TABLE D.1.32 DISBURSEMENT SCHEDULE OF ANTOFAGASTA MAIN DRAINAGE

Unit : Bs.

Item		Amount	Year										
			2,001	2,002	2,003	2,004	2,005	2,006	2,007	2,008	2,009	2,010	2,011
A. Construction Cost	Total	16,173,000							2,074,000	4,852,000	6,469,000	2,778,000	
	L/C	5,545,000							711,000	1,664,000	2,218,000	952,000	
	F/C	10,628,000							1,363,000	3,188,000	4,251,000	1,826,000	
B. Land Acquisition	Total	0							0	0	0	0	
	L/C	0							0	0	0	0	
	F/C	0							0	0	0	0	
C. Administration Cost	Total	809,000							0	243,000	324,000	242,000	
(5% of Item A + B)	L/C	809,000							0	243,000	324,000	242,000	
L/C only	F/C	0							0	0	0	0	
D. Engineering Cost	Total	1,617,000							162,000	485,000	647,000	323,000	
(10% of Item A)	L/C	323,000							32,000	97,000	129,000	65,000	
L.C.20%, F.C. 80%	F/C	1,294,000							129,000	388,000	518,000	259,000	
Subtotal (1)	Total	18,599,000							2,235,000	5,580,000	7,440,000	3,344,000	
(Item A+B+C+ D)	L/C	6,677,000							743,000	2,004,000	2,671,000	1,259,000	
	F/C	11,922,000							1,492,000	3,576,000	4,769,000	2,085,000	
E. Physical Contingency	Total	2,790,000							335,000	837,000	1,116,000	502,000	
(15% of Subtotal (1))	L/C	1,002,000							111,000	301,000	401,000	189,000	
	F/C	1,788,000							224,000	536,000	715,000	313,000	
Subtotal (2)	Total	21,389,000							2,570,000	6,417,000	8,556,000	3,846,000	
(Item A+B+C+D+E)	L/C	7,679,000							854,000	2,305,000	3,072,000	1,448,000	
	F/C	13,710,000							1,716,000	4,112,000	5,484,000	2,398,000	
F. Price Contingency	Total	14,773,000	0	0	0	0	0	0	1,245,000	3,674,000	5,605,000	4,249,000	
(L/C=7%)	L/C	7,117,000	0	0	0	0	0	0	613,000	1,933,000	2,971,000	1,600,000	
(F/C=4%)	F/C	7,656,000	0	0	0	0	0	0	632,000	1,741,000	2,634,000	2,649,000	
Total	Total	36,162,000	0	0	0	0	0	0	3,815,000	10,091,000	14,161,000	8,095,000	
(Item A+B+C+D+E +F)	L/C	14,796,000	0	0	0	0	0	0	1,467,000	4,238,000	6,043,000	3,048,000	
	F/C	21,366,000	0	0	0	0	0	0	2,348,000	5,853,000	8,118,000	5,047,000	
O.M.Cost	Total	804,000		0	0	0	0	0	0	39,000	138,000	284,000	343,000
1.O.M.Cost	L/C	389,000		0	0	0	0	0	0	21,000	70,000	135,000	163,000
2.Price Contingency	L/C	415,000		0	0	0	0	0	0	18,000	68,000	149,000	180,000

TABLE D.1.33 DISBURSEMENT SCHEDULE OF ANTOFAGASTA SECONDARY DRAINAGE

Unit : Bs.

Item		Amount	Year										
			2,001	2,002	2,003	2,004	2,005	2,006	2,007	2,008	2,009	2,010	2,011
A. Construction Cost	Total	26,988,000			3,460,000	3,778,000	3,778,000	3,913,000	4,318,000	3,913,000	3,778,000	50,000	
	L/C	10,833,000			1,389,000	1,517,000	1,517,000	1,571,000	1,733,000	1,571,000	1,517,000	18,000	
	F/C	16,155,000			2,071,000	2,262,000	2,262,000	2,342,000	2,585,000	2,342,000	2,262,000	29,000	
B. Land Acquisition	Total	0			0	0	0	0	0	0	0	0	
	L/C	0			0	0	0	0	0	0	0	0	
	F/C	0			0	0	0	0	0	0	0	0	
C. Administration Cost	Total	1,349,000			0	189,000	189,000	196,000	216,000	196,000	189,000	174,000	
(5% of Item A + B)	L/C	1,349,000			0	189,000	189,000	196,000	216,000	196,000	189,000	174,000	
L/C only	F/C	0			0	0	0	0	0	0	0	0	
D. Engineering Cost	Total	2,699,000			270,000	378,000	378,000	391,000	432,000	391,000	378,000	81,000	
(10% of Item A)	L/C	540,000			54,000	76,000	76,000	78,000	86,000	78,000	76,000	16,000	
L.C.20%, F.C. 80%	F/C	2,159,000			216,000	302,000	302,000	313,000	345,000	313,000	302,000	66,000	
Subtotal (1)	Total	31,036,000			3,730,000	4,346,000	4,346,000	4,500,000	4,965,000	4,500,000	4,346,000	303,000	
(Item A+B+C+ D)	L/C	12,722,000			1,443,000	1,782,000	1,782,000	1,845,000	2,035,000	1,845,000	1,782,000	208,000	
	F/C	18,314,000			2,287,000	2,564,000	2,564,000	2,655,000	2,930,000	2,655,000	2,564,000	95,000	
E. Physical Contingency	Total	4,655,000			559,000	652,000	652,000	675,000	745,000	675,000	652,000	45,000	
(15% of Subtotal (1))	L/C	1,908,000			216,000	267,000	267,000	277,000	305,000	277,000	267,000	32,000	
	F/C	2,747,000			343,000	385,000	385,000	398,000	440,000	398,000	385,000	13,000	
Subtotal (2)	Total	35,691,000			4,289,000	4,998,000	4,998,000	5,175,000	5,710,000	5,175,000	4,998,000	348,000	
(Item A+B+C+D+E)	L/C	14,630,000			1,659,000	2,049,000	2,049,000	2,122,000	2,340,000	2,122,000	2,049,000	240,000	
	F/C	21,061,000			2,630,000	2,949,000	2,949,000	3,053,000	3,370,000	3,053,000	2,949,000	108,000	
F. Price Contingency	Total	4,048,000			519,000	567,000	567,000	587,000	648,000	587,000	567,000	6,000	
(15% of Item A)	L/C	1,625,000			208,000	228,000	228,000	236,000	260,000	236,000	228,000	1,000	
	F/C	2,423,000			311,000	339,000	339,000	351,000	388,000	351,000	339,000	5,000	
Total	Total	39,739,000			4,808,000	5,565,000	5,565,000	5,762,000	6,358,000	5,762,000	5,565,000	354,000	
(Item A+B+C+D+E +F)	L/C	16,255,000			1,867,000	2,277,000	2,277,000	2,358,000	2,600,000	2,358,000	2,277,000	241,000	
	F/C	23,484,000			2,941,000	3,288,000	3,288,000	3,404,000	3,758,000	3,404,000	3,288,000	113,000	
O.M.Cost	Total	2,544,000		0	0	49,000	110,000	178,000	258,000	355,000	456,000	568,000	570,000
1.O.M.Cost	L/C	1,335,000		0	0	35,000	73,000	111,000	150,000	193,000	232,000	270,000	271,000
2.Price Contingency	L/C	1,209,000		0	0	14,000	37,000	67,000	108,000	162,000	224,000	298,000	299,000

TABLE D.1.34 COST ESTIMATION OF RIVER IMPROVEMENT(1)

1. **Rio Chane (W=100-75 m, D=6 m, L=26.354 km) - RIO CHANE** Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		51,607,232		84,863,816	136,471,048	
(1) Earth Work		lump	1		43,126,950		70,112,739	113,239,689	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	790,620	1.40	1,106,868	2.31	1,826,332	2,933,200	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	5,638,360	2.08	11,727,789	5.32	29,996,075	41,723,864	W-3
Soil Transportation	D. Truck 11T, L=1km	m3	5,638,360	3.25	18,324,670	5.74	32,364,186	50,688,856	W-8
Surplus Soil Filling	Bulldozer 15T	m3	5,638,360	0.82	4,623,455	1.00	5,638,360	10,261,815	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	184,478	39.78	7,338,535	1.56	287,786	7,626,321	W-4
Reforespation	Eucalipthos,Carnadulencia,Citroduros	ha	3	1,942.50	5,633	0.00	0	5,633	
(2) Structural Construction		lump	1		3,788,715		7,036,185	10,824,900	
Bridge (1)	L=115.0m x W=5.5m	m2	633	1,645.00	1,041,285	3,055.00	1,933,815	2,975,100	
Bridge (2)	L= 83.5m x W=5.5m	m2	459	1,715.00	787,185	3,185.00	1,461,915	2,249,100	
Bridge (3)	L= 82.0m x W=5.5m	m2	451	1,715.00	773,465	3,185.00	1,436,435	2,209,900	
Bridge (4)	L= 86.5m x W=8.0m	m2	692	1,715.00	1,186,780	3,185.00	2,204,020	3,390,800	
(3) Preparatory Works	((1)+(2))*10%	lump	1		4,691,567		7,714,892	12,406,459	
B. Indirect Cost		lump	1		15,482,170		25,459,145	40,941,315	
Unforeseen	A.* 5%	lump	1		2,580,362		4,243,191	6,823,553	
Overhead	A.*10%	lump	1		5,160,723		8,486,382	13,647,105	
Profit	A.*15%	lump	1		7,741,085		12,729,572	20,470,657	
C. Construction Cost	A.+B.	lump	1		67,089,402		110,322,961	177,412,363	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.34 COST ESTIMATION OF RIVER IMPROVEMENT(2)

2. Rio Pailon (downstream) (W=70 m, D=5 m, L=23.632 km) - RIO PAILON

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		61,739,943		106,731,266	168,471,210	
(1) Earth Work		lump	1		55,404,471		95,686,174	151,090,645	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	708,960	1.40	992,544	2.31	1,637,698	2,630,242	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	7,776,983	2.08	16,176,125	5.32	41,373,550	57,549,675	W-3
Soil Transportation	D. Truck 11T, L=1km	m3	7,776,983	3.25	25,275,195	5.74	44,639,882	69,915,077	W-8
Surplus Soil Filling	Bulldozer 15T	m3	7,776,983	0.82	6,377,126	1.00	7,776,983	14,154,109	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	165,424	39.78	6,580,567	1.56	258,061	6,838,628	W-4
Reforespation	Eucalipthos,Camadulencis,Citroduros	ha	2	1,942.50	2,914	0.00	0	2,914	
(2) Structural Construction		lump	1		722,750		1,342,250	2,065,000	
Bridge (1)	L=75.0m x W=5.5m	m2	413	1,750.00	722,750	3,250.00	1,342,250	2,065,000	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*10%	lump	1		5,612,722		9,702,842	15,315,565	
B. Indirect Cost		lump	1		18,521,982		32,019,380	50,541,362	
Unforeseen	A.* 5%	lump	1		3,086,997		5,336,563	8,423,560	
Overhead	A.*10%	lump	1		6,173,994		10,673,127	16,847,121	
Profit	A.*15%	lump	1		9,260,991		16,009,690	25,270,681	
C. Construction Cost	A.+B.	lump	1		80,261,925		138,750,646	219,012,572	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.34 COST ESTIMATION OF RIVER IMPROVEMENT(3)

3. Rio Pailon (upstream) (W=65 m, D=5 m, L=8.046 km) - RIO PAILON

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		12,438,788		19,540,312	31,979,100	
(1) Earth Work		lump	1		11,307,989		17,763,920	29,071,909	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	241,380	1.40	337,932	2.31	557,588	895,520	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	1,419,442	2.08	2,952,439	5.32	7,551,431	10,503,870	W-3
Soil Transportation	D. Truck 11T, L=1km	m3	1,419,442	3.25	4,613,187	5.74	8,147,597	12,760,784	W-8
Surplus Soil Filling	Bulldozer 15T	m3	1,419,442	0.82	1,163,942	1.00	1,419,442	2,583,384	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	56,322	39.78	2,240,489	1.56	87,862	2,328,351	W-4
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*10%	lump	1		1,130,799		1,776,392	2,907,191	
B. Indirect Cost		lump	1		3,731,636		5,862,094	9,593,730	
Unforeseen	A.* 5%	lump	1		621,939		977,016	1,598,955	
Overhead	A.*10%	lump	1		1,243,879		1,954,031	3,197,910	
Profit	A.*15%	lump	1		1,865,818		2,931,047	4,796,865	
C. Construction Cost	A.+B.	lump	1		16,170,424		25,402,406	41,572,830	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.34 COST ESTIMATION OF RIVER IMPROVEMENT(4)

4. Arroyo Yapacanicito (W=35-30 m, D=3 m, L=17.363 m) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		9,294,720		12,430,343	21,725,063	
(1) Earth Work		lump	1		7,392,170		9,702,249	17,094,419	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	520,890	1.40	729,246	2.31	1,203,256	1,932,502	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	688,991	2.08	1,433,101	5.32	3,665,432	5,098,533	W-3
Soil Transportation	D. Truck 11T, L=1km	m3	688,991	3.25	2,239,221	5.74	3,954,808	6,194,029	W-8
Surplus Soil Filling	Bulldozer 15T	m3	688,991	0.82	564,973	1.00	688,991	1,253,964	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	121,541	19.85	2,412,808	1.56	189,762	2,602,570	W-4-S
Reforespation	Eucaliptbos,Camadulencia,Citroduros	ha	7	1,942.50	12,821	0.00	0	12,821	
(2) Structural Construction		lump	1		353,430		656,370	1,009,800	
Bridge (1)	L=34.0m x W=5.5m	m2	187	1,890.00	353,430	3,510.00	656,370	1,009,800	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		1,549,120		2,071,724	3,620,844	
B. Indirect Cost		lump	1		2,788,416		3,729,102	6,517,518	
Unforeseen	A.* 5%	lump	1		464,736		621,517	1,086,253	
Overhead	A.*10%	lump	1		929,472		1,243,034	2,172,506	
Profit	A.*15%	lump	1		1,394,208		1,864,551	3,258,759	
C. Construction Cost	A.+B.	lump	1		12,083,136		16,159,445	28,242,581	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.34 COST ESTIMATION OF RIVER IMPROVEMENT(5)

5. Arroyo Jochi (W=30-22 m, D=4 m, L=13.8 m) - ANTOFAGASTA Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		6,481,040		8,066,407	14,547,448	
(1) Earth Work		lump	1		4,757,322		5,526,851	10,284,173	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	414,000	1.40	579,600	2.31	956,340	1,535,940	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	366,475	2.08	762,268	5.32	1,949,647	2,711,915	W-3
Soil Transportation	D. Truck 11T, L=1km	m3	366,475	3.25	1,191,044	5.74	2,103,567	3,294,611	W-8
Surplus Soil Filling	Bulldozer 15T	m3	366,475	0.82	300,510	1.00	366,475	666,985	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	96,600	19.85	1,917,684	1.56	150,822	2,068,506	W-4-S
Reforespation	Eucalipthos,Camadulencia,Citroduros	ha	3	1,942.50	6,216	0.00	0	6,216	
(2) Structural Construction		lump	1		643,545		1,195,155	1,838,700	
Bridge (1)	L=36.0m x W=5.5m	m2	198	1,890.00	374,220	3,510.00	694,980	1,069,200	
Bridge (2)	L=25.0m x W=5.5m	m2	135	1,995.00	269,325	3,705.00	500,175	769,500	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		1,080,173		1,344,401	2,424,575	
B. Indirect Cost		lump	1		1,944,312		2,419,922	4,364,234	
Unforeseen	A.* 5%	lump	1		324,052		403,320	727,372	
Overhead	A.*10%	lump	1		648,104		806,641	1,454,745	
Profit	A.*15%	lump	1		972,156		1,209,961	2,182,117	
C. Construction Cost	A.+B.	lump	1		8,425,352		10,486,329	18,911,682	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.34 COST ESTIMATION OF RIVER IMPROVEMENT(6)

6. Arroyo Tacuaral (W=26 m, D=4 m, L=5.799 km) - ANTOFAGASTA

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		4,252,840		6,375,108	10,627,948	
(1) Earth Work		lump	1		3,232,183		4,733,440	7,965,623	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	173,970	1.40	243,558	2.31	401,871	645,429	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	353,913	2.08	736,139	5.32	1,882,817	2,618,956	W-3
Soil Transportation	D. Truck 11T, L=1km	m3	353,913	3.25	1,150,217	5.74	2,031,461	3,181,678	W-8
Surplus Soil Filling	Bulldozer 15T	m3	353,913	0.82	290,209	1.00	353,913	644,122	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	40,593	19.85	805,844	1.56	63,378	869,222	W-4-S
Reforespation	Eucalipthos,Camadulencis,Citroduros	ha	3	1,942.50	6,216	0.00	0	6,216	
(2) Structural Construction		lump	1		311,850		579,150	891,000	
Bridge (1)	L=30.0m x W=5.5m	m2	165	1,890.00	311,850	3,510.00	579,150	891,000	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		708,807		1,062,518	1,771,325	
B. Indirect Cost		lump	1		1,275,852		1,912,532	3,188,384	
Unforeseen	A.* 5%	lump	1		212,642		318,755	531,397	
Overhead	A.*10%	lump	1		425,284		637,511	1,062,795	
Profit	A.*15%	lump	1		637,926		956,266	1,594,192	
C. Construction Cost	A.+B.	lump	1		5,528,692		8,287,640	13,816,332	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(1)

1. Rancho Chico (W=12 m, D=3 m, L=3.600 km) - RIO PAILON

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		1,605,173		3,112,305	4,717,478	
(1) Earth Work		lump	1		1,459,248		2,829,368	4,288,616	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	108,000	1.40	151,200	2.31	249,480	400,680	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	226,306	2.08	470,716	5.32	1,203,948	1,674,664	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	226,306	2.88	651,761	5.08	1,149,634	1,801,395	W-8
Surplus Soil Filling	Bulldozer 15T	m3	226,306	0.82	185,571	1.00	226,306	411,877	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	39.78	0	1.56	0	0	W-4
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*10%	lump	1		145,925		282,937	428,862	
B. Indirect Cost		lump	1		481,552		933,691	1,415,243	
Unforeseen	A.* 5%	lump	1		80,259		155,615	235,874	
Overhead	A.*10%	lump	1		160,517		311,230	471,747	
Profit	A.*15%	lump	1		240,776		466,846	707,622	
C. Construction Cost	A.+B.	lump	1		2,086,725		4,045,996	6,132,721	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(2)

2. Chaco (W=18 m, D=3 m, L=1.472 km) - RIO PAILON

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		225,881		423,591	649,472	
(1) Earth Work		lump	1		205,346		385,083	590,429	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	44,160	1.40	61,824	2.31	102,010	163,834	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	24,831	2.08	51,648	5.32	132,101	183,749	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	24,831	2.88	71,513	5.08	126,141	197,654	W-8
Surplus Soil Filling	Bulldozer 15T	m3	24,831	0.82	20,361	1.00	24,831	45,192	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	39.78	0	1.56	0	0	W-4
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*10%	lump	1		20,535		38,508	59,043	
B. Indirect Cost		lump	1		67,764		127,078	194,842	
Unforeseen	A.* 5%	lump	1		11,294		21,180	32,474	
Overhead	A.*10%	lump	1		22,588		42,359	64,947	
Profit	A.*15%	lump	1		33,882		63,539	97,421	
C. Construction Cost	A.+B.	lump	1		293,645		550,669	844,314	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(3)

3. Empalme II (W=35 m, D=4 m, L=5.295 km) - RIO PAILON

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		1,467,116		2,781,411	4,248,527	
(1) Earth Work		lump	1		1,070,402		2,039,495	3,109,897	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	158,850	1.40	222,390	2.31	366,944	589,334	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	146,715	2.08	305,167	5.32	780,524	1,085,691	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	146,715	2.88	422,539	5.08	745,312	1,167,851	W-8
Surplus Soil Filling	Bulldozer 15T	m3	146,715	0.82	120,306	1.00	146,715	267,021	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	39.78	0	1.56	0	0	W-4
(2) Structural Construction		lump	1		263,340		489,060	752,400	
Bridge (1)	L=24.0m x W=5.5m	m2	132	1,995.00	263,340	3,705.00	489,060	752,400	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*10%	lump	1		133,374		252,856	386,230	
B. Indirect Cost		lump	1		440,135		834,424	1,274,559	
Unforeseen	A.* 5%	lump	1		73,356		139,071	212,427	
Overhead	A.*10%	lump	1		146,712		278,141	424,853	
Profit	A.*15%	lump	1		220,067		417,212	637,279	
C. Construction Cost	A.+B.	lump	1		1,907,251		3,615,835	5,523,086	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(4)

4. Okinawa Main Drainage (W=35 m, D=4 m, L=20.550 km) - OKINAWA

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		12,128,673		23,870,839	35,999,512	
(1) Earth Work		lump	1		10,625,386		20,956,643	31,582,029	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	0	1.40	0	2.31	0	0	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	1,838,302	2.08	3,823,668	5.32	9,779,767	13,603,435	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	1,838,302	2.88	5,294,310	5.08	9,338,574	14,632,884	W-8
Surplus Soil Filling	Bulldozer 15T	m3	1,838,302	0.82	1,507,408	1.00	1,838,302	3,345,710	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		400,680		744,120	1,144,800	
Bridge (1)	L=38.5m x W=5.5m	m2	212	1,890.00	400,680	3,510.00	744,120	1,144,800	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	4.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*10%	lump	1		1,102,607		2,170,076	3,272,683	
B. Indirect Cost		lump	1		3,638,602		7,161,252	10,799,854	
Unforeseen	A.* 5%	lump	1		606,434		1,193,542	1,799,976	
Overhead	A.*10%	lump	1		1,212,867		2,387,084	3,599,951	
Profit	A.*15%	lump	1		1,819,301		3,580,626	5,399,927	
C. Construction Cost	A.+B.	lump	1		15,767,275		31,032,091	46,799,366	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(5)

5. San Juan Main Drainage km13 (W=13 m, D=3 m, L=3.665 km) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		832,313		1,543,738	2,376,050	
(1) Earth Work		lump	1		416,394		771,648	1,188,042	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	109,950	1.40	153,930	2.31	253,985	407,915	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	45,409	2.08	94,451	5.32	241,576	336,027	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	45,409	2.88	130,778	5.08	230,678	361,456	W-8
Surplus Soil Filling	Bulldozer 15T	m3	45,409	0.82	37,235	1.00	45,409	82,644	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3m	C.Gravel, t=20cm	m2	0	19.85	0	1.56	0	0	W-4
(2) Structural Construction		lump	1		277,200		514,800	792,000	
Bridge (1)	L=16.5m x W=8.0m	m2	132	2,100.00	277,200	3,900.00	514,800	792,000	
Bridge (2)		m2		0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		138,719		257,290	396,008	
B. Indirect Cost		lump	1		249,694		463,122	712,816	
Unforeseen	A.* 5%	lump	1		41,616		77,187	118,803	
Overhead	A.*10%	lump	1		83,231		154,374	237,605	
Profit	A.*15%	lump	1		124,847		231,561	356,408	
C. Construction Cost	A.+B.	lump	1		1,082,007		2,006,860	3,088,866	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(6)

6. San Juan Main Drainage km17 (W=12 m, D=3 m, L=3.857 km) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		894,392		1,658,413	2,552,806	
(1) Earth Work		lump	1		434,527		804,811	1,239,338	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	115,710	1.40	161,994	2.31	267,290	429,284	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	47,151	2.08	98,074	5.32	250,843	348,917	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	47,151	2.88	135,795	5.08	239,527	375,322	W-8
Surplus Soil Filling	Bulldozer 15T	m3	47,151	0.82	38,664	1.00	47,151	85,815	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
Operation Road B=3m	C.Gravel, t=20cm	m2	0	19.85	0	1.56	0	0	W-4-S
(2) Structural Construction		lump	1		310,800		577,200	888,000	
Bridge (1)	L=18.5m x W=8.0m	m2	148	2,100.00	310,800	3,900.00	577,200	888,000	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		149,065		276,402	425,468	
B. Indirect Cost		lump	1		268,318		497,524	765,842	
Unforeseen	A.* 5%	lump	1		44,720		82,921	127,641	
Overhead	A.*10%	lump	1		89,439		165,841	255,280	
Profit	A.*15%	lump	1		134,159		248,762	382,921	
C. Construction Cost	A.+B.	lump	1		1,162,710		2,155,937	3,318,648	
D. Land Acquisition		ha	0	1,186,780.00	0	3,185.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(7)

7. San Juan Main Drainage km11 (W=12 m, D=3 m, L=2.409 km) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		315,682		448,162	763,843	
(1) Earth Work		lump	1		263,068		373,468	636,536	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	72,270	1.40	101,178	2.31	166,944	268,122	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	3,259	2.08	6,779	5.32	17,338	24,117	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	3,259	2.88	9,386	5.08	16,556	25,942	W-8
Surplus Soil Filling	Bulldozer 15T	m3	3,259	0.82	2,672	1.00	3,259	5,931	W-7-1
Slope Forming	Hoe 0.6m3	m2	26,057	5.49	143,053	6.50	169,371	312,424	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	19.85	0	1.56	0	0	W-4-S
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		52,614		74,694	127,307	
B. Indirect Cost		lump	1		94,704		134,448	229,152	
Unforeseen	A.* 5%	lump	1		15,784		22,408	38,192	
Overhead	A.*10%	lump	1		31,568		44,816	76,384	
Profit	A.*15%	lump	1		47,352		67,224	114,576	
C. Construction Cost	A.+B.	lump	1		410,386		582,610	992,995	
D. Land Acquisition		ha	0	0.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(8)

8. San Juan Main Drainage km15 (W=13 m, D=3 m, L=8.927 km) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		1,233,822		1,786,975	3,020,797	
(1) Earth Work		lump	1		1,028,185		1,489,146	2,517,331	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	267,810	1.40	374,934	2.31	618,641	993,575	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	21,304	2.08	44,312	5.32	113,337	157,649	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	21,304	2.88	61,356	5.08	108,224	169,580	W-8
Surplus Soil Filling	Bulldozer 15T	m3	21,304	0.82	17,469	1.00	21,304	38,773	W-7-1
Slope Forming	Hoe 0.6m3	m2	96,560	5.49	530,114	6.50	627,640	1,157,754	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	19.85	0	1.56	0	0	W-4-S
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		205,637		297,829	503,466	
B. Indirect Cost		lump	1		370,146		536,093	906,239	
Unforeseen	A.* 5%	lump	1		61,691		89,349	151,040	
Overhead	A.*10%	lump	1		123,382		178,698	302,080	
Profit	A.*15%	lump	1		185,073		268,046	453,119	
C. Construction Cost	A.+B.	lump	1		1,603,968		2,323,068	3,927,036	
D. Land Acquisition		ha	0	0.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(9)

9. San Juan Main Drainage km24 (W= - m, D= - m, L=5.584 km) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		748,549		1,017,416	1,765,966	
(1) Earth Work		lump	1		623,791		847,847	1,471,638	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	167,520	1.40	234,528	2.31	386,971	621,499	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	0	2.08	0	5.32	0	0	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	0	2.88	0	5.08	0	0	W-8
Surplus Soil Filling	Bulldozer 15T	m3	0	0.82	0	1.00	0	0	W-7-1
Slope Forming	Hoe 0.6m3	m2	70,904	5.49	389,263	6.50	460,876	850,139	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	19.85	0	1.56	0	0	W-4-S
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		124,758		169,569	294,328	
B. Indirect Cost		lump	1		224,564		305,225	529,789	
Unforeseen	A.* 5%	lump	1		37,427		50,871	88,298	
Overhead	A.*10%	lump	1		74,855		101,742	176,597	
Profit	A.*15%	lump	1		112,282		152,612	264,894	
C. Construction Cost	A.+B.	lump	1		973,113		1,322,641	2,295,755	
D. Land Acquisition		ha	0	0.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(10)

10. San Juan Main Drainage km28 (W=9 m, D=2 m, L=10.552 km) - SAN JUAN

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		1,089,547		1,582,324	2,671,871	
(1) Earth Work		lump	1		907,956		1,318,603	2,226,559	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	316,560	1.40	443,184	2.31	731,254	1,174,438	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	8,136	2.08	16,923	5.32	43,284	60,207	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	8,136	2.88	23,432	5.08	41,331	64,763	W-8
Surplus Soil Filling	Bulldozer 15T	m3	8,136	0.82	6,672	1.00	8,136	14,808	W-7-1
Slope Forming	Hoe 0.6m3	m2	76,092	5.49	417,745	6.50	494,598	912,343	W-6
Operation Road B=3.5m	C.Gravel, t=20cm	m2	0	19.85	0	1.56	0	0	W-4-S
(2) Structural Construction		lump	1		0		0	0	
Bridge (1)		m2	0	0.00	0	0.00	0	0	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		181,591		263,721	445,312	
B. Indirect Cost		lump	1		326,864		474,697	801,561	
Unforeseen	A.* 5%	lump	1		54,477		79,116	133,593	
Overhead	A.*10%	lump	1		108,955		158,232	267,187	
Profit	A.*15%	lump	1		163,432		237,349	400,781	
C. Construction Cost	A.+B.	lump	1		1,416,411		2,057,021	3,473,432	
D. Land Acquisition		ha	0	0.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(11)

11. Arroyo Tejeria (W=22 m, D=4 m, L=8.160 km) - SAN JUAN Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		1,671,756		3,107,208	4,778,964	
(1) Earth Work		lump	1		977,330		1,817,140	2,794,470	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	244,800	1.40	342,720	2.31	565,488	908,208	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	109,794	2.08	228,372	5.32	584,104	812,476	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	109,794	2.88	316,207	5.08	557,754	873,961	W-8
Surplus Soil Filling	Bulldozer 15T	m3	109,794	0.82	90,031	1.00	109,794	199,825	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		415,800		772,200	1,188,000	
Bridge (1)	L=27.5m x W=8.0m	m2	220	1,890.00	415,800	3,510.00	772,200	1,188,000	
Bridge (2)		m2	0	0.00	0	0.00	0	0	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		278,626		517,868	796,494	
B. Indirect Cost		lump	1		501,527		932,162	1,433,689	
Unforeseen	A.* 5%	lump	1		83,588		155,360	238,948	
Overhead	A.*10%	lump	1		167,176		310,721	477,897	
Profit	A.*15%	lump	1		250,763		466,081	716,844	
C. Construction Cost	A.+B.	lump	1		2,173,283		4,039,370	6,212,653	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.35 COST ESTIMATION OF MAIN DRAINAGE IMPROVEMENT(12)

12. Antofagasta Main Drainage (W=28-25 m, D=4 m, L=8.797 km) - ANTOFAGASTA

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		4,265,072		8,175,134	12,440,207	
(1) Earth Work		lump	1		2,873,827		5,549,012	8,422,839	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	263,910	1.40	369,474	2.31	609,632	979,106	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	433,279	2.08	901,220	5.32	2,305,044	3,206,264	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	433,279	2.88	1,247,844	5.08	2,201,057	3,448,901	W-8
Surplus Soil Filling	Bulldozer 15T	m3	433,279	0.82	355,289	1.00	433,279	788,568	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		680,400		1,263,600	1,944,000	
Bridge (1)	L=35.5m x W=5.5m	m2	195	1,890.00	368,550	3,510.00	684,450	1,053,000	
Bridge (2)	L=30.0m x W=5.5m	m2	165	1,890.00	311,850	3,510.00	579,150	891,000	
Bridge (3)		m2	0	0.00	0	0.00	0	0	
Bridge (4)		m2	0	0.00	0	0.00	0	0	
(3) Preparatory Works	((1)+(2))*20%	lump	1		710,845		1,362,522	2,073,368	
B. Indirect Cost		lump	1		1,279,522		2,452,540	3,732,062	
Unforeseen	A.* 5%	lump	1		213,254		408,757	622,011	
Overhead	A.*10%	lump	1		426,507		817,513	1,244,020	
Profit	A.*15%	lump	1		639,761		1,226,270	1,866,031	
C. Construction Cost	A.+B.	lump	1		5,544,594		10,627,674	16,172,269	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.36 COST ESTIMATION OF ROAD CUM EMBANKMENT

1. Road-cum-embankment (W=9.1 m, L=9.0 km) - SAN JUAN – ANTOFAGASTA

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		2,486,736		1,044,188	3,530,924	
(1) Earth Work		lump	1		2,072,280		870,157	2,942,437	
Base-Layer Placing		m2	73,710	0.71	52,334	0.84	61,916	114,250	W-10
Soil Excavation	Bulldozer 15T	m3	163,400	1.15	187,910	2.93	478,762	666,672	W-2
Soil Excavation	Hoe 0.6m3	m3	0	2.08	0	5.32	0	0	W-3
Soil Transportation	D.Truck 11T,L=0.5km	m3	0	2.88	0	5.08	0	0	W-8
Roadbed Compaction	Bulldozer 15T	m3	36,528	1.83	66,846	4.67	170,586	237,432	W-7-1
Base Course	C.Gravel, t=20cm	m2	34,398	19.85	682,862	1.56	53,706	736,568	W-4-S
Base Course	C.Stone, t=15cm	m2	58,968	18.35	1,082,328	1.78	105,187	1,187,515	W-5-S
Slope Forming		m2	0	5.49	0	6.50	0	0	W-6
(2) Preparatory Works	(1)*20%	lump	1		414,456		174,031	588,487	
B. Indirect Cost		lump	1		746,021		313,256	1,059,277	
Unforeseen	A.* 5%	lump	1		124,337		52,209	176,546	
Overhead	A.*10%	lump	1		248,674		104,419	353,093	
Profit	A.*15%	lump	1		373,010		156,628	529,638	
C. Construction Cost	A.+B.	lump	1		3,232,757		1,357,444	4,590,201	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.37 COST ESTIMATION OF SECONDARY DRAINAGE IMPROVEMENT(1)

1. Rio Pailon (W=12.0 m, D=3.0 m, L=18.5 km) - CHANE－PAILON

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		2,996,978		4,562,910	7,559,888	
(1) Earth Work		lump	1		1,207,125		2,630,700	3,837,825	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	0	1.40	0	2.31	0	0	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	416,250	2.08	865,800	5.32	2,214,450	3,080,250	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	0	2.88	0	5.08	0	0	W-8
Surplus Soil Filling	Bulldozer 15T	m3	416,250	0.82	341,325	1.00	416,250	757,575	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		1,517,400		1,517,400	3,034,800	
Box culvert (1)	3.5m x 3.0m x 2	lump	9	168,600.00	1,517,400	168,600.00	1,517,400	3,034,800	
Box culvert (2)		lump	0	0.00	0	0.00	0	0	
(3) Prepratory Works	((1)+(2))*10%	lump	1		272,453		414,810	687,263	
B. Indirect Cost		lump	1		899,094		1,368,874	2,267,968	
Uniforseen	A.* 5%	lump	1		149,849		228,146	377,995	
Overhead	A.*10%	lump	1		299,698		456,291	755,989	
Profit	A.*15%	lump	1		449,547		684,437	1,133,984	
C. Construction Cost	A.+B.	lump	1		3,896,072		5,931,784	9,827,856	
D. Land Acquisition		ha	0	1,458.00	0	0.00	0	0	

TABLE D.1.37 COST ESTIMATION OF SECONDARY DRAINAGE IMPROVEMENT(2)

2. Okinawa (W=12.0 m, D=3.0 m, L=35.5 km) - CHANE – PAILON Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		5,700,833		10,533,270	16,234,103	
(1) Earth Work		lump	1		2,316,375		6,709,500	9,025,875	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	0	1.40	0	2.31	0	0	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	798,750	2.08	1,661,400	7.40	5,910,750	7,572,150	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	0	2.88	0	5.08	0	0	W-8
Surplus Soil Filling	Bulldozer 15T	m3	798,750	0.82	654,975	1.00	798,750	1,453,725	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		2,866,200		2,866,200	5,732,400	
Box culvert (1)	3.5m x 3.0m x 2	lump	17	168,600.00	2,866,200	168,600.00	2,866,200	5,732,400	
Box culvert (2)		lump	0	0.00	0	0.00	0	0	
(3) Prepratory Works	((1)+(2))*10%	lump	1		518,258		957,570	1,475,828	
B. Indirect Cost		lump	1		1,710,250		3,159,982	4,870,232	
Uniforseen	A.* 5%	lump	1		285,042		526,664	811,706	
Overhead	A.*10%	lump	1		570,083		1,053,327	1,623,410	
Profit	A.*15%	lump	1		855,125		1,579,991	2,435,116	
C. Construction Cost	A.+B.	lump	1		7,411,083		13,693,252	21,104,335	
D. Land Acquisition		ha	0	5,550.00	0	0.00	0	0	

TABLE D.1.37 COST ESTIMATION OF SECONDARY DRAINAGE IMPROVEMENT(3)

Unit : Bs.

3. San Juan (W=14.0 m, D=3.0 m, L=9.0 km) - SAN JUAN – ANTOFAGASTA

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		7,638,588		11,732,328	19,370,916	
(1) Earth Work		lump	1		2,892,750		6,304,200	9,196,950	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	0	1.40	0	2.31	0	0	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	997,500	2.08	2,074,800	5.32	5,306,700	7,381,500	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	0	2.88	0	5.08	0	0	W-8
Surplus Soil Filling	Bulldozer 15T	m3	997,500	0.82	817,950	1.00	997,500	1,815,450	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		3,472,740		3,472,740	6,945,480	
Box culvert (1)	3.0m x 3.0m x 3	lump	18	192,930.00	3,472,740	192,930.00	3,472,740	6,945,480	
Box culvert (2)		lump	0	0.00	0	0.00	0	0	
(3) Prepratory Works	((1)+(2))*20%	lump	1		1,273,098		1,955,388	3,228,486	
B. Indirect Cost		lump	1		2,291,576		3,519,698	5,811,274	
Uniforseen	A.* 5%	lump	1		381,929		586,616	968,545	
Overhead	A.*10%	lump	1		763,859		1,173,233	1,937,092	
Profit	A.*15%	lump	1		1,145,788		1,759,849	2,905,637	
C. Construction Cost	A.+B.	lump	1		9,930,164		15,252,026	25,182,190	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.37 COST ESTIMATION OF SECONDARY DRAINAGE IMPROVEMENT(4)

4. Antofagasta (W=14.0 m, D=3.0 m, L=21.0 km) - SAN JUAN – ANTOFAGASTA

Unit : Bs.

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Unit Cost	Cost	Unit Cost	Cost		
A. Direct Cost		lump	1		8,333,255		12,427,134	20,760,389	
(1) Earth Work		lump	1		2,892,849		6,304,415	9,197,264	
Clearing & Grubbing	Buck hoe & Bulldozer	m2	0	1.40	0	2.31	0	0	W-1
Soil Excavation	Bulldozer 15T	m3	0	1.15	0	2.93	0	0	W-2
Soil Excavation	Hoe 0.6m3	m3	997,534	2.08	2,074,871	5.32	5,306,881	7,381,752	W-3
Soil Transportation	D. Truck 11T, L=0.5km	m3	0	2.88	0	5.08	0	0	W-8
Surplus Soil Filling	Bulldozer 15T	m3	997,534	0.82	817,978	1.00	997,534	1,815,512	W-7-1
Slope Forming	Hoe 0.6m3	m2	0	5.49	0	6.50	0	0	W-6
(2) Structural Construction		lump	1		4,051,530		4,051,530	8,103,060	
Box culvert (1)	3.0m x 3.0m x 3	lump	21	192,930.00	4,051,530	192,930.00	4,051,530	8,103,060	
Box culvert (2)		lump	0	0.00	0	0.00	0	0	
(3) Prepratory Works	((1)+(2))*20%	lump	1		1,388,876		2,071,189	3,460,065	
B. Indirect Cost		lump	1		2,499,976		3,728,140	6,228,116	
Uniforseen	A.* 5%	lump	1		416,663		621,357	1,038,020	
Overhead	A.*10%	lump	1		833,325		1,242,713	2,076,038	
Profit	A.*15%	lump	1		1,249,988		1,864,070	3,114,058	
C. Construction Cost	A.+B.	lump	1		10,833,231		16,155,274	26,988,505	
D. Land Acquisition		ha	0	3,330.00	0	0.00	0	0	

TABLE D.1.38 SUMMARY OF CONSTURUCTION UNIT COST

Unit : Bs.

No.	Item	Specification	Unit	Unit Cost			Reference
				L/P	F/P	Total	
E-1	Truck Operation	10T	hour	53.47	88.00	141.47	
E-2	Concrete Pump Truck	90-110m3/H	hour	69.75	345.42	415.17	
E-3	Tracktor Shovel	1.8 m3	hour	37.26	222.00	259.26	
E-4	Water Truck	10.0 m3	hour	191.27	145.00	336.27	
E-5	Concrete Plant Operation	30M3	hour	19.92	17.23	37.15	
E-6	Macadam Roller	10.0 T	hour	59.96	114.00	173.96	
E-7	Motor Grader	3.1M	hour	57.38	134.00	191.38	
E-8	Buck Hoe	0.6m3	hour	79.62	203.00	282.62	
E-9	Dump Truck	11T	hour	51.50	91.00	142.50	
E-10	Rubber Tire Roller	8-20T	hour	48.95	121.00	169.95	
E-11	Tamper Operation	60kg	day	82.46	48.00	130.46	
E-12	Bulldozer	15T	hour	87.93	224.00	311.93	
E-13	Clamshell	0.6 m3	hour	76.38	223.00	299.38	
E-14	Truck Crane	15T	hour	45.29	244.00	289.29	
M-1	Concrete Mixing	σ=180(kg/cm2)	m3	352.88	17.23	370.11	
M-2	〃	σ=240(kg/cm2)	m3	434.69	30.83	465.52	
M-3	〃	σ=350(kg/cm2)	m3	507.99	56.33	564.32	
W-1	Clearing & Grubbing	Dozer & Hoe	m2	1.40	2.31	3.71	
W-2	Excavation	Bulldozer 15T	m3	1.15	2.93	4.08	
W-3	Excavation	Buckhoe 0.6m3	m3	2.08	5.32	7.40	
W-4	Road Base Course	t=20cm	m2	39.78	1.56	41.34	
W-4-S	Road Base Course	t=20cm	m2	19.85	1.56	21.41	San Juan
W-5	Road Base Course	t=15cm	m2	36.39	1.78	38.17	
W-5-S	Road Base Course	t=15cm	m2	18.35	1.78	20.14	San Juan
W-6	Slope Forming	Hoe 0.6m3	m2	5.49	6.50	11.99	
W-7-1	Surplus Soil Filling	Bulldozer15T	m3	0.82	1.00	1.82	
W-7-2	Roadbed Compaction	Bulldozer 15T	m3	1.83	4.67	6.50	
W-8	Soil Transportation	L=0.5Km	m3	2.88	5.08	7.96	
W-8	〃	L=1.0Km	m3	3.25	5.74	8.99	
W-8	〃	L=2.0Km	m3	4.00	7.07	11.07	
W-8	〃	L=3.0Km	m3	4.75	8.39	13.14	
W-8	〃	L=4.0Km	m3	5.50	9.72	15.22	
W-8	〃	L=5.0Km	m3	6.25	11.04	17.29	
W-9	Excavation Transportation	L=1.0Km	m3	6.48	13.99	20.47	
W-10	Base Layer Placing		m2	0.71	0.84	1.55	
W-11	Steel Bar Bend & Placing		ton	1,257.25	3,445.00	4,702.25	
W-12	Forming		m2	101.56	0.00	101.56	
W-13	Concrete Placing	σ=180kg/cm2	m3	383.82	57.18	441.00	
W-14	〃	σ=240kg/cm2	m3	468.11	71.19	539.30	
W-15	〃	σ=350kg/cm2	m3	547.57	113.85	661.42	
W-16	Concrete Curing		m3	8.80	0.00	8.80	
W-17	Gabion Mat	t=30cm	m2	220.16	54.78	274.94	
W-18	Fundation Bed Stone	Crushed	m3	256.35	0.00	256.35	
W-19	Excavation	Hoe 0.6m3	m3	2.19	5.58	7.77	
W-20	Embankment	Bulldozer t=20cm	m3	2.64	5.11	7.75	
W-21	Filling	Manpower	m3	25.24	13.48	38.72	

TABLE D.1.39 UNIT COST(1)

E-1 **TRUCK OPERATION (11T)** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Driver B		person	0.21	117.00	24.57	0.00	0.00	24.57	
Material									
Fuel	Light oil	liter	11.20	2.58	28.90	0.00	0.00	28.90	
Other Oil		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Equipment									
Truck	311HP	hour	1.00	0.00	0.00	88.00	88.00	88.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					53.47		88.00	141.47	
%					0.38		0.62	1.00	

E-2 **CONCRETE PUMP TRUCK** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator Class D		person	0.21	120.00	25.20	0.00	0.00	25.20	
Material									
Fuel	Light oil	liter	17.00	2.58	43.86	0.00	0.00	43.86	
Equipment									
Pump Truck		hour	1.00	0.00	0.00	342.00	342.00	342.00	
Sundries	1%	lump	1.00	0.69	0.69	3.42	3.42	4.11	
Total					69.75		345.42	415.17	
%					0.17		0.83	1.00	

E-3 **TRACTOR SHOVEL (1.8 m3)** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator B	Tractor Shovel	person	0.21	159.00	33.39	0.00	0.00	33.39	
Material									
Fuel	Light oil	liter	1.50	2.58	3.87	0.00	0.00	3.87	
Other Oil		lump	0.00	0.00	0.00	0.00	0.00	0.00	
Equipment									
Tractor Shovel	1.8 M3	hour	1.00	0.00	0.00	222.00	222.00	222.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					37.26		222.00	259.26	
%					0.14		0.86	1.00	

E-4 **WATER TRUCK (10.0 m3)** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Driver B	Truck	person	0.21	117.00	24.57	0.00	0.00	24.57	
Material									
Fuel	Light oil	liter	8.41	2.58	21.70	0.00	0.00	21.70	
Other Oil		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Equipoment									
Water Truck	290HP	hour	1.00	145.00	145.00	145.00	145.00	290.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					191.27		145.00	336.27	
%					0.57		0.43	1.00	

TABLE D.1.39 UNIT COST(2)

E-5 CONCRETE PLANT OPERATION (30 M3) Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator C		person	0.21	142.00	29.82	0.00	0.00	29.82	
Foreman		person	0.77	130.00	100.10	0.00	0.00	100.10	
Heper B		person	2.57	80.00	205.60	0.00	0.00	205.60	
Material									
Fuel	Light oil	liter	13.00	2.58	33.54	0.00	0.00	33.54	
Equipment									
Concrete Plant	30M3/hr.	hour	1.00	0.00	0.00	150.00	150.00	150.00	
Tractor Shover	1.8 M3	hour	1.00	37.26	37.26	222.00	222.00	259.26	E-3
Water Tanck	10 M3	hour	1.00	191.27	191.27	145.00	145.00	336.27	E-4
Sundries		lump	0.00	0.00	0.00	0.00	0.00	0.00	
Total		m3	30.00		597.59		517.00	1,114.59	
		m3	1.00		19.92		17.23	37.15	
%					0.54		0.46	1.00	

E-6 MACADAM ROLLER (10 T) Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator B	Mcadam roller	person	0.21	159.00	33.39	0.00	0.00	33.39	
Material									
Fuel	Light oil	liter	10.30	2.58	26.57	0.00	0.00	26.57	
Other Oil		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Equipment									
Macadam Roller	(10T)	hour	1.00	0.00	0.00	114.00	114.00	114.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					59.96		114.00	173.96	
%					0.34		0.66	1.00	

E-7 MOTOR GRADER (3.1 M) Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator B		person	0.21	159.00	33.39	0.00	0.00	33.39	
Material									
Fuel	Light oil	liter	9.30	2.58	23.99	0.00	0.00	23.99	
Other Oil		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Equipment									
Motor Grader	3.1M	hour	1.00	0.00	0.00	134.00	134.00	134.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					57.38		134.00	191.38	
%					0.30		0.70	1.00	

E-8 BACK HOE (0.6 M3) Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator B		person	0.21	159.00	33.39	0.00	0.00	33.39	
Material									
Fuel	Light oil	liter	17.40	2.58	44.89	0.00	0.00	44.89	
Other Oil		lump	1.00	1.34	1.34	0.00	0.00	1.34	
Equipment									
Back Hoe	0.6M3	hour	1.00	0.00	0.00	203.00	203.00	203.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					79.62		203.00	282.62	
%					0.28		0.72	1.00	

TABLE D.1.39 UNIT COST(3)

E-9 **DUMP TRUCK OPERATION (11 T)** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Driver A		person	0.15	106.00	15.90	0.00	0.00	15.90	
Material									
Fuel	Light oil	liter	13.40	2.58	34.57	0.00	0.00	34.57	
Other Oil		lump	1.00	1.03	1.03	0.00	0.00	1.03	
Equipment									
Dump Truck	11T	hour	1.00	0.00	0.00	91.00	91.00	91.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					51.50		91.00	142.50	
%					0.36		0.64	1.00	

E-10 **RUBBER TIRED ROLLER (8 - 20 T)** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator C		person	0.21	142.00	29.82	0.00	0.00	29.82	
Material									
Fuel	Light oil	liter	7.20	2.58	18.58	0.00	0.00	18.58	
Other Oil		lump	1.00	0.55	0.55	0.00	0.00	0.55	
Equipment									
Rubber Tired Roller	8-20T	hour	1.00	0.00	0.00	121.00	121.00	121.00	
		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					48.95		121.00	169.95	
%					0.29		0.71	1.00	

E-11 **TAMPER OPERATION (60 Kg)** Unit : Bs./Da

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper B		person	1.00	80.00	80.00	0.00	0.00	80.00	
Material									
Fuel	Light oil	liter	0.90	2.58	2.32	0.00	0.00	2.32	
Other Oil		lump	1.00	0.14	0.14	0.00	0.00	0.14	
Equipment									
Tamper	60Kg	day	1.00	0.00	0.00	48.00	48.00	48.00	
Total					82.46		48.00	130.46	
%					0.63		0.37	1.00	

E-12 **BULLDOZER (15 T)** Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator A		person	0.21	172.00	36.12	0.00	0.00	36.12	
Material							0.00		
Fuel	Light oil	liter	19.50	2.58	50.31	0.00	0.00	50.31	
Other Oil		lump	1.00	1.50	1.50	0.00	0.00	1.50	
Equipment							0.00		
Bulldozer	15T	hour	1.00	0.00	0.00	224.00	224.00	224.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					87.93		224.00	311.93	
%					0.28		0.72	1.00	

TABLE D.1.39 UNIT COST(4)

E-13 CLAMSHELL (0.6 M3) Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Operator B		person	0.21	159.00	33.39	0.00	0.00	33.39	
Material							0.00		
Fuel	Light oil	liter	15.87	2.58	40.94	0.00	0.00	40.94	
Other Oil	5%xFuel	lump	1.00	2.05	2.05	0.00	0.00	2.05	
Equipment							0.00		
Clamshell	0.6M3	hour	1.00	0.00	0.00	223.00	223.00	223.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					76.38		223.00	299.38	
%					0.26		0.74	1.00	

E-14 TRUCK CRANE (13 T) Unit : Bs./Hr.

Item	Specification	Unit	Volume	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Driver A		person	0.21	106.00	22.26	0.00	0.00	22.26	
Material							0.00		
Fuel	Light oil	liter	8.50	2.58	21.93	0.00	0.00	21.93	
Other Oil	5% x Fuel	lump	1.00	1.10	1.10	0.00	0.00	1.10	
Equipment							0.00		
Truck Creane	15T	hour	1.00	0.00	0.00	244.00	244.00	244.00	
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total					45.29		244.00	289.29	
%					0.16		0.84	1.00	

TABLE D.1.39 UNIT COST(5)

M-1 **CONCRETE MIXING (180 kg/cm2)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Material									
Cement	Poltland	kg	222.00	0.69	153.18	0.00	0.00	153.18	
Aggregate		m3	0.69	156.50	107.99	0.00	0.00	107.99	
Sand		m3	0.49	146.50	71.79	0.00	0.00	71.79	
Admixture		kg	0.00	0.00	0.00	17.00	0.00	0.00	
Equipo							0.00		
Plant		m3	1.00	19.92	19.92	17.23	17.23	37.15	E-5
Total		m3	1.00		352.88		17.23	370.11	
%		%			0.95		0.05	1.00	

M-2 **CONCRETE MIXING (240 kg/cm2)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Material									
Cement	Poltland	kg	323.00	0.69	222.87	0.00	0.00	222.87	
Aggregate		m3	0.73	156.50	114.25	0.00	0.00	114.25	
Sand		m3	0.53	146.50	77.65	0.00	0.00	77.65	
Admixture		kg	0.80	0.00	0.00	17.00	13.60	13.60	
Equipo							0.00		
Plant	Operaition	m3	1.00	19.92	19.92	17.23	17.23	37.15	E-5
Total		m3	1.00		434.69		30.83	465.52	
%		%			0.93		0.07	1.00	

M-3 **CONCRETE MIXING (350 kg/cm2)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Material									
Cement		kg	455.00	0.69	313.95	0.00	0.00	313.95	
Aggregate		m3	0.71	156.50	111.12	0.00	0.00	111.12	
Sand		m3	0.43	146.50	63.00	0.00	0.00	63.00	
Admixture		kg	2.30	0.00	0.00	17.00	39.10	39.10	
Equipo							0.00		
Plant		hour	1.00	19.92	19.92	17.23	17.23	37.15	E-5
Total					507.99		56.33	564.32	
%					0.90		0.10	1.00	

TABLE D.1.39 UNIT COST(6)

W-1 CLEARING & GRUBBING — Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.76	130.00	98.80	0.00	0.00	98.80	
Herper A		person	0.88	106.00	93.28	0.00	0.00	93.28	
Herper B		person	3.32	80.00	265.60	0.00	0.00	265.60	
Sundries	8% x Labor	lump	1.00	36.61	36.61	0.00	0.00	36.61	
	Subtotal				494.29		0.00	494.29	
Equipment									
Bulldozer	15T	hour	6.40	87.93	562.75	224.00	1,433.60	1,996.35	E-12
Buck Hoe	0.6M3	hour	4.30	79.62	342.37	203.00	872.90	1,215.27	E-8
	Subtotal				905.12		2,306.50	3,211.62	
Total		m2	1,000.00		1,399.41		2,306.50	3,705.91	
		m2	1.00		1.40		2.31	3.71	
%					0.38		0.62	1.00	

W-2 EXCAVATION (BULLDOZER 15T) — Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Equipment									
Bulldozer	15T	hour	1.00	87.93	87.93	224.00	224.00	311.93	E-12
Total		m3	76.39		87.93		224.00	311.93	
		m3	1.00		1.15		2.93	4.08	
%					0.28		0.72	1.00	

Bulldozer 15T (Extrusion)

Q=60*q*f*e/Cm Q=60*1.73*1.0*0.8/1.087=76.39 (m3/H)

q=1.73

f-1.0

e=0.80

Cm=0.27*1.+0.79=0.27*1.1m+0.79=1.087

W-3 EXCAVETION (BACK HOE 0.6M3 — Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Equipment									
Buck Hoe	0.6M3	hour	1.00	79.62	79.62	203.00	203.00	282.62	E-8
Total		m3	38.19		79.62		203.00	282.62	
		m3	1.00		2.08		5.32	7.40	
%					0.28		0.72	1.00	

Buck Hoe

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

q=0.59m3

f=1/1.2=0.83

E=0.65

Cm=30sec

W-4 SUB BASE COURSE (t=20cm) — Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper B		person	0.51	80.00	40.80	0.00	0.00	40.80	
Material									
Crushed Gravel		m3	24.60	156.00	3,837.60	0.00	0.00	3,837.60	
Equipment									
Motor Grader	3.1M	hour	0.32	57.38	18.36	134.00	42.88	61.24	E-7
Tired Roller	8-20T	hour	0.34	48.95	16.64	121.00	41.14	57.78	E-10
Water Truck	10.0M3	hour	0.23	191.27	43.99	145.00	33.35	77.34	E-4
Macadam Roller	10T	hour	0.34	59.96	20.39	114.00	38.76	59.15	E-6
Total		m2	100.00		3,977.78		156.13	4,133.91	
		m2	1.00		39.78		1.56	41.34	
%					0.96		0.04	1.00	

TABLE D.1.39 UNIT COST(7)

W-4-S **SUB BASE COURSE** (t=20cm) Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper B		person	0.51	80.00	40.80	0.00	0.00	40.80	
Material									
Crushed Gravel		m3	24.60	75.00	1,845.00	0.00	0.00	1,845.00	
Equipment									
Motor Grader	3.1M	hour	0.32	57.38	18.36	134.00	42.88	61.24	E-7
Tired Roller	8-20T	hour	0.34	48.95	16.64	121.00	41.14	57.78	E-10
Water Truck	10.0M3	hour	0.23	191.27	43.99	145.00	33.35	77.34	E-4
Macadam Roller	10T	hour	0.34	59.96	20.39	114.00	38.76	59.15	E-6
Total		m2	100.00		1,985.18		156.13	2,141.31	
		m2	1.00		19.85		1.56	21.41	
%					0.93		0.07	1.00	

W-5 **BASE COURSE** (T=15cm) Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper B		person	0.66	80.00	52.80	0.00	0.00	52.80	
Material									
Crushd Stone		m3	20.85	166.50	3,471.53	0.00	0.00	3,471.53	
Equipment									
Motor Grader	3.1M	hour	0.32	57.38	18.36	134.00	42.88	61.24	E-7
Rubber Tired Roller	8-20T	hour	0.41	48.95	20.07	121.00	49.61	69.68	E-10
Water Truck	10M3	hour	0.27	191.27	51.64	145.00	39.15	90.79	E-4
Macadam Roller	10T	hour	0.41	59.96	24.58	114.00	46.74	71.32	E-6
Total		m2	100.00		3,638.98		178.38	3,817.36	
		m2	1.00		36.39		1.78	38.17	
%		%			0.95		0.05	1.00	

W-5-S **BASE COURSE** (T=15cm) Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper B		person	0.66	80.00	52.80	0.00	0.00	52.80	
Material									
Crushd Stone		m3	20.85	80.00	1,668.00	0.00	0.00	1,668.00	
Equipment									
Motor Grader	3.1M	hour	0.32	57.38	18.36	134.00	42.88	61.24	E-7
Rubber Tired Roller	8-20T	hour	0.41	48.95	20.07	121.00	49.61	69.68	E-10
Water Truck	10M3	hour	0.27	191.27	51.64	145.00	39.15	90.79	E-4
Macadam Roller	10T	hour	0.41	59.96	24.58	114.00	46.74	71.32	E-6
Total		m2	100.00		1,835.45		178.38	2,013.83	
		m2	1.00		18.35		1.78	20.14	
%		%			0.91		0.09	1.00	

W-6 **SLOPE FORMING** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.60	130.00	78.00	0.00	0.00	78.00	
Helper B		person	2.70	80.00	216.00	0.00	0.00	216.00	
Eqipment									
Buck Hoe	0.6M3	hour	3.20	79.62	254.78	203.00	649.60	904.38	E-8
Total		m3	100.00		548.78		649.60	1,198.38	
		m3	1.00		5.49		6.50	11.98	
%		%			0.46		0.54	1.00	

TABLE D.1.39 UNIT COST(8)

W-7-1 SURPLUS SOIL FILLING Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Herper B		person	1.20	80.00	96.00	0.00	0.00	96.00	
Equipment							0.00		
Bulldozer	15T	hour	1.00	87.93	87.93	224.00	224.00	311.93	E-12
Total		m3	224.00		183.93		224.00	407.93	
		m3	1.00		0.82		1.00	1.82	
%		%			0.45		0.55	1.00	

Bulldozer (15T)
Q=3500*W*D*E/N Q=3500*0.80*0.20*0.6/1.5=224.00 m3/hour
W=0.80m
D=0.20m
E=0.6
N=1.5

W-7-2 ROADBED COMPACTION (t=20cm) Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Herper B		person	1.20	0.00	0.00	0.00	0.00	0.00	
Equipment							0.00		
Bulldozer	15T	hour	1.00	87.93	87.93	224.00	224.00	311.93	E-12
Total		m3	48.00		87.93		224.00	311.93	
		m3	1.00		1.83		4.67	6.50	
%		%			0.28		0.72	1.00	

Bulldozer (15T)
Q=3500*W*D*E/N Q=3500*0.80*0.20*0.6/7=48.00m3/hour
W=0.80m
D=0.20m
E=0.6
N=7

W-8 SOIL TRANPORTATION (D. TRUCK 11T) Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Equipment									
D. Truck 11T		hour	1	51.50	51.50	91.00	91.00	142.50	E-9
0.5 km	17.90	m3	1.00	2.88	2.88	5.08	5.08	7.96	
1.0 km	15.84	m3	1.00	3.25	3.25	5.74	5.74	8.99	
2.0 km	12.87	m3	1.00	4.00	4.00	7.07	7.07	11.07	
3.0 km	10.84	m3	1.00	4.75	4.75	8.39	8.39	13.14	
4.0 km	9.36	m3	1.00	5.50	5.50	9.72	9.72	15.22	
5.0 km	8.24	m3	1.00	6.25	6.25	11.04	11.04	17.29	
%		%			0.36		0.64	1.00	

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=17.9(m3/hou 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

TABLE D.1.39 UNIT COST(9)

W-9 EXCAVATION TRANSPORTATION (L=1.0 Km) Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Equipment									
Excavation	Bulldozer	m3	1.00	1.15	1.15	2.93	2.93	4.08	W-2
Buck Hoe Loading	0.6M3	m3	1.00	2.08	2.08	5.32	5.32	7.40	W-3
Soil Transportation (D.T11T	1.0 Km	m3	1.00	3.25	3.25	5.74	5.74	8.99	W-8
Total		m3			6.48		13.99	20.47	
%		%			0.32		0.68	1.00	

W-10 BASE LAYER PLACING Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Herper B		person	0.45	80.00	36.00	0.00	0.00	36.00	
Equipment									
Moter Grader	3.1M	hour	0.40	57.38	22.95	134.00	53.60	76.55	E-7
Tired Roller	8-20T	hour	0.25	48.95	12.24	121.00	30.25	42.49	E-10
Total		m3	100.00		71.19		83.85	155.04	
		m3	1.00		0.71		0.84	1.55	
%		%			0.46		0.54	1.00	

W-11 REINFORCEMENT WORK Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.60	130.00	78.00	0.00	0.00	78.00	
Reinforcing-bar placer	Bend	person	2.70	92.00	248.40	0.00	0.00	248.40	
Helper B		person	1.80	80.00	144.00	0.00	0.00	144.00	
Sundries	2%	lump	1.00	9.41	9.41	0.00	0.00	9.41	
Subtotal					479.81			479.81	
Foreman		person	0.90	92.00	82.80	0.00	0.00	82.80	
Reinforcing-bar placer		person	4.50	80.00	360.00	0.00	0.00	360.00	
Helper B		person	3.90	80.00	312.00	0.00	0.00	312.00	
Sundries	3%	lump	1.00	22.64	22.64	0.00	0.00	22.64	
Subtotal					777.44			777.44	
Material									
Reinfocing Bar		ton	1.06	0.00	0.00	3,250.00	3,445.00	3,445.00	
Total		ton	1.00		1,257.25		3,445.00	4,702.25	
%		%			0.27		0.73	1.00	

W-12 MOULD WORK Unit : Bs./m2

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	10.80	130.00	1,404.00	0.00	0.00	1,404.00	
Mould worker		person	54.60	92.00	5,023.20	0.00	0.00	5,023.20	
Helper B		person	33.60	80.00	2,688.00	0.00	0.00	2,688.00	
Sundries	9%	lump	1.00	820.37	820.37	0.00	0.00	820.37	
Material									
Mould wood		m2	100.00	2.20	220.00	0.00	0.00	220.00	
Total		m2	100.00		10,155.57		0.00	10,155.57	
		m2	1.00		101.56		0.00	101.56	
%		%			1.00		0.00	1.00	

TABLE D.1.39 UNIT COST(10)

W-13 **CONCRETE PLACING (180 kg/cm2** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.18	130.00	23.40	0.00	0.00	23.40	
Helper A		person	0.50	106.00	53.00	0.00	0.00	53.00	
Helper B		person	0.65	80.00	52.00	0.00	0.00	52.00	
Material									
Concrete		m3	10.20	352.88	3,599.38	17.23	175.75	3,775.13	M-1
Equipment									
Truck Crene	15T	hour	1.60	45.29	72.46	244.00	390.40	462.86	E-14
Sundries	1%	lump	1.00	38.00	38.00	5.66	5.66	43.66	
Total		m3	10.00		3,838.24		571.81	4,410.05	
		m3	1.00		383.82		57.18	441.01	
%		%			0.87		0.13	1.00	

W-14 **CONCRETE PLACING (240 kg/cm2)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.18	130.00	23.40	0.00	0.00	23.40	
Helper A		person	0.50	106.00	53.00	0.00	0.00	53.00	
Helper B		person	0.65	80.00	52.00	0.00	0.00	52.00	
Material					0.00		0.00		
Concrete		m3	10.20	434.69	4,433.84	30.83	314.47	4,748.31	M-2
Equipment									
Truck Crene	15T	hour	1.60	45.29	72.46	244.00	390.40	462.86	E-14
Sundries	1%	lump	1.00	46.35	46.35	7.05	7.05	53.40	
Total		m3	10.00		4,681.05		711.92	5,392.97	
		m3	1.00		468.11		71.19	539.30	
%		%			0.87		0.13	1.00	

W-15 **CONCRETE PLACING (350 kg/cm2** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.18	130.00	23.40	0.00	0.00	23.40	
Helper A		person	0.50	106.00	53.00	0.00	0.00	53.00	
Helper B		person	0.65	80.00	52.00	0.00	0.00	52.00	
Material							0.00		
Concrete		m3	10.20	507.99	5,181.50	56.33	574.57	5,756.07	M-3
Equipment							0.00		
Truck Crene	15T	hour	1.60	69.75	111.60	345.42	552.67	664.27	E-14
Sundries	1%	lump	1.00	54.22	54.22	11.27	11.27	65.49	
Total		m3	10.00		5,475.72		1,138.51	6,614.23	
		m3	1.00		547.57		113.85	661.42	
%		%			0.83		0.17	1.00	

W-16 **CONCRETE CURING** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper B		person	0.10	80.00	8.00	0.00	0.00	8.00	
Sundries	10%*Labor	lump	1.00	0.80	0.80	0.00	0.00	0.80	
Total		m3	1.00		8.80		0.00	8.80	
%		%			1.00		0.00	1.00	

TABLE D.1.39 UNIT COST(11)

W-17 **GABION MAT (t=30 cm)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.60	130.00	78.00	2.00	1.20	79.20	
Helper A		person	2.40	106.00	254.40	2.00	4.80	259.20	
Helper B		person	2.10	80.00	168.00	2.00	4.20	172.20	
Material									
Gabion Mat	t=30cm	m2	33.30	0.00	0.00	7.00	233.10	233.10	
Crushed Stone		m3	9.50	166.50	1,581.75	0.00	0.00	1,581.75	
Equipment									
Back Hoe	0.6M3	hour	1.50	79.62	119.43	203.00	304.50	423.93	E-8
Total		m3	10.00		2,201.58		547.80	2,749.38	
		m3	1.00		220.16		54.78	274.94	
%		%			0.80		0.20	1.00	

W-18 **FUNDATION BED STONE** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Foreman		person	0.90	130.00	117.00	0.00	0.00	117.00	
Helper B		person	5.40	80.00	432.00	0.00	0.00	432.00	
Sundries	Labor*3%	lump	1.00	16.47	16.47	0.00	0.00	16.47	
Material									
Crushed Stone		m3	12.00	166.50	1,998.00	0.00	0.00	1,998.00	
Total		m3	10.00		2,563.47		0.00	2,563.47	
		m3	1.00		256.35		0.00	256.35	
%		%			1.00		0.00	1.00	

W-19 **EXCAVETION (BUCK HOE 0.6 m3)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Equipment									
Bock Hoe	0.6 M3	hour	1.00	79.62	79.62	203.00	203.00	282.62	E-8
Total		m3	36.41		79.62		203.00	282.62	
		m3	1.00		2.19		5.58	7.76	
%		%			0.28		0.72	1.00	

Buck Hoe (0.6 m3)

Q=3600*q*f*E/Cn Q=3600*0.59*1.0*0.6/35=36.41 m3/hour
q=0.59 m3
f=1.0
E=0.6
Cm=35 sec

W-20 **EMBANKMENT (BULLDOZER 15T, t=20 cm)** Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Helper A		person	0.60	106.00	63.60	0.00	0.00	63.60	
Equipment									
Bulldozer	15T	hour	2.28	87.93	200.48	224.00	510.72	711.20	E-12
Sundries		lump	1.00	0.00	0.00	0.00	0.00	0.00	
Total		m3	100.00		264.08		510.72	774.80	
		m3	1.00		2.64		5.11	7.75	
%		%			0.34		0.66	1.00	

TABLE D.1.39 UNIT COST(12)

W-21 FILLING (MANPOWER) Unit : Bs./m3

Item	Specification	Unit	Quantity	Local Portion		Foreign Portion		Total	Reference
				Price	Cost	Price	Cost		
Labor									
Earth worker		persen	1.20	92.00	110.40	0.00	0.00	110.40	
Helper B		person	0.90	80.00	72.00	0.00	0.00	72.00	
Equipment									
Tamper	60 Kg	day	0.27	82.46	22.26	48.00	12.96	35.22	E-11
Buck Hoe	0.6 M3	hour	0.60	79.62	47.77	203.00	121.80	169.57	E-8
Total		m3	10.00		252.43		134.76	387.19	
		m3	1.00		25.24		13.48	38.72	
%		%			0.65		0.35	1.00	

TABLE D.1.40 LABOR WAGES

Unit : Bs

Labor	Specification	Unit Price		Reference
		Hour	Day	
Operator Class A	Bulldozer, Shovel, Grader, Macadam, Buck-hoe	18.62	172.00	
Operator Class B	Tire Roller, Concrete Plant, Truck Crene	17.31	159.00	
Operator Class C	Tire Roller	15.37	142.00	
Operator Class D	Concrete Plant	13.53	120.00	
Driver Class A	Truck crene,Dump truck	12.46	128.00	
Driver Class B	Truck	10.85	117.00	
Foreman		10.62	130.00	
Helper Class A	Heavy	9.56	106.00	
Helper Class B	Light	4.90	80.00	
Reinforcing-bar placer		4.90	92.00	
Mould worker		4.90	92.00	
Earth worker		4.90	92.00	
Building Worker		9.70	92.00	
Plant Operator		15.37	142.00	
Prompter		12.90	103.00	

TABLE D.1.41 UNIT PRICE OF TYPICAL MATERIAL

Unit : Bs.

Item	Specification	Unit	Price	Reference
Kerosen		Liter	2.60	
Diesel		Liter	2.58	
Gasoline		Liter	3.34	
Cement		Kg	0.69	
Aggregate		M3	156.50	
Sand		M3	146.50	
Admixture		Kg	17.00	
Crushed Gravel		M3	156.00	
Crushed Gravel		M3	75.00	San Juan
Crushed Stone		M3	166.50	
Crushed Stone		M3	80.00	San Juan
Forming Wood		M2	2.20	
Reinforcing Bar		Ton	3250.00	
Nail		Kg	5.80	
Wire		Kg	19.43	
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	Reinfocing Bar	Ton	50.00	L=100km
Transportation	Asphalt Concrete	Ton	83.00	

TABLE D.1.42 CONSTRUCTION EQUIPMENT PRICE

Unit : Bs./Hr.

Item	Specification	H.P	Price	Reference
1.Bulldozer	Cat D18 32T	289	336.00	
	Cat D7 21T	200	288.00	
	Cat D6 15T	165	224.00	
	Cat D6 11T	100	169.00	
2.Shovel	Cat 930 1.4m3	105	200.00	
	Cat 966E 1.8m3	170	222.00	
3.Motor Grador	Cat 120G 3.1m	125	134.00	
	Komatzu 3.7m	166	200.00	
4.Macadam Roller	10T	75	114.00	
	Dynapac CA-15T	79	135.00	
	Dynapac CA-15T	115	166.00	
5.Water Truck	10m3	290	145.00	
6.Buck Hoe	0.35m3	80	115.00	
	0.60m3	99	203.00	
7.Dump Truck	5m3		70.00	
	8m3		91.00	
	10m3		127.00	
	12m3		213.00	
	25m3		342.00	
8.Truck	11T	311	88.00	
	6T		60.00	
9.Concrete Plant	30m3/hr.		150.00	
10.Rubber Tire Roller			121.00	
	Dynapac CP-30T	100	157.00	
	Dynapac CP-30T	100	191.00	
11.Tamper	60kg		48.00	day
12.Clamshell	0.6m3		223.00	
13.Truck Crene	15T		244.00	

TABLE D.1.43 MAJOR CONSTRUCTION WORK

Unit: Km

		Sub-Project Item	Improvement			Road Embankment
			River	Main Drainage	Secondary Drainage	
1. Chane – Pailon	(1) Rio Chane		26.354	–	–	–
	(2) Rio Pailon	1) Rio Pailon (downstream)	23.362	–	–	–
		2) Rio Pailon (upstream)	8.046	–	–	–
		3) Rancho Chico	–	3.600	–	–
		4) Chaco	–	1.472	–	–
		5) EmpalmeII	–	5.295	–	–
		6) Pailon Secondary Drainage	–	–	18.500	–
	(3) Okinawa Drainage	1) Okinawa Main Drainage	–	21.652	–	–
		2) Okinawa Secondary	–	–	35.500	–
2. San Juan – Antofagasta	(1) San Juan	1) Arroyo Ypacanicito	17.363	–	–	–
		2) San Juan Main Drainage	–	7.512	–	–
		3) San Juan Main Drainage	–	27.472	–	–
		4) Arryo Tejeria	–	8.160	–	–
		5) Road-cum-embankment	–	–	–	9.000
		6) San Juan econdaryrainage	–	–	35.000	–
	(2) Antofagasta	1) Arrpyo Jochi	11.800	–	–	–
		2) Arroyo Tacuaral	5.799	–	–	–
		3) Antofagasta Main rainage	–	8.797	–	–
		4) Antofagasta Secondary Drainage	–	–	26.500	–

TABLE D.1.44 MINOR CONSTRUCTION WORK

Unit: m

	Sub-Project Item		Bridge			Box Culvert	
			Length	Span No.	Width	Section	No.
1. Chane - Pailon	(1) Rio Chane	Rio Chane	115.0	4.0	5.5	—	—
		〃	83.5	3.0	5.5	—	—
		〃	82.0	3.0	5.5	—	—
		〃	86.5	3.0	8.0	—	—
	(2) Rio Pailon	1) Rio Pailon (downstream)	75.0	3.0	5.5	—	—
		2) Rio Pailon (upstream)	—	—	—	—	—
		3) Ramcho Chico	—	—	—	—	—
		4) Chaco	—	—	—	—	—
		5) El Empalme II	—	—	—	—	—
		6) Pailon Secondary Drainage	—	—	—	3.5 x 3.0 x 2	9
	(3) Drainage	1) Okinawa Main Drainage	38.7	2.0	5.5	—	—
		2) Okinawa Secondary	—	—	—	3.5 x 3.0 x 2	17
2. San Juan - Antofagasta	(1) San Juan	1) Arroyo Yapacanicito	34.0	1.0	5.5	—	—
		2) San Juan Main Drainage ①	18.5	1.0	8.0	—	—
		〃	16.5	1.0	8.0	—	—
		3) San Juan Main Drainage ②	—	—	—	—	—
		4) Arroyo Tejeria	20.0	1.0	8.0	—	—
		5) Road –cum-embankment	—	—	—	—	—
		6)San Juan Secondary Drainage	—	—	—	3.0 x 3.0 x 3	18
	(2) Antofagasta	1) Arroyo Jochi	36.0	1.0	5.5	—	—
		〃	24.5	1.0	5.5	—	—
		2) Arroyo Tacuaral	30.0	1.0	5.5	—	—
		3) Antofagasta Main Drainage	35.5	1.0	5.5	—	—
		〃	30.0	1.0	5.5	—	—
		4) Antofagasta Secondary	—	—	—	3.0 x 3.0 x 3	21

TABLE D.1.45 NUMBER OF MAJOR CONSTRUCTION EQUIMENT TURNING

/Year

Sub-Project Item	Bulldoze	Buckhoe	Motor Grader	Tired Roller	Macadam Roller	Dump Truck	Refference
1. Chane – Pailon							
(1) Rio Chane							
1) Rio Chane	4	23	1	1	1	56	–
(2) Rio Pailon							
1) Rio Pailon (downstream)	5	32	1	1	1	77	–
2) Rio Pailon (upstream)	2	8	1	1	1	19	–
3) Rancho Chico	1	1	1	1	1	3	–
4) Chaco	1	1	1	1	1	1	–
5) EmpalmeII	1	1	1	1	1	2	–
6) Pailon Secondary Drainage	1	2	0	0	0	4	
(3) OkinawaDrainage							–
1) Okinawa Main Drainage	2	10	0	0	0	22	
2) Okinawa Secondary Drainage	1	2	0	0	0	0	
2. San Juan – Antofagasta							
(1) San Juan							
1) Arroyo Ypacanicito	1	3	1	1	1	7	–
2) San Juan Main Drainage ①	1	1	0	0	0	2	–
3) San Juan Main Drainage ②	4	6	0	0	0	2	
3) Arryo Tejeria	1	1	0	0	0	1	–
4) Road-cum-embankment	1	1	1	1	1	0	–
5) San Juan Secondary Drainage	1	2	0	0	0	0	–
(2) Antofagasta							
1) Arrpyo Jochi	1	2	1	1	1	5	–
2) Arroyo Tacuaral	1	2	1	1	1	4	–
3) Antofagasta Main Drainage	1	2	0	0	0	4	–
4) Antofagasta Secondary Drainage	1	2	0	0	0	0	

FIGURES

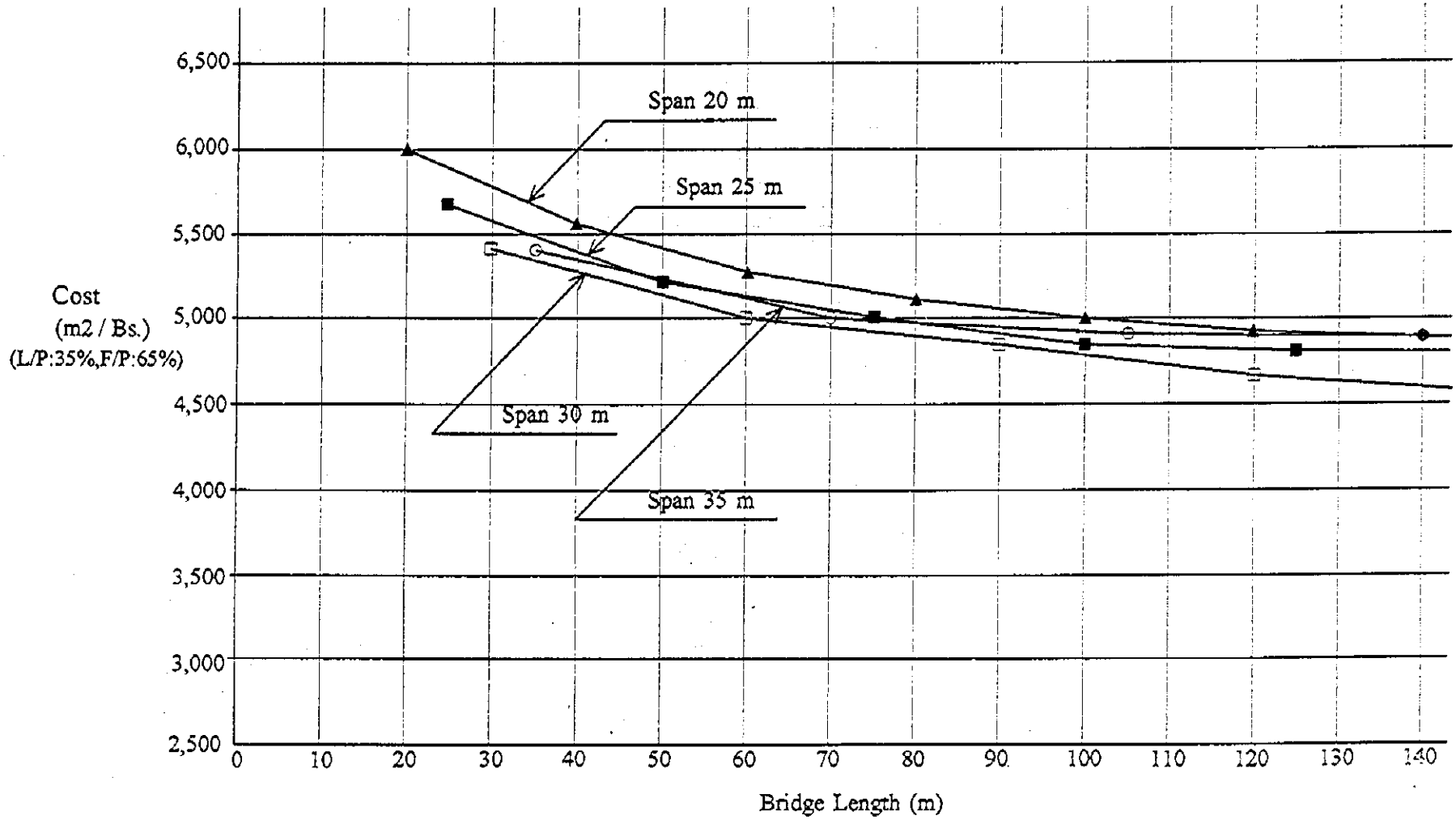

FIG.D.1.1 DIRECT CONSTRUCTION COST OF PC I-GIRDER BRIDGE (INCLUDING SUBSTRUCTURE)

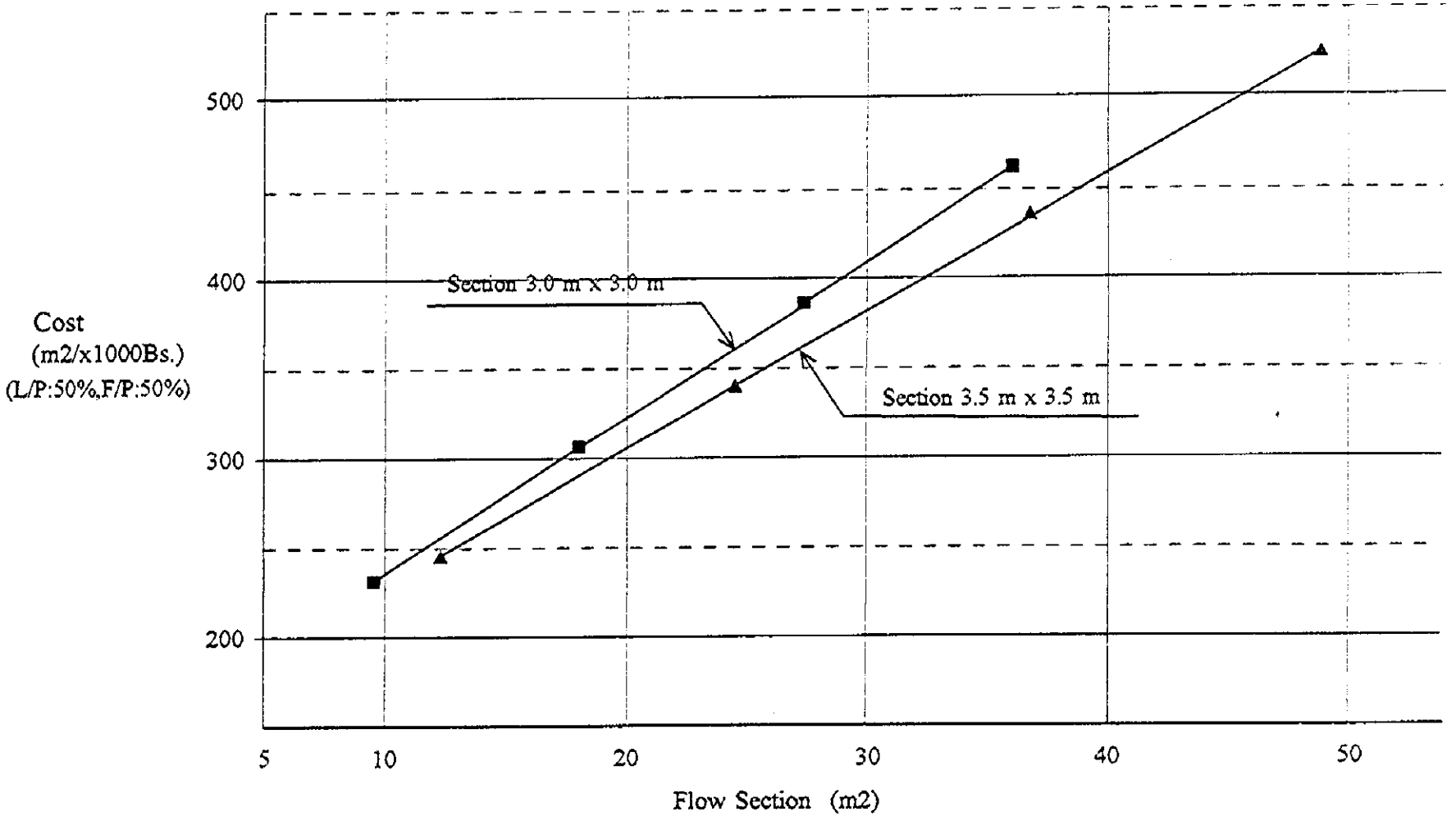

FIG.D.1.2 DIRECT CONSTRUCTION COST OF BOX CULVERT (INCLUDING FOUNDATION)

SUPPORTING REPORT E

CONSTRUCTION PLAN

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SUPPORTING REPORT E CONSTRUCTION PLAN

1 Basic Condition of the Construction Plan

1.1 Basic Consideration of Construction Plan

(1) Construction Period

The construction period of the proposed project is assumed to be 10 years in consideration with the quantity of works, funding and realization of flood mitigation effect at early stage.

(2) Procurement of Works

The construction works proposed for major river and drainage improvement are assumed to procure through a package contract system by the international tendering, since the construction should be carried out in a limited period. On the other hands, the minor drainage improvement works such as the rehabilitation of the San Juan Main Drainage km 11, km15, km 24 and km 28 and the secondary drainage development are assumed to procure the local construction companies by the local government or inhabitants group.

(3) Workable Days and Daily Working Hours

The annual workable days are assumed to be 200 days based on the current holidays, the rainfall condition and accessibility in the rainy season.

The daily working hours is assumed to be eight hours.

(4) Construction Method

The major work for the river and drainage improvement is soil excavation with no rock materials, therefore, all construction works except for the bridge construction are basically carried out by the conventional methods and equipment. Since the quantity of work is large, major works are planned to carry out by mechanical power.

(5) Disposal of Excavated Materials

The basic concept of disposal of excavated materials is as follows:

- The space of the spoiled bank from the excavation in the river improvement is prepared within 1 km distance along each site of the river bank.
- The space of the spoiled bank from the excavation in the drainage improvement is prepared within 0.5 km distance along each site of the river bank.
- The excavated materials from the secondary drainage development are to be discarded onto the peripheral farmland along the drainage without soil transportation.

1.2 Construction and Technology of Local Construction Companies

The construction and technology of the local construction companies are considered sufficient according to the results of the investigation as follows:

(1) The number of construction companies

From the number of the registered construction companies in the Construction Association as shown below, Santa Cruz has 230 registered construction companies which is the highest among all.

	The number of Registered company
Santa Cruz	230
La Paz	216
Cochabamba	84
Chuquisaca	57
Tarija	30
Beni	25
Oruro	32
Potosi	17
Total	691

The data are considered reliable because all construction companies in Bolivia have to register to the Ministry of Transport and the Construction Association.

The head office of the Construction Association is in La Paz, but there are also branch offices in each prefecture.

(2) The experience of construction

- The construction works of river, drainage and roads
  All these construction works are carried out mostly by the construction companies in Santa Cruz.

- The construction works related structures
  In the past 3 years, it is found that 14 bridges have been under construction. The structure type is mainly the pre-stressed concrete with the length of 20 – 180 m and the span of 20 – 180 m.

It is considered that the construction experience for the related structures is sufficient.

(3) The number of construction equipment

The main work of the construction of river, drainage and road is the civil work which occupies almost all the equipment in the construction. The number of the construction equipment is reportedly sufficient and the equipment can be borrowed among the companies in the case of shortage.

2 Preparation Woks

2.1 Transportation Road and Access Road

The entrance of the Chane - Pailon area and the San Juan – Antofagasta area are connected to the Santa Cruz City by the National Road No.7 and No.9 which are asphalt paved. The branch roads from above main roads for each river and drainage are also available. However, the access roads along the distance of river and drainage improvement are necessary to be developed in prior to the river and drainage dredging works, since they are not available at present.

2.2 Topographic and Geological Survey

It is required to carry out the topographic survey for the river and drainage improvement and the geological survey for the bridge construction in prior to the commencement of the construction works.

2.3 Other Works

Clearing and grubbing works should be executed at the site of the river and drainage improvement and the road-cum-embankment, and some other temporary works also will be required.

3 Construction Plan

3.1 Major Construction Works

According to the preliminary design of the river and drainage improvement, the major quantities of works for respective work are shown below:

Area / Basin / Work Item	Chane-Pailon			San Juan-Antofagasta	
	Rio Chane	Rio Pailon	Okinawa Drainage	San Juan	Antofagasta
River Improvement					
Soil Excavation (1,000m^3)	5,638	9,196	0	652	640
Bridge Construction	4	1		1	3
Road-cum-embankment					
Soil Filling (1,000m^3)				37	
Drainage Improvement					
Soil Excavation (1,000m^3)	0	398	1,838	235	389
Bridge Construction	0	1	1	3	2
Secondary Drainage					
Soil Excavation (1,000m^3)	0	416	799	998	755
Culvert Construction	0	9	17	18	21

3.2 Division of Construction Section

Each river improvement will be implemented in each package. The Rio Chane and Rio Pailon will be implemented as a single river because of their river system. The Rio Chane and Rio Pailon have a long distance of 58 km. Hence, this route should be divided into 3 sections as bellow:

- 26.35 km from km 0.00 to km 26.35 (Rio Chane distance)
- 23.36 km from km 26.35 to km 49.71 (Rio Pailon downstream distance)
- 8.05 km from km 49.71 to km 57.76 (Rio Pailon upstream distance)

3.3 Land Acquisition and Compensation

In accordance with the New Forest Law of Bolivia, the rights of individuals to use the land with 20 m to 100 m width along both channel bank sides are controlled by the

conservation and sustainable use of the natural resources. The land acquisition or compensation will not be needed in the construction works of the project, since the necessary width of the river and drainage improvement is covered by above regulated area.

3.4 Protected Forest

The forests along rivers proposed for the improvement are protected by the above regulation. Hence, when the protected forests are required to cut due to the construction works, reforestation is necessary to maintain the adequate width of the protected forest.

3.5 Construction Method

The proposed construction method of the project is as follows:

(1) Construction Works for River and Drainage Improvement

- Clearing and Grubbing Works
  Clearing and grubbing works should be carried out by bulldozer (15 ton class) and backhoe (0.6 m^3 class).

- Channel Excavation
  Excavation is carried out by backhoe (0.6 m^3 class) and excavated material should be loaded to dump truck (11 ton class).

- Soil Transportation
  Excavated materials should be transported by dump truck (11 ton class) to the spoiled bank.

- Surplus Soil Filling
  Surplus soils from the river and drainage improvement works should be moved to the spoiled bank and filled up and compacted by bulldozer as a trapezoid to avoid soil spill by rainfall.

- Operation Road
  Operation road along the improved river should be constructed by fully using the access road constructed. Gravel pavement of 20 cm thickness should be carried out by motor grader, tire roller and macadam roller.

(2) Construction Works for Road-cum-embankment

- Base Layer Placing
  Base layer placing should be carried out by motor grader and tire roller in prior to embankment.

- Road Bed Embankment
  Road bed embankment should be carried out by side borrow method with bulldozer (15 ton class).

- Sub-grade Compaction
  Sub-grade should be prepared by shaping and rolling compaction by bulldozer.

- Base Course
  Gravel pavement of 20 cm thickness should be carried out by motor grader, tire roller and macadam roller.

(3) Construction Works for Bridge Improvement

Post pre-stressed concrete beam type is planned for bridge improvement. The piers and abutments should be built on the pile foundation. The bank around the bridge site is to be protected by gabion works.

3.6 Construction Schedule

3.6.1 Basic Concept of Construction Schedule

Because of the scale of the total construction work of the feasibility project, the construction period for the whole project will be long. Hence, the phasing of the project implementation is important. The basic determination of the construction schedule composes of the following items:

- The fiscal year 1999 and 2000 are set for preparation period,
- Each project is categorized into two priority groups, i.e., the first priority group and the second priority group,
- The first priority group will be implemented from the fiscal year 2001 to 2005 (Phase I), and the second priority group will be implemented from the fiscal year 2006 to 2010 (Phase II).

3.6.2 Study on Project Phasing

The project phasing were studied based on the following aspects comprehensively.

- The impact of projects to the target areas
- The amount of construction work and investment
- The influence of partial implementation of the Project to the other areas

(1) Impact of Projects

The impact of projects is evaluated with the expected reduction of inundation area by the project. The area inundated less than 30 cm depth of with and without project condition of each basin is shown in Table E.3.1.

The Rio Pailon basin, the Okinawa Drainage basin, the Arroyo Yapacanicito basin including the San Juan Main Drainage basin and the Arroyo Jochi basin were expected the large impact by the projects. The Rio Chane basin, the Arroyo Tejeria baisn, the Arroyo Tacuaral basin and the Antofagasta Main Drainage basin were expected comparatively small impact by the projects.

(2) Amount of Construction Work and Investment

The amount of the construction work and investment are represented by the amount of excavation works which is the majority of the construction works. The volume of excavation works of each basin is shown in Table E.3.2.

The Rio Chane and the Rio Pailon have around 15 million m^3 of excavation work. In consideration with the importance of those basins and the time consuming for the completion of that work, these river improvement should be started as soon as possible because of their total amount of works.

(3) Influence of Partial Implementation of Project to Other Areas

The Rio Chane and the Rio Pailon are considered as a single river system and they have a long distance of around 58 km , which will take long period to complete the river improvement. Hence, the construction schedule of those rivers was studied based on the hydrodynamic model to verify the influence of the distance-limited improvement for the remaining reach. The cases studied are as follows:

- Case-1 : The Rio Chane will be improved but Rio Pailon will not be improved,

- Case-2 : The down-stream of the Rio Pailon will be improved but the Rio Chane and the upstream of the Rio Pailon will not be improved,
- Case-3 : The Rio Chane and the down-stream of the Rio Pailon will be improved but the upstream of the Rio Pailon will not be improved.

The results of above analysis are shown in Table E.3.3.

In the Case-1, the impact for the upper reach is estimated that the water level will be reduced 0.18 m in the 10-year frequency flood in the distance of 2.4 km of the down-stream of the Rio Pailon.

The Case-2 is the case that the Rio Pailon down-stream will be improved in prior to the remaining distance. The impact for the upper reach is estimated that the water level will be reduced 0.22 m in the distance of 8.0 km. However, the water level of the Rio Chane will increase 1.5 m, which means the average inundation depth will increase 1.3 m.

In the Case-3, the impact for the upper reach is estimated that the water level will be reduced 0.22 m in the distance of 8.0 km.

As a result of above study, the river improvement must be implemented from the down-stream to upstream. The improvement of the downstream of Rio Pailon should also be implemented as soon as possible after the completion of the improvement of the Rio Chane because of the large impact to the upper reach.

The basic considerations of the project phasing in each basin are as follows:

(1) Chane – Pailon Area

The Rio Chane and Pailon should be divided into three parts due to the distance for the improvement and the characteristics of each distance. The area from the lowest reach to the area where the contraction of the river channel is observed shall be put in the high priority because the significant effect to mitigate the flood condition in the upper reach by solving the contraction is expected.

The distance from the Chane - Pailon Bridge to the Okinawa – Pailon Bridge and the connecting channels to the new constructed bridges, i.e. the El Rancha Chico, the El Chaco and the El Empalme II, the crossing the National Road No.9 are to be implemented together. Those areas are influenced by the increase of discharge

from the new bridges and the flooding condition is worsening. This distance is desired to implement earlier.

(2) Okinawa Drainage Area

The improvement of the Okinawa Main Drainage is expected to mitigate the influence of the flood from the Rio Grande by discharging the water from the river quickly after the flood as much as the improvement of the drainage condition for the internal discharge. The shortening of the inundation period seems to be effective to reduce the damage to the agricultural production. In recent years, this area suffers from the river floods frequently, hence, the improvement of the Okinawa Main Drainage is necessary as soon as possible.

(3) San Juan – Antofagasta Area

The rehabilitation of San Juan Main Drainage Canals to improve the drainage condition is expected to be small construction works because there are existing drainage canals developed. In addition, it will contribute to reduce the discharge burden of the lower reach of the Arroyo Yapacanicito by increasing the discharge to the Rio Yapacani directly and to mitigate flood condition there. Furthermore, this area is one of the most developed agricultural areas in Santa Cruz and the significant effect to the agricultural production is expected. Hence, the rehabilitation of San Juan Main Drainage Canals is to be implemented earlier than the other components.

The improvement of the Arroyo Yapacanicito and Jochi and the construction of the Road-cum embankment between those rivers are to be implemented at the same time because those basins are complicated. The precedent implementation of one of them will make the influence to the inundation condition to the remaining area.

As a result of the study, the prioritization of projects were decided as follows :

The First Priority Group	The Secondary Priority Group
1) River Improvement - Rio Chane - Rio Pailon - Arroyo Jochi	- Arroyo Yapacnicito - Arroyo Tacuaral
2) Road-cum-embankment - Road-cum-embankment	
3) Drainage Improvement - Okinawa Drainage - San Juan Main Drainage (km 13, km 17)	- Ranch Chico - El Chaco - El Empalme II - San Juan Main Drainage (km 131, km 15, km 24, km 28) - Arroyo Tejeria - Antofagasta Main Dranage

3.7 Construction Schedule

In accordance with the study on project phasing, the construction schedule shown in Table E.3.4 is proposed.

TABLES

TABLE E.3.1 IMPACT OF PROJECTS

Items	Area less than 30 cm inundation		Increment of the area less than 30 cm inundation (km^2)	Rank of Impact
	Without Project (km^2)	With Project (km^2)		
1. Chane-Pailon Area				
(1) Chane Basin				
1) Rio Chane Basin	24.8	45.9	21.1	B
(2) Pailon Basin				
1)Rio Pailon Basin	62.1	229.6	167.5	A
(3) Okinawa Drainage Baisn				
1) Okinwa Drainage Basin	94.6	185.0	90.4	A
2. San Juan - Antofagasta Area				
(1) San Juan Area				
1) Arooyo Yapacanicito Basin	85.1	158.9	73.8	A
2) Arroyo Tejeria Basin	23.0	40.8	17.8	B
(2) Antofagasta Area				
1) Arroyo Jochi Basin	40.8	105.3	64.5	A
2) Arroyo Tacuaral Basin	10.9	18.6	7.7	B
3) Antofagasta Main Drainage Basin	12.9	46.8	33.9	B

TABLE E.3.2 WORK AMOUNT OF EACH BASIN

Items	Volume of Excavation (1,000 m^3)
1. Chane-Pailon Area	
(1) Chane Basin	
1) Rio Chane Basin	5,638
(2) Pailon Basin	
1)Rio Pailon Basin	9,594
(3) Okinawa Drainage Baisn	
1) Okinwa Drainage Basin	1,838
2. San Juan - Antofagasta Area	
(1) San Juan Area	
1) Arooyo Yapacanicito Basin	777
2) Arroyo Tejeria Basin	110
(2) Antofagasta Area	
1) Arroyo Jochi Basin	338
2) Arroyo Tacuaral Basin	302
3) Antofagasta Main Drainage Basin	389

TABLE E.3.3 HYDRAULIC CONDITION OF PERTIAL IMPLEMENTATION OF CHANE-PAILON RIVER IMPROVEMENT

CASE-1 : Only Rio Chane distance improved

River	Acc. Distance from / to (km)	Distance (km)	Increase of Water Level from Whole Improvement (m)		Increase of Inundation Depth from Whole Improvement (m)	
			5-year	10-year	5-year	10-year
Rio Chane	0.000 23.229	23.23	Improved Distance			
	23.229 26.354	3.13				
Rio Pailon (downst.)	26.354 28.754	2.40	-0.20	-0.18	-0.04	-0.04
	28.754 49.986	21.23	0.00	0.00	0.00	0.00
Rio Pailon (upstream)	49.986 58.032	8.05				

CASE-2 : Only Rio Pailon downstream distance improved

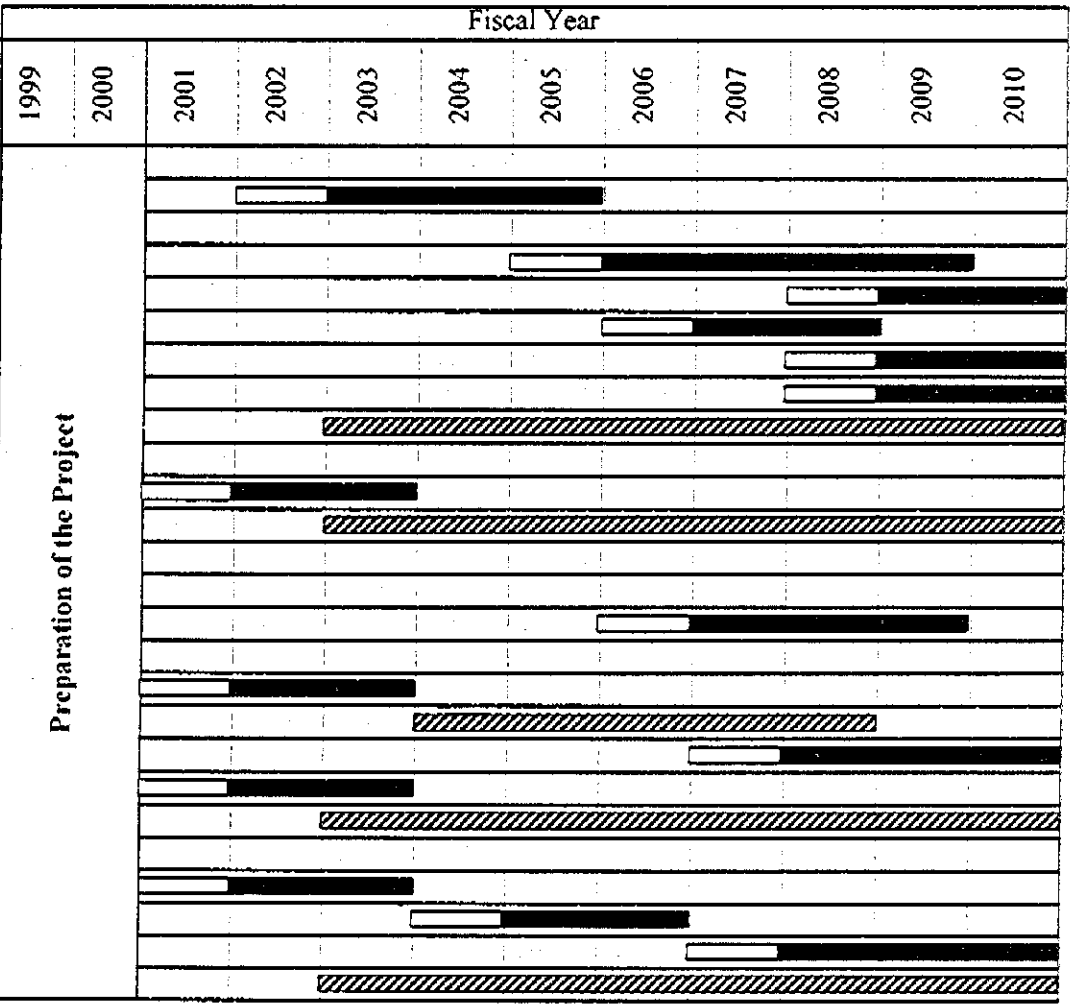
River	Acc. Distance from / to (km)	Distance (km)	Increase of Water Level from Whole Improvement (m)		Increase of Inundation Depth from Whole Improvement (m)	
			5-year	10-year	5-year	10-year
Rio Chane	0.000 23.229	23.23	1.57	1.52	1.25	1.33
	23.229 26.354	3.13	Improved Distance			
Rio Pailon (downst.)	26.354 28.754	2.40				
	28.754 49.986	21.23				
Rio Pailon (upstream)	49.986 58.032	8.05	-0.25	-0.22	-0.25	-0.22

CASE-3 : Rio Chane and Rio Pailon dwonstream distance improved

River	Acc. Distance from / to (km)	Distance (km)	Increase of Water Level from Whole Improvement (m)		Increase of Inundation Depth from Whole Improvement (m)	
			5-year	10-year	5-year	10-year
Rio Chane	0.000 23.229	23.23	Improved Distance			
	23.229 26.354	3.13				
Rio Pailon (downst.)	26.354 28.754	2.40				
	28.754 49.986	21.23				
Rio Pailon (upstream)	49.986 58.032	8.05	-0.25	-0.22	-0.25	-0.22

TABLE E.3.4 WORK SCHEDULE OF RIVER AND DRAINAGE IMPROVEMENT

Work item	Distance to be improved (m)	Amount of excavation (1,000 m^3)
1. Chane-Pailon		
(1) Rio Chane	26.354	5,638
(2) Rio Pailon		
1) Rio Pailon (downstream)	23.362	7,777
2) Rio Pailon (upstream)	8.046	1,419
3) Rancha Chico	3.600	629
4) Chaco	1.472	147
5) El Empalme II	5.293	147
6) Secondary Drainage		
(3) Okinawa Drainage	21.652	1,838
1) Okinawa MainDrainage		
2) Secondary Dranage		
2. San Juan-Antofagasta		
(1) San Juan		
1) Arroyo Yapacanicito	17.363	652
2) San Juan Main Drainage	34.952	
① km 13, 17	7.500	93
② km 11,15,24,28		
3) Arroyo Tejeria	8.160	110
4) Road-cum-embankment	9.830	37
5) Secondary Drainage		
(2) Antofagasta		
1) Arroyo Jochi	11.800	338
2) Arroyo Tacuaral	5.799	302
3) Antofagasta Main Drainage	8.797	344
4) Secondary Dranage		



Remarks :
- Detail Design
- Construction Work
- Implemented by inhabitants group