2. Economic Benefit

2.1 Concept of Flood Control Benefit

The economic benefit of a flood control project could be presented as an expected reduction effect in flood damage by implementing the flood control project, that is, a difference between with-project and without-project situations.

The economic benefit is estimated dividing into two stages; in the first stage the direct effect of reduction in the flood damage to assets, and in the second stage the reduction effect in flood damage to public facilities and economic activities as a function of the damage to assets.

For the purpose of estimating the economic benefit, a flood damage analysis would be made to assets, which are composed of general assets (buildings and household effects), livestock and agricultural field crops, using results of a flood damage survey shown in the **Supporting Report C.**

2.2 Flood Damage Analysis

2.2.1 General

The flood damages to the general assets and livestock could be estimated by using (a) number of the assets to be inundated by flood, (b) appraisal values of the assets and (c) damage rate of the assets inundated. It can be expressed by an equation as follows:

$$D_i = N_i \cdot A_i \cdot R_i$$

where i : Kind of buildings,
D_i : Flood damage to general asset (buildings and household effects) and livestock for i-kind of building (Bs.),
N_i : Number of i-kind of building,
A_i : Average appraisal values per general asset and livestock for i-kind of building (Bs.), and

R_i : Average damage rate of general assets and livestock for i-building.

On the other hand, the damages to agricultural field crops could be estimated by using (a) inundation areas in the agricultural crop fields, (b) production per unit area, and (c) the damage rate of agricultural field crops inundated, and it can be expressed by the following equation:

$$D_j = A_j \cdot V_j \cdot R_j$$

where j : Kind of Agricultural field crops,
D_j : Flood damage to j-crop (Bs.),
A_j : Planted area of j-crop (ha),
V_j : Average unit price of j-crop (Bs./ha), and
R_j : Average damage rate for j-crop.

2.2.2 Number of General Assets and Area of Agricultural Crop Fields in Inundation Area

In the inundation area, major buildings include residential houses (high, medium, and low classes), shops, restaurants, schools, churches, factories, hospitals, etc., and agricultural crop fields are mainly composed of soybeans, rice, sugar cane, maize and pasture. These data have been prepared using the land use maps and aerial photographs by return period of flood on the basis of hydrological and hydraulic analyses. The results are given according to with and without project situations in *Tables K.2.1* to *K.2.7*.

In the present study, an increase in number of buildings in the future is taken in no account in the flood prone area, and the number in 1995 is applied to estimate the flood damage, because the numbers of population and households in the rural area of the Department of Santa Cruz were only a little variation during the intercensal period between 1976 and 1992.

On the other hand, the agricultural crop lands in the Study Area have fully been developed, that is, it is considered to be difficult to expect a further increase in the agricultural land area, even though the kinds of planted crops are varied in the future. Accordingly in the present study, an increase in the agricultural crop areas is also taken

into no account in the flood prone area during the period of project life.

2.2.3 Appraisal Values of Assets

An interview survey was carried out to obtain the present appraisal values of buildings, household effects and livestock for each of residences, shops, restaurants, schools, churches, factories, hospitals, etc. in the flood prone area, and available samples of about 640 were collected. Where, the livestock is composed of a greater part of hens and a small number of cattle and pigs. These average appraisal values are summarized according to categories of building and household effects in *Table K.2.8.*

With regard to the agricultural field crops, production (tons/ha), prices (Bs/ton) and yield (Bs/ha) at the farm gate were estimated on the basis of agricultural production statistics and the result of questionnaire survey. These data together with the appraisal values of the assets are listed in the same table.

2.2.4 Flood Damage Rates of Assets

The flood damage rates of building, household effects, livestock and agricultural crops are estimated on the basis of the results of interview survey on the past flood damages in the flood prone area. Available number of the interview survey attained 110 samples for buildings, 37 samples for household effects, 44 samples for livestock, and 100 samples on average for each agricultural field crop.

The damage rate are given according to the water depth of inundation for building, household effects, livestock and agricultural crops, and the respective average damage rates are summarized in *Table K.2.9.*

In addition to the said flood damage to assets, a damage to public facilities and a loss in business activities are considered. The public facilities contain transportation and agricultural facilities, electric and water supply systems, etc. However, it was difficult to estimate the flood damage to these facilities from the past flood damage records. Therefore, in the present study the total damage to these public facilities is assumed to be 34 % of the damage to general assets, in accordance with similar projects in the South-east Asian countries.

On the other hand, major economic losses in the business activities are caused by

suspensions of business activities and road traffic in and around the inundation area. According to records of the past flood, inhabitants and enterprises in and around the flooded area have been obliged to suspend all or a part of their business and production activities during some periods in and after flooding. For example, it is reported that some sugar factories reduced remarkably their sugar productions over two years, caused by flood damage to the planted sugar cane and suspension of road traffic.

Generally, the economic basic loss in the example above could be evaluated by a reduction in the profit. However, it is very difficult to have an accurate grasp of the economic loss for all sectors in and around the flooded area. Therefore, in the present study, the economic loss in business suspension (including the traffic suspension) is assumed to be approximately 6 % of the flood damage to general assets, according to similar project in the South-east Asian countries.

2.2.5 Estimates of Flood Damage

Under the conditions above, the damage amounts are estimated according to kind of assets and return periods of flood. Estimates of the flood damage are carried out for the without-project and with-project situations of respective projects. The results are given in *Tables K.2.10* to *K.2.16*, and the total amount is summarized as follows:

Flood Damage reduced by Return Period

Name of Projects	Return Period (year)		
	2	5	10
1. Rio Chane	4,326	392	-313
2. Rio Pailon	49,277	65,348	73,457
3. Quebrada Chane	17,752	26,276	31,980
4. Chane Chacras	39,080	53,674	54,399
5. Okinawa Drainage	15,916	24,214	-
6. San Juan	9,688	15,946	19,068
7. Antofagasta	18,693	25,583	30,626
Total	154,732	211,433	209,217

Unit : Bs. 1,000

2.3 Expected Average Annual Benefit

Using the damage amounts for each return period shown in *Tables K.2.10* to *K.2.16*, the average annual flood damage is calculated for the period of ten years for each project (five year for the Okinawa Drainage project), taking the occurrence probability of flood into account. The result is summarized as follows:

Average Annual Flood Damage

Name of Projects	Without-Project	With-Project	Reduction in Damage (Annual Benefit)
1. Rio Chane	17,450	15,656	1,794
2. Rio Pailon	38,890	2,436	36,454
3. Quebrada Chane	17,310	3,350	13,960
4. Chane Chacras	30,912	1,825	29,087
5. Okinawa Drainage	13,458	3,458	10,000
6. San Juan	8,828	810	8,018
7. Antofagasta	17,572	3,447	14,125
Total	144,420	30,982	113,438

Unit : Bs. 1,000

As shown in the above table, the average annual flood damage in the Study Area would be expected to reduce by Bs. 113.438 million in total by executing the flood mitigation project for all return period floods from every year to ten year. Among projects, the two projects of Rio Pailon and Chane Chacras indicate the comparatively large reduction effect of Bs. 36.454 million and 29.087 million, respectively.

These annual reduction effects in flood damage would be considered as a direct tangible benefit of the projects which are expected to accrue every year during the period of project life of 30 years after completion of the construction works.

In addition to the annual benefit after completion of construction works, a partial annual benefit would be expected to accrue before completion of the construction works. It is assumed to be proportional to progress of the construction works, i.e. the partial benefit could be approximately estimated by a ratio of the invested construction cost to the total construction cost.

Results of the annual benefits which have been calculated are transferred to *Tables*

K.4.1 to *K.4.20* for the purpose of an economic analysis of the projects. Besides, indirect and/or intangible benefits would be discussed in Chapter 4.

3. Economic Cost

The economic costs are converted from the project costs given in the **Supporting Report J**, by taking into account the conditions and assumptions listed in Section 1.1. In addition to these conditions and assumptions, the following matters are taken into consideration:

(1) Value Added Tax (VAT) is set as 13 % of costs of commodities and services to be procured locally (L.C.) and costs of commodities to be imported from abroad (F.C.) for the project. Since this tax is already included in the project cost shown in the **Supporting Report J**, it would be taken out from the project cost for estimating the economic cost.

(2) Ratio of commodity costs and unskilled labor wages in the L.C. of the construction cost is assumed to be 55 : 45 on average judging from the distribution of construction cost. The economic cost of this labor wages would be estimated by taking into account the opportunity cost of labor (80 %) together with the standard conversion rate (88 %) and the VAT (13 %).

(3) The engineering services of foreign consultants are assumed to be tax-free.

Based on the matters above, the economic cost of the project can be estimated by multiplying the project cost by the following rates:

Rates to be Multiplied to the Project Costs
for Estimating the Economic Costs

Items of Cost	Rates	Calculation Formula
Local Currency Portion (L.C.)		
1. Construction Cost	0.71	0.88(0.55+0.45x0.80)/1.13
2. Land Acquisition Cost	0.55	0.88x0.70/1.13
3. Administration Cost	0.88	1/1.13
4. Engineering Service Fee	0.88	1/1.13
Foreign Currency Portion (F.C.)		
1. Construction Cost	0.88	1/1.13

The annual economic costs of the projects are be calculated using the rates above as shown in *Tables K.3.1* to *K.3.12*, and these results are transferred to *Tables K.4.1* to *K.4.20* for estimating the EIRR. For respective projects, the total economic costs together with the financial costs (project costs) are summarized below:

Comparison of Economic Costs and Financial Costs of the Projects

Name of Projects	Construction Cost		Annual OM Cost	
	Financial Cost	Economic Cost	Financial Cost	Economic Cost
I. Eastern Group				
1-1. Rio Chane (Alt.-1)	269,644	144,160	2,813	1,074
1-2. Rio Chane (Alt.-2)	0	0	0	0
2. Rio Pailon	452,058	236,795	4,649	1,763
3. Quebrada Chane	199,979	102,260	2,019	760
4. Chane Chacras	370,449	177,400	4,267	1,318
5. Okinawa Drainage	139,023	74,946	1,467	557
II. Western Group				
6-1. San Juan (Alt.-1)	129,800	70,995	1,297	528
6-2. San Juan (Alt.-2)	146,067	80,424	1,470	599
7. Antofagasta	150,953	81,784	1,602	607

Unit : Bs. 1,000

The total cost of each alternative-1 and -2 is summarized blow:

Alternative/Group	Construction Cost		Annual OM Cost	
	Financial Cost	Economic Cost	Financial Cost	Economic Cost
Alternative-1				
Eastern Group	1,431,153	735,561	15,215	5,472
Western Group	280,753	152,779	2,899	1,135
Total	1,711,906	888,340	18,114	6,607
Alternative-2				
Eastern Group	1,161,509	591,401	12,402	4,398
Western Group	297,020	162,208	3,072	1,206
Total	1,458,529	753,609	15,474	5,604

4. Cost-Benefit Analysis

4.1 Economic Evaluation of Individual Projects

Five projects of Rio Pailon, Quebrada Chane, Chane Chacras, Okinawa Drainage and Antofagasta have been planned under the same condition between alternative-1 and alternative-2. The Rio Chane project is not included alternative-2, and also the San Juan project is planned under a different condition between alternative-1 and alternative-2 (see Supporting Report J).

Under such a condition, an economic feasibility for each project is examined using annual flows of the economic cost and benefit shown in the *Tables K.4.1* to *K.4.10*. As a result the evaluation factors such as the Economic Internal Rate of Return (EIRR), the Net Present Value (NPV) and the Benefit-Cost Ratio (B/C) are listed at the lower parts of respective tables. Out of these evaluation factors, the EIRR is summarized as follows:

Name of Projects	EIRR (%)	
	Alternative-1	Alternative-2
I. Eastern Group	11.04	14.00
1. Rio Chane	Negative	Excluded
2. Rio Pailon	14.33	14.33
3. Quebrada Chane	12.52	12.52
4. Chane Chacras	15.38	15.38
5. Okinawa Drainage	12.21	12.21
II. Western Group	13.41	12.51
6. San Juan	9.97	8.48
7. Antofagasta	16.24	16.24

According to an information from international financial agencies, the opportunity cost of capital is estimated to be between 10 % and 12 % in Bolivia. Based on such an economic standard, the five projects other than two projects of Rio Chane and San Juan are considered to be economically feasible. In particular, the three projects of Antofagasta, Chane Chacras and Rio Pailon could be expected a fairly high economic return.

Although EIRR of the San Juan project resulted in somewhat lower value than 10 % in both alternative-1 and -2, it is considered to be viable from the socio-economic point of view, on the grounds that this project (1) is very useful for an improvement of social environment, and also (2) can be expected a fairly indirect economic effect owing to the large investment.

On the contrary, the Rio Chane project is regarded to be economically unfeasible, because of having the negative EIRR and NPV as shown in *Table K.4.1*.

4.2 Economic Evaluation for Combined Projects under Construction Schedule

Under the construction schedule shown in the **Supporting Report J**, the economic feasibility for the combined projects has been examined for alternative-1 and -2 of each eastern group and western group. As mentioned already, alternative-1 of the eastern group is composed of five projects of Rio Chane, Rio Pailon, Quebrada Chane, Chane Chacras and Okinawa Drainage, and the alternative-2 excludes the Rio Chane project. On the other hand, the western group consists of two projects of San Juan and Antofagasta, for both alternative-1 and -2 which have different plan at each other.

Calculations of the EIRR for the combined projects are given in *Tables K.4.11* to *K.4.20*, and the results are summarized below:

Group	EIRR (%)	
	Alt.-1	Alt.-2
I. Eastern Group	10.18	14.04
II. Western Group	13.41	12.51

The EIRR for the eastern group would come to 10.18 % for the alternative-1. This percentage is somewhat low compared with EIRR (11.04 %) for case where the constructions of the said five projects are simultaneously commenced. This matter is due mainly to that the Rio Chane project with a negative EIRR has been scheduled to be implemented in an early stage of construction. On the other hand, the EIRR of 14.04 % for the alternative-2 is nearly equal to the EIRR (14.00 %) for case of the simultaneous commencement of construction works shown in Section 4.1.

In the western group, constructions of both San Juan and Antofagasta projects are

scheduled to be commenced at the same time. The EIRR would come therefore to the same as figure the shown in Section 4.1, for each alternative-1 and -2.

As a result, the figures above of EIRR indicate that the projects are economically feasible for all cases of alternative-1 and -2 of the eastern and western groups.

4.3 Sensitivity Test

Based on professional experience and appropriate judgment by experts, several conditions and assumptions have been carefully set throughout the study. However, there are always some questions as to the degree of reliability of the inputs. A test is therefore carried out about the sensitivity of EIRR affected by variations in the economic costs and benefits.

The EIRR sensitivity test has been examined under the conditions of the increase in 5 % and 10 % of the economic cost and the decrease in 5 % and 10 % of the economic benefit, on the alternative-1 and -2 for each eastern and western group. The results are summarized as follows:

EIRR Sensitivity Test (%)

1-1. Alternative-1, Eastern Group

Decrease in	Increase in Cost		
Benefit	0 %	5 %	10 %
0 %	10.18	9.64	9.13
5 %	9.61	9.08	8.59
10 %	9.03	8.51	8.04

1-2. Alternative-2, Eastern Group

Decrease in	Increase in Cost		
Benefit	0 %	5 %	10 %
0 %	14.04	13.30	12.62
5 %	13.26	12.55	11.90
10 %	12.40	11.76	11.17

II-1. Alternative-1, Western Group

Decrease in	Increase in Cost		
Benefit	0 %	5 %	10 %
0 %	13.41	12.69	12.03
5 %	12.65	11.96	11.33
10 %	11.89	11.27	10.62

II-2. Alternative-2, Western Group

Decrease in	Increase in Cost		
Benefit	0 %	5 %	10 %
0 %	12.51	11.82	11.19
5 %	11.79	11.13	10.53
10 %	11.06	10.43	9.85

As shown above, EIRR for alternative-2 of the eastern group and alternative-1 of the western group maintains the figures of 11.17 % and 10.62 % which indicate the economic feasibility respectively, even for the unfavorable case where the increase in cost and the decrease in benefit are both 10 %.

EIRR for alternative-2 of the western group holds over 10 % which shows the economic feasibility, for a combined condition of the 10 % increase in cost and the 5 % decrease in benefit, or for case of the 5 % increase in cost and the 10 % decrease in benefit. However, the EIRR falls to 9.8 % for a combined condition of the 10 % increase in cost and the 10 % decrease in benefit.

EIRR for alternative-1 of the eastern group falls to 9.6 %, which does not attain to a level of the economic feasibility, for the 5 % increase in cost, or the 5 % decrease in benefit. This is due mainly to a negative EIRR for the Rio Chane project.

5. Summary of Project Evaluation

5.1 Direct Effects

A. Individual Projects

Of seven individual projects, only the San Juan project have two plans; alternative-1

and-2. The economic evaluation of individual projects are summarized as follows:

(1) Five projects of Rio Pailon, Quebrada Chane, Chane Chacras, Okinawa Drainage and Antofagasta are economically feasible. Especially, three projects of Antofagasta, Chane Chacras and Rio Pailon can be expected a high economic return by implementing the projects.

(2) The San Juan project can be considered to be feasible from the socio-economic point of view, on the grounds that it is very useful for an improvement of social environment and can be expected a fairly indirect economic effect owing to the large investment. This matter is applied to both alternative-1 and -2.

(3) The Rio Chane project is regarded to be economically infeasible, because of having a negative EIRR and NPV.

B. Combined Projects

In accordance with the geographical condition in the study area, the seven projects can be divided into two groups; the eastern and western groups. The eastern group is composed of five projects of Rio Chane, Rio Pailon, Quebrada Chane, Chane Chacras and Okinawa Drainage, and the western group consists of two projects of San Juan and Antofagasta. The Rio Chane project is however excluded from alternative-2. The result of economic evaluation for each group is summarized as follows:

(1) The combined projects are economically feasible for alternative-2 of the eastern group and the alternative-1 the western group.

(2) According to the sensitivity test, the EIRR for alternative-1 of the eastern group falls to 9.6 % for the 5 % increase in cost, or the 5 % decrease in benefit, and also for alternative-2 of the western group it comes to 9.8 % for case where the 10 % increase in cost and the 10 % decrease in benefit is combined.

(3) However, although the two groups above do not attain to a standard of the economic feasibility for some special cases, these projects are considered to be feasible from the socio-economic point of view, by taking into account that it is very useful for an improvement of social environment and can be expected a fairly indirect economic return owing to the large investment.

5.2 Indirect Effects

In addition to the direct effects above, the projects are expected to produce the following the indirect and/or intangible effects:

(1) The projects are expected to contribute to an improvement of social and economic aspects in the Study Area throughout reductions in: 1) interruption of traffic and communications, 2) increase in idle laborers, 3) spread of disease, 4) drop in quality of crops, 5) increase in unit production costs in factories and agricultural lands, and 6) rise in consumer prices.

(2) The projects are expected to produce a stimulate impact to the development of regional economy owing to the investment of large fund.