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TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT



COST ESTIMATE – PHASE II

ALTERNATIVE 3: FSL=1220 M.A.S.L

P002378. RP49_revC

August 2014



TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

VOLUME 4: IMPLEMENTATION STUDIES

CHAPTER 2: COST ESTIMATE

ALTERNATIVE 3 – FSL 1220 M.A.S.L

August 2014

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PART IV – Alt 3: Calculation assumptions (Civil Works - Dam)

1 Introduction

This part has been adapted for the alternative 1220, in order to show only the modifications from the report 2.1 Alternative 1 – FSL 1290 m.a.s.l. The other details about calculation assumptions are the same as for alternative 1290 m.a.s.l.

The aim of this paragraph is to give the main assumptions taken into account for the calculation of quantities and unit prices.

The purpose of this preliminary approach being to derive representative overall cost estimates of each alternative at feasibility level. Comprehensive Method Statements of the works will be prepared at detailed design stage by the Engineer of the project.

2 Grout and drainage curtains

The main details necessary to calculate the quantities are given in the paragraph below. More details are given in the Phase 0 report.

2.1 Stage 1

Two grout curtains (CG 1 and GC 2) in parallel are considered with the characteristics below:

- Grouting density: $\rho = 70 \text{ kg/ml}$
- Primary (P), secondary (S) and tertiary (T) holes
- Spacing between primary: $e = 12 \text{ m}$
- Depth criteria: $p = 0.6 * H = 65 \text{ m}$ (with $H=110\text{m}$ the stage 1 height).
- Angle (Downstream – Upstream): $\alpha = 20^\circ$



Figure 2-1: Grout curtain

One drainage curtain (DC) is considered:

- Depth criteria: $p' = 0.6 * p$ (with p : depth of grout curtain)
- Spacing between each holes: $e' = 5 m$

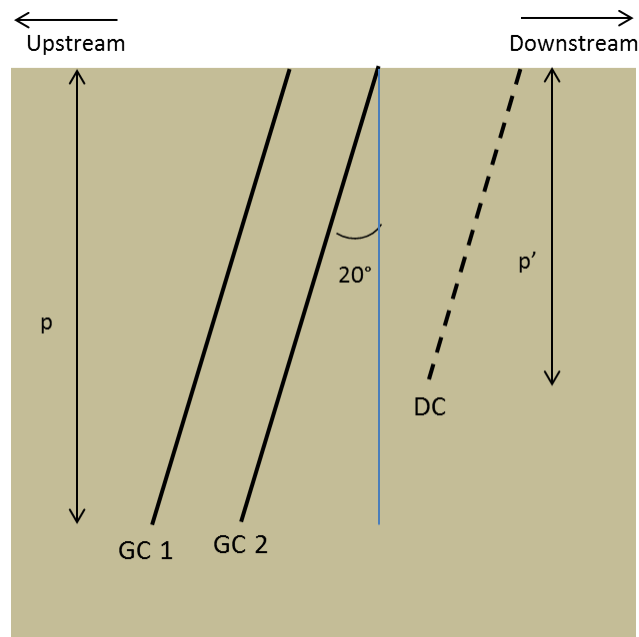


Figure 2-2: Grout and drainage curtains

One control hole is made each 50 m, and 30 water pressure tests are made for each primary hole.

The quantities are detailed in Table 2-1.

Table 2-1: Grout and drainage curtain - Stage 1 - Quantities

B.I.8	Grouting Curtains - Stage 1		
B.I.8.01	<u>Drilling:</u>		
	1 Rotary grout holes, vertical, min. diameter 48 mm		
	a) Depth from 0 to 50 m	m	9,456
	b) Depth from 50 to 100 m	m	6,304
	2 Rotary control holes, vertical, min. diameter 76 mm:		
	a) Depth from 0 to 50 m	m	297
	b) Depth from 50 to 100 m	m	198
	3 Percussion drain holes, vertical, 100 mm min. diameter:		
	a) Depth from 0 to 50 m	m	6,809
	b) Depth from 50 to 100 m	m	4,539
B.I.8.02	<u>Water pressure tests:</u>		
	1 Multiple steps	unit	157
B.I.8.03	<u>Grouting:</u>		
	1 Cement pressure grouting (excluding materials), vertical holes:		
	a) Depth from 0 to 50 m	t	662
	b) Depth from 50 to 100 m	t	441
	2 Portland cement ASTM Type I or II	t	551
	3 Portland cement ASTM Type V (sulfate resistant)	t	551
	4 Bentonite	t	11
	5 Superplasticizer admixture	kg	1,654

2.2 Stage 2

Two grout curtains in parallel are considered with the characteristics below (with a similar method as for Stage 1):

- Grouting density: $\rho = 70 \text{ kg/ml}$
- Primary, secondary and tertiary holes
- Spacing between primary: $e = 12 \text{ m}$
- **Depth criteria: $p = 0.6 * H = 160 \text{ m}$ (with $H = 265\text{m}$)**
- Angle (Downstream – Upstream): $\alpha = 20^\circ$

One drilling curtain is considered:

- Depth criteria: $p' = 0.6 * p$ (with p: depth of grout curtain)
- Spacing between each holes: $e' = 5 \text{ m}$

The quantities are detailed in Table 2-2.

Table 2-2: Grout and drainage curtain - Stage 2 - Quantities

B.I.9	Grouting Curtains - Stage 2		
B.I.9.01	<u>Drilling</u>		
	1 Rotary grout holes, vertical, minimum diameter 48 mm		
	a) Depth from 0 to 50 m	m	25,472
	b) Depth from 50 to 100 m	m	25,472
	c) Depth from 100 to 150 m	m	21,833
	2 Rotary control holes, vertical minimum diameter 76 mm:		
	a) Depth from 0 to 50 m	m	1,681
	b) Depth from 50 to 100 m	m	1,681
	c) Depth from 100 to 150 m	m	1,441
	3 Percussion drain holes, vertical, 100 mm min. diameter:		
	a) Depth from 0 to 50 m	m	18,340
	b) Depth from 50 to 100 m	m	18,340
	c) Depth from 100 to 150 m	m	15,720
B.I.9.02	<u>Water pressure tests</u>		
	1 Multiple steps	unit	450
B.I.9.03	<u>Grouting</u>		
	1 Cement pressure grouting (excluding materials), vertical holes:		
	a) Depth from 0 to 50 m	t	1,783
	b) Depth from 50 to 100 m	t	1,783
	c) Depth from 100 to 150 m	t	1,528
	2 Portland cement ASTM Type I or II	t	2,547
	3 Portland cement ASTM Type V (sulfate resistant)	t	2,547
	4 Bentonite	t	51
	5 Superplasticizer admixture	kg	7,642
B.I.9.04	Miscellaneous works	%	3%

3 Dam Fills

3.1 General

The dam construction has been divided into six phases as presented in the schematic view below:

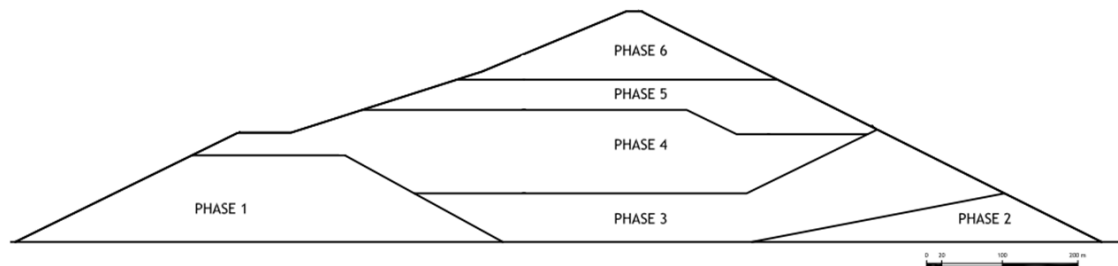


Figure 3-1: Construction phasing – Longitudinal section.

The above mentioned six zones of the dam embankment have the following compacted volume:

Table 3-1: Materials quantities

Phase	Volume (m3)					
	Alluvium shell	Rock fill shell	Core	Fine filter	Coarse filter	Rip-rap
1	4,613,063	1,085,877		26,942	112,718	
2	1,062,853	503,585				
3	3,047,972	580,173	832,600	113,007	297,452	
4	6,721,618	1,404,026	1,704,788	194,936	618,889	
5	2,959,828	2,218,395	529,181	116,774	319,506	70,804
6	519,270	3,560,305	648,159	295,978	651,769	231,785

Note: The core is composed of 10% of Fine and 90% of loam by volume

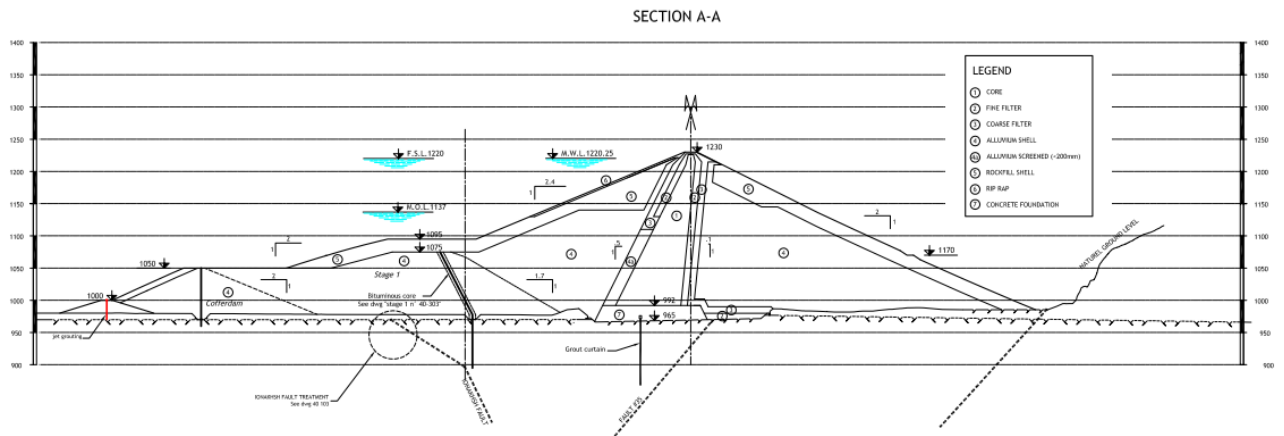


Figure 3-2: Materials definition - Section A-A.

3.2 Source of Fill Materials

The source of materials and quantities for each phases are given in the tables below. Table 3-2: Source of material

Material		Phase 1	Phase 2	Phase 3	Phase 4		Phase 5	Phase 6
1	Alluvium shell	LG1	LG1	LG2	LG2	LG1	LG1	LG1
2	Rockfill shell	Q26	Q26	Q26	Q26		Q26	Q26
4	Core (Loam)			LL3	LL3		BA17	BA17
5	Fine Filter	LG2		LG2	LG2		LG2	LG2
6	Coarse Filter	LG2		LG2	LG2		LG2	LG2
7	Rip rap						Q26	Q26

Table 3-3: Quantity of material per material and phase

Material		Phase 1	Phase 2	Phase 3	Phase 4		Phase 5	Phase 6
1	Alluvium shell	4,613,063	1,062,853	3,047,972	3,767,928	2,953,690	2,959,828	519,270
2	Rockfill shell	1,085,877	503,585	580,173	1,404,026		2,218,395	3,560,305
4	Core (Loam + Fine)			832,600	1,704,788		529,181	648,159
5	Fine Filter	26,942		113,007	194,936		116,774	295,978
6	Coarse Filter	112,718		297,452	618,889		319,506	651,769
7	Rip rap						70,804	231,785

The table below gives the description of transportation for each material and phase considered.

Table 3-4: Fill materials transportation per material and phase

Phase 1							
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Alluvium shell (by trucks)	LG1	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Alluvium shell (by conveyor)	LG1	>>>>>> >>	>>>>>> >	Load. Stat. 1	Conveyor 1-3	>>>>>> >	Dam
Rockfill shell	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Core (Loam)							
Fine Filter	LG2	>>>>>> >>	Process. Plant	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Coarse Filter	LG2	>>>>>> >>	Process. Plant	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Rip rap							
Phase 2							
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Alluvium shell	LG1	>>>>>> >>	>>>>>> >	Load. Stat. 1	Conveyor 1-3	>>>>>> >	Dam
Rockfill shell	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Core (Loam)							
Fine Filter							
Coarse Filter							
Rip rap							
Phase 3							
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Alluvium shell	LG2	>>>>>> >>	>>>>>> >	Load. Stat. 1	Conveyor 2-3	>>>>>> >	Dam
Rockfill shell	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Core (Loam)	LL3	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Fine Filter	LG2	>>>>>> >>	Process. Plant	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Coarse Filter	LG2	>>>>>> >>	Process. Plant	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Rip rap							

Phase 4							
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Alluvium shell (from LG1)	LG1	>>>>>> >>	>>>>>> >	Load. Stat. 1	Conveyor 1-3	>>>>>> >	Dam
Alluvium shell (from LG2)	LG2	>>>>>> >>	>>>>>> >	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Rockfill shell	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Core (Loam)	LL3	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Fine Filter	LG2	>>>>>> >	Process. Plant	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Coarse Filter	LG2	>>>>>> >	Process. Plant	Load. Stat. 2	Conveyor 2-3	>>>>>> >	Dam
Rip rap							
Phase 5							
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Alluvium shell	LG1	>>>>>> >>	>>>>>> >	Load. Stat. 1	Conveyor 1-3	>>>>>> >	Dam
Rockfill shell	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Core (Loam)	BA17	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Fine Filter	LG2	>>>>>> >>	Process. Plant	Load. Stat. 2	Conveyor 2-3	Inter. Stock. 2	Dam
Coarse Filter	LG2	>>>>>> >>	Process. Plant	Load. Stat. 2	Conveyor 2-3	Inter. Stock. 2	Dam
Rip rap	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Phase 6							
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Alluvium shell	LG1	>>>>>> >>	>>>>>> >	Load. Stat. 1	Conveyor 1-3	Int. Stock. 2	Dam
Rockfill shell	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Core (Loam)	BA17	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam
Fine Filter	LG2	>>>>>> >	Process. Plant	Load. Stat. 2	Conveyor 2-3	Inter. Stock. 2	Dam
Coarse Filter	LG2	>>>>>> >	Process. Plant	Load. Stat. 2	Conveyor 2-3	Inter. Stock. 2	Dam
Rip rap	Q26	>>>>>> >>	>>>>>> >	>>>>>> >	>>>>>> >	>>>>>> >	Dam

3.3 Belt Conveyor System

The weight of the materials to be transported by the belt conveyor subdivided for the seven dam phases and the two loading stations is given in the following table.

Dam Phase	Material	Loading Station 1 (t)	Loading Station 2 (t)
1	Alluvium shell	22,577,222	
	Fine filters		61,429
	Coarse filter		256,996
2	Alluvium shell	10,989,905	
3	Alluvium shell		7,162,735
	Fine filters		257,656
	Coarse filters		678,190
4	Alluvium shell	6,941,172	8,854,630
	Fine filters		444,454
	Coarse filters		1,411,066
5	Alluvium shell	6,955,595	
	Fine filters		266,246
	Coarse filters		728,475
6	Alluvium shell	1,220,285	
	Fine filters		674,830
	Coarse filters		1,486,034

PART V – Alt 3: PRICE LIST (Civil Works)

1 Introduction

In the Part V of this volume are listed the unit prices that have been applied to the Priced Bill of Quantities included in Part VI.

The main unit prices related to the excavation, concrete and fills of the dam have been established with the detailed analyses which are included in Part VIII (Annex A) of this Volume.

The unit prices of the drilling and grouting works of the dam curtains have been established according to the prevailing quotation for similar works which are under construction in foreign countries having a labor cost level close to that currently in force in Tajikistan.

The unit prices of the related to the diversion tunnels, outlets, spillways, power facilities and road-works, have been established on the analogy of the works which have been analyzed for the Phase I Cost Estimate.

The unit prices of minor works have been established partly on the analogy of the analyzed prices and partly from rates of similar projects currently in progress in various countries.

The rates are given in local and foreign currency. The currency splitting of the unit prices is in accordance with the details of the analyses performed. The currency splitting of the unit prices that have not been analyzed has been established on the analogy of the analyzed prices.

2 Table

PART VI – Alt 3: PRICE BILL OF QUANTITIES & COST SUMMARY (Civil Works)

DAM 1220

ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
A	GENERAL PROJECT COSTS								
A.I	MOBILIZATION - DEMOBILIZATION - CAMPS								
A.I.01	Mobilization and demobilization	I.s.	1		2 841 221		25 570 991		28 412 212
A.I.02	Camps, buildings and appurtenant facilities								
	1 Construction	I.s.	1		5 682 442		32 200 507		37 882 949
	2 Maintenance	I.s.	1		1 363 786		7 728 122		9 091 908
	TOTAL AMOUNT OF MOBILIZATION - DEMOBILIZATION - CAMPS				9 887 450		65 499 619		75 387 068
A.II	ROADS (CONSTRUCTION - IMPROVEMENT - MAINTENANCE)								
A.II.1	ROAD IMPROVEMENT - ROAD FROM SITE TO DUSHANBE								
	TOTAL AMOUNT OF ROAD IMPROVEMENT - ROAD FROM SITE TO DUSHANBE				1 962 552		11 121 127		13 083 679
A.II.2	ROAD IMPROVEMENT - SITE ROADS - WITHOUT ENLARGEMENT								
	TOTAL AMOUNT OF ROAD IMPROVEMENT - SITE ROADS - WITHOUT ENLARGEMENT				850 166		4 817 610		5 667 776
A.II.3	ROAD IMPROVEMENT - SITE ROADS - WITH ENLARGEMENT								
	TOTAL AMOUNT OF ROAD IMPROVEMENT - SITE ROADS - WITH ENLARGEMENT				2 411 179		13 663 347		16 074 526
A.II.4	NEW ROADS - SITE ROADS								
	TOTAL AMOUNT OF NEW ROADS - SITE ROADS				2 592 804		14 692 557		17 285 361
A.II.5	ROADS MAINTENANCE - SITE ROADS								
A.II.5.01	Maintenance of roadbed								
	1 Maintenance of concrete pavings	m ² /year	140 800	0.27	38 016	4.04	568 832	4.31	606 848
	2 Maintenance of asphalt pavings	m ² /year	752 000	0.23	172 960	1.28	962 560	1.51	1 135 520
	3 Maintenance of gravel surfacing pavings	m ² /year	6 240 000	0.20	1 248 000	1.31	8 174 400	1.51	9 422 400
A.II.5.02	Removal of landslides and rock falls from roadbed:								
	1 Roads mainly excavated in rock formations	m ³	200 112	0.14	28 016	1.25	250 140	1.39	278 156
	2 Roads mainly excavated in loose formations	m ³	240 000	0.14	33 600	1.25	300 000	1.39	333 600
A.II.5.03	Sundries								
	1 Miscellaneous works	%	8%		121 647		820 475		942 122
	TOTAL AMOUNT OF ROADS MAINTENANCE - SITE ROADS				1 642 239		11 076 407		12 718 646
	TOTAL AMOUNT OF ROADS (CONSTRUCTION - IMPROVEMENT - MAINTENANCE)				9 458 940		55 371 048		64 829 989
	TOTAL AMOUNT OF GENERAL PROJECT COSTS				19 346 390		120 870 667		140 217 057
B	DAM WORKS								
B.I	DAM - COMMON WORKS OF PHASES FROM 1 TO 6								
B.I.1	Fix Type Cableway, 25 t Capacity								
B.I.1.01	Cableway, supply and installation	I.s.	1		700 000		2 800 000		3500000
B.I.1.02	Cableway, operation and maintenance	I.s.	1		34 353		1 179 498		1213851
	Total No. B.I.1				734 353		3 979 498		4 713 851
B.I.2	Dam Excavation								
B.I.2.01	Excavation above river bed:								
	1 Excavation on right bank for clay core foundation, unclassified	m3	630 350	2.34	1 475 019	14.84	9 354 394	17.2	10 829 413
	2 Excavation on left bank for clay core foundation, unclassified	m3	467 517	2.23	1 042 563	13.38	6 255 377	15.6	7 297 940
B.I.2.02	Excavation in river bed:								

DAM 1220

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
					Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
	1	Excavation, alluvium	m3	522 789	0.31	162 065	3.62	1 892 496	3.9	2 054 561
	2	Excavation, rock	m3	20 000	1.90	38 000	9.00	180 000	10.9	218 000
		Sundries								
B.I.2.03	1	Presplitting	m2	105 913	3.56	377 051	16.25	1 721 090	19.81	2 098 141
	2	Care of wate and miscellaneous works	%	3%		92 841		582 101		674 942
		Total No. B.I.2				3 187 539		19 985 459		23 172 997
B.I.3		Protection of Dam Core Excavation Surfaces								
B.I.3.01		Surface preparation	m2	54 983	1.50	82 474	6.00	329 896	7.50	412 371
B.I.3.02		Welded wire fabric	kg	137 640	0.50	68 820	1.93	265 645	2.43	334 465
B.I.3.03		Grouted anchor bars, 22 mm diameter	m	17 760	1.44	25 574	10.97	194 827	12.41	220 402
B.I.3.04		Shotcrete, thikness 5 cm	m2	54 983	0.89	48 935	5.55	305 154	6.44	354 089
B.I.3.05		Portland cement ASTM Type I or II	t	27 491	5.16	141 855	252.60	6 944 320	257.76	7 086 176
B.I.3.06		Miscellaneous works	%	2%		7 353		160 797		168 150
		Total No. B.I.3				375 012		8 200 640		8 575 652
B.I.4		Reinforcement of Dam Core Excavation Surfaces								
B.I.4.01		Surface preparation	m2	50 931	1.50	76 396	6.00	305 583	7.50	381 979
B.I.4.02		Trellis composed of welded wire fabric	kg	24 864	0.50	12 432	1.93	47 988	2.43	60 420
B.I.4.03		Rock bolts, 25 mm diameter	m	42 920	2.62	112 450	27.27	1 170 428	29.89	1 282 879
B.I.4.04		Concrete	m3	7 640	16.40	125 292	75.80	579 094	92.20	704 386
B.I.4.05		Portland cement ASTM Type I or II	t	3 820	5.16	19 711	252.60	964 902	257.76	984 612
B.I.4.06		Miscellaneous works	%	2%		6 926		61 360		68 286
		Total No. B.I.4				353 206		3 129 354		3 482 561
B.I.5		Dam Core Plint								
B.I.5.01		Concrete works:								
	1	Concrete	m3	354 405	5.65	2 002 388	44.77	15 866 712	50.4	17 869 100
	2	Formworks, flat modular	m2	83 259	3.77	313 886	14.61	1 216 414	18.4	1 530 300
	3	Formworks, flat non modular	m2	5 638	6.06	34 164	17.78	100 237	23.8	134 400
	4	Portland cement ASTM Type I or II	t	79 741	5.16	411 464	252.60	20 142 608	257.8	20 554 072
B.I.5.02		Blanket grouting								
	1	Percussion grout holes, 64 mm diameter	m	172 899	5.90	1 020 107	33.30	5 757 552	39.2	6 777 658
	2	Cement pressure grouting (excluding materials)	t	17 290	42.60	736 533	124.85	2 158 595	167.5	2 895 128
	3	Portland cement ASTM Type I or II	t	17 290	5.16	89 214	252.60	4 367 330	257.8	4 456 544
	4	Bentonite	t	346	8.93	3 088	437.33	151 224	446.3	154 312
	5	Superplasticizer admixture	kg	51 869	0.05	2 593	2.41	125 003	2.5	127 597
B.I.5.03		Sundries:								
	1	Surface preparation	m2	20 010	1.50	30 015	6.00	120 060	7.5	150 075
	2	Steel pipes for grouting connections	kg	6 090	0.50	3 045	4.00	24 360	4.5	27 405
	3	PVC waterstops, width 300 mm	m	218	2.70	587	15.30	3 328	18.0	3 915
	4	Care of wate and miscellaneous works	%	3%		139 413		1 501 003		1 640 415
		Total No. B.I.5				4 786 498		51 534 426		56 320 923
B.I.6		Breakwater on Dam Crest								
B.I.6.01		Concrete	m3	1 738	8.20	14 252	37.90	65 870	46.10	80 122
B.I.6.02		Formworks, flat surfaces	m2	2 370	6.06	14 362	17.78	42 139	23.84	56 501
B.I.6.03		Reinforcing steel	t	87	242.54	21 077	1 308.26	113 688	1550.80	134 765
B.I.6.04		Portland cement ASTM Type I or II	t	626	5.16	3 229	252.60	158 047	257.76	161 275
B.I.6.05		Miscellaneous works	%	2%		1 058		7 595		8 653
		Total No. B.I.6				53 977		387 338		441 316
B.I.7		Grouting Galleries on Dam Abutments								
B.I.7.01		Excavation and supports:								
	1	Excavation	m3	40 764	25.00	1 019 100	102.00	4 157 928	127.00	5 177 028
	2	Rock bolts, 22 mm diameter	m	23 858	1.71	40 797	24.13	575 694	25.84	616 491
	3	Welded wire fabric	kg	42 660	0.58	24 743	2.16	92 146	2.74	116 888
	4	Shotcrete	m3	2 868	14.59	41 840	103.39	296 492	117.98	338 331
	5	Portland cement ASTM Type I or II	t	717	5.16	3 699	252.60	181 095	257.76	184 795
	6	Portland cement ASTM Type V (sulfate resistant)	t	717	6.06	4 345	296.70	212 712	302.76	217 056

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
B.1.7.02	Concrete works:								
1	Concrete, arch and sidewalls	m3	9 559	24.00	229 416	138.00	1 319 142	162.00	1 548 558
2	Concrete, invert	m3	2 686	18.00	48 348	84.00	225 624	102.00	273 972
B.1.7.03	Sundries:								
1	Portland cement ASTM Type I or II	t	2 204	5.16	11 373	252.60	556 756	257.76	568 129
2	Portland cement ASTM Type V (sulfate resistant)	t	2 204	6.06	13 357	296.70	653 956	302.76	667 313
3	Miscellaneous works	%	3%		43 111		248 146		291 257
	Total No. B.1.7				1 480 128		8 519 690		9 999 818
B.1.8	Grouting Curtains - Stage 1								
B.1.8.01	Drilling:								
1	Rotary grout holes, vertical, min. diameter 48 mm								
a)	Depth from 0 to 50 m	m	9 456	11.00	104 021	62.50	591 030	74	695 051
b)	Depth from 50 to 100 m	m	6 304	12.76	80 443	72.50	457 063	85	537 506
2	Rotary control holes, vertical, min. diameter 76 mm:								
a)	Depth from 0 to 50 m	m	297	22.10	6 564	125.10	37 155	147	43 718
b)	Depth from 50 to 100 m	m	198	25.64	5 076	145.12	28 733	171	33 809
3	Percussion drain holes, vertical, 100 mm min. diameter:								
a)	Depth from 0 to 50 m	m	6 809	8.80	59 915	49.90	339 747	59	399 662
b)	Depth from 50 to 100 m	m	4 539	10.21	46 335	57.88	262 738	68	309 072
B.1.8.02	Water pressure tests:								
1	Multiple steps	unit	157	23.00	3 605	128.00	20 064	151	23 669
B.1.8.03	Grouting:								
1	Cement pressure grouting (excluding materials), vertical holes:								
a)	Depth from 0 to 50 m	t	662	53.42	35 345	160.28	106 049	214	141 395
b)	Depth from 50 to 100 m	t	441	61.47	27 114	184.42	81 348	246	108 462
2	Portland cement ASTM Type I or II	t	551	5.16	2 845	252.60	139 277	258	142 122
3	Portland cement ASTM Type V (sulfate resistant)	t	551	6.06	3 341	296.70	163 593	303	166 934
4	Bentonite	t	11	8.93	98	437.33	4 823	446	4 921
5	Superplasticizer admixture	kg	1 654	0.05	83	2.41	3 986	2	4 069
B.1.8.04	Miscellaneous works	%	3%		11 244		67 068		78 312
	Total No. B.1.8				386 030		2 302 674		2 688 704
B.1.9	Grouting Curtains - Stage 2								
B.1.9.01	Drilling								
1	Rotary grout holes, vertical, minimum diameter 48 mm								
a)	Depth from 0 to 50 m	m	25 472	11.00	280 192	62.50	1 591 998	73.5	1 872 190
b)	Depth from 50 to 100 m	m	25 472	12.76	325 022	72.50	1 846 718	85.3	2 171 740
c)	Depth from 100 to 150 m	m	21 833	15.18	331 524	86.28	1 883 662	101.5	2 215 186
2	Rotary control holes, vertical minimum diameter 76 mm:								
a)	Depth from 0 to 50 m	m	1 681	22.10	37 153	125.10	210 308	147.2	247 461
b)	Depth from 50 to 100 m	m	1 681	25.64	43 097	145.12	243 957	170.8	287 055
c)	Depth from 100 to 150 m	m	1 441	30.51	43 959	172.69	248 837	203.2	292 796
3	Percussion drain holes, vertical, 100 mm min. diameter:								
a)	Depth from 0 to 50 m	m	18 340	8.80	161 389	49.90	915 151	58.7	1 076 540
b)	Depth from 50 to 100 m	m	18 340	10.21	187 212	57.88	1 061 575	68.1	1 248 786
c)	Depth from 100 to 150 m	m	15 720	12.15	190 956	68.88	1 082 806	81.0	1 273 762
B.1.9.02	Water pressure tests								
1	Multiple steps	unit	450	23.00	10 357	128.00	57 638	151.0	67 995
B.1.9.03	Grouting								
1	Cement pressure grouting (excluding materials), vertical holes:								
a)	Depth from 0 to 50 m	t	1 783	53.42	95 256	160.28	285 803	213.7	381 059
b)	Depth from 50 to 100 m	t	1 783	61.47	109 610	184.42	328 848	245.9	438 458
c)	Depth from 100 to 150 m	t	1 528	70.70	108 059	212.10	324 176	282.8	432 235
2	Portland cement ASTM Type I or II	t	2 547	5.16	13 144	252.60	643 462	257.8	656 606
3	Portland cement ASTM Type V (sulfate resistant)	t	2 547	6.06	15 437	296.70	755 800	302.8	771 237
4	Bentonite	t	51	8.93	455	437.33	22 281	446.3	22 736
5	Superplasticizer admixture	kg	7 642	0.05	382	2.41	18 417	2.5	18 799
B.1.9.04	Miscellaneous works	%	3%		58 596		345 643		404 239

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	Total No. B.I.9				2 011 800		11 867 081		13 878 881
	TOTAL AMOUNT OF DAM - COMMON WORKS OF PHASES FROM 1 TO 6				13 368 543		109 906 160		123 274 703
B.II	DAM - PHASE 1								
B.II.1	<u>Pre-cofferdam:</u>								
	1 Concrete blocks, 10 ton weight	m3	20 000	15.20	304 000	74.40	1 488 000	89.60	1 792 000
	2 Portland cement for ditto, Type I ASTM	t	5 200	5.16	26 832	252.60	1 313 520	257.76	1 340 352
	3 Selected rockfill, fragment weight from 1 to 2 ton	m3	11 300	2.90	32 770	22.70	256 510	25.60	289 280
	4 Selected rockfill, fragment weight from 3 to 4 ton	m3	26 200	3.50	91 700	27.20	712 640	30.70	804 340
	5 Selected rockfill, fragment weight from 5 to 7 ton	m3	6 800	4.10	27 880	31.80	216 240	35.90	244 120
	6 Clay blanket	m3	23 000	1.80	41 400	16.40	377 200	18.20	418 600
	7 Filters	m3	7 800	1.03	8 034	12.53	97 734	13.56	105 768
B.II.2	<u>Impermeabilization diaphragm of pre-cofferdam:</u>								
	1 Cased grout boreholes, 90 mm diameter	m	2 200	22.00	48 400	124.00	272 800	146.00	321 200
	2 Fiberglass valved pipes, 2" size	m	2 200	1.00	2 200	14.00	30 800	15.00	33 000
	3 Cement pressure grouting (excluding injected materials)	t	600	28.00	16 800	157.00	94 200	185.00	111 000
	4 Set paker at each valve	unit	4 400	1.50	6 600	8.50	37 400	10.00	44 000
	5 Portland cement Type I ASTM	t	600	5.16	3 096	252.60	151 560	257.76	154 656
B.II.3	<u>Ionakhsh fault treatment (grouting and hydraulic curtain):</u>								
	1 Rotary drilling grout holes, Ø 48 mm, 45 m max. depth	m	108 000	11.00	1 188 000	62.50	6 750 000	73.50	7 938 000
	2 Cement pressure grouting (excluding injected materials)	t	1 680	36.20	60 816	102.00	171 360	138.20	232 176
	3 Portland cement ASTM Type V (sulfate resistant)	t	1 680	6.06	10 181	296.70	498 456	302.76	508 637
	4 Bentonite	t	34	8.93	300	437.33	14 694	446.26	14 994
	5 Superplasticizer admixture	kg	5 040	0.05	252	2.41	12 146	2.46	12 398
	6 Hydraulic curtain (three directional drillings)	unit	3		1 694 410		15 249 689		16 944 099
B.II.4	<u>Embankment</u>								
	1 Alluvium shell (from LG1, by trucks)	m3	2 429 580	1.99	4 834 863	18.69	45 408 842	20.68	50 243 705
	2 Alluvium shell (from LG1, by conveyer)	m3	2 183 484	1.08	2 364 713	12.57	27 445 299	13.65	29 810 011
	3 Rockfill, shell zones (from Q26)	m3	1 085 877	1.56	1 693 969	11.36	12 335 566	12.92	14 029 535
	4 Filter, transition fine zone (from LG2)	m3	26 942	1.17	31 641	17.78	479 014	18.95	510 655
	5 Filter, transition coarse zone (from LG2)	m3	112 718	1.17	132 376	17.78	2 004 031	18.95	2 136 407
B.II.5	<u>Bituminous inclined impermeabilization diaphragm</u>								
	1 Excavation, alluvium	m3	2 736	0.35	958	3.70	10 123	4.05	11 081
	2 Excavation, rock	m3	5 472	1.83	10 014	8.93	48 865	10.76	58 879
	3 Rock surface preparation	m2	1 292	1.50	1 938	6.00	7 752	7.5	9 690
	4 Concrete plint for bituminous inclined core	m3	7 600	5.40	41 040	43.60	331 360	49.0	372 400
	5 Formworks	m2	2 660	6.06	16 120	17.78	47 295	23.8	63 414
	6 Portland cement ASTM Type I or II	t	1 976	5.16	10 196	252.60	499 138	257.8	509 334
	7 Bituminous inclined core	m3	17 778	58.00	1 031 124	332.00	5 902 296	390.0	6 933 420
B.II.6	<u>Sundries</u>								
	1 Dam instrumentation	i.s.	1		181 151		1 753 455		1 934 606
	2 Care of water and miscellaneous works	%	4.5%		626 120		5 580 809		6 206 929
	TOTAL AMOUNT OF DAM - PHASE 1				14 539 892		129 598 794		144 138 686
B.III	DAM PHASES FROM 2 TO 6								
B.III.1	Dam Phase 2								
	1 Alluvium shell (from LG1)	m3	1 062 853	1.08	1 151 070	12.57	13 359 536	13.65	14 510 607
	2 Rockfill, shell zones (from Q26)	m3	503 585	1.33	669 768	8.69	4 376 154	10.02	5 045 923
	3 Dam instrumentation	i.s.	1		36 417		354 714		391 131
	4 Miscellaneous works	%	2.5%		46 431		452 260		498 691
	Total No. B.III.1				1 903 687		18 542 665		20 446 351
B.III.2	Dam phase 3								
	1 Alluvium shell (from LG2)	m3	3 047 972	0.89	2 698 979	10.60	32 320 698	11.49	35 019 678
	2 Rockfill, shell zones (from Q26)	m3	580 173	1.39	806 440	9.38	5 442 022	10.77	6 248 463

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
3	Core (loam from LL3)	m3	832 600	1.65	1 374 622	12.81	10 663 936	14.46	12 038 558
4	Filter, transition fine zone (from LG2)	m3	113 007	1.40	158 707	19.62	2 217 106	21.02	2 375 813
5	Filter, transition coarse zone (from LG2)	m3	297 452	1.40	417 741	19.62	5 835 764	21.02	6 253 505
6	Dam instrumentation	l.s.	1		109 130		1 129 591		1 238 720
7	Miscellaneous works	%	2.5%		139 140		1 440 228		1 579 368
	Total No. B.III.2				5 704 760		59 049 345		64 754 106
B.III.3	Dam phase 4								
1	Alluvium shell (from LG2)	m3	3 767 928	1.13	4 240 803	12.82	48 319 905	13.95	52 560 707
2	Alluvium shell (from LG1)	m3	2 953 690	1.36	4 025 880	15.17	44 806 002	16.53	48 831 882
3	Rockfill, shell zones (from Q26)	m3	1 404 026	1.56	2 190 281	11.28	15 837 415	12.84	18 027 696
4	Core (loam from LL3)	m3	1 704 788	1.85	3 145 333	14.61	24 908 653	16.46	28 053 986
5	Filter, transition fine zone (from LG2)	m3	194 936	1.70	332 249	22.55	4 395 646	24.25	4 727 895
6	Filter, transition coarse zone (from LG2)	m3	618 889	1.70	1 054 834	22.55	13 955 445	24.25	15 010 279
7	Dam instrumentation	l.s.	1		299 788		3 044 461		3 344 249
8	Miscellaneous works	%	2.5%		374 734		3 805 577		4 180 311
	Total No. B.III.3				15 663 901		159 073 104		174 737 005
B.III.4	Dam phase 5								
1	Alluvium shell (from LG1)	m3	2 959 828	1.40	4 152 638	15.59	46 142 236	16.99	50 294 875
2	Rockfill, shell zones (from Q26)	m3	2 218 395	1.62	3 593 799	11.98	26 576 367	13.60	30 170 166
3	Core (loam from BA17)	m3	529 181	1.89	999 624	15.07	7 974 765	16.96	8 974 389
4	Filter, transition fine zone (from LG2)	m3	116 774	1.59	186 185	23.73	2 770 965	25.32	2 957 150
5	Filter, transition coarse zone (from LG2)	m3	319 506	1.59	509 421	23.73	7 581 631	25.32	8 091 052
6	Rip-rap (from Q26)	m3	70 804	2.09	147 980	17.53	1 241 188	19.62	1 389 168
7	Dam instrumentation	l.s.	1		191 793		1 845 743		2 037 536
8	Miscellaneous works	%	2.5%		244 536		2 353 322		2 597 858
	Total No. B.III.4				10 025 976		96 486 218		106 512 194
B.III.5	Dam phase 6								
1	Alluvium shell (from LG1)	m3	519 270	1.57	816 812	18.79	9 756 830	20.36	10 573 642
2	Rockfill, shell zones (from Q26)	m3	3 560 305	1.66	5 910 106	12.41	44 183 384	14.07	50 093 490
3	Core (loam from BA17)	m3	648 159	1.93	1 251 595	15.38	9 967 392	17.31	11 218 988
4	Filter, transition fine zone (from LG2)	m3	295 978	1.92	569 580	24.63	7 289 700	26.55	7 859 280
5	Filter, transition coarse zone (from LG2)	m3	651 769	1.92	1 254 265	24.63	16 052 561	26.55	17 306 826
6	Rip-rap (from Q26)	m3	231 785	2.21	512 246	18.87	4 373 789	21.08	4 886 035
7	Dam instrumentation	l.s.	1		206 292		1 832 473		2 038 765
8	Miscellaneous works	%	2.5%		263 022		2 336 403		2 599 426
	Total No. B.III.5				10 783 919		95 792 532		106 576 451
	TOTAL AMOUNT OF DAM PHASES FROM 2 TO 6				44 082 243		428 943 865		473 026 108
	TOTAL AMOUNT OF DAM WORKS				71 990 679		668 448 819		740 439 498
C	UNDERGROUND WORKS								
C.I	POWER SYSTEM STRUCTURES								
C.I.1	POWERHOUSE, MISCELLANEOUS WORKS, REMEDIAL WORKS								
C.I.1.1	SURFACE WORKS OF UNDERGROUND STRUCTURES								
C.I.1.1.1	Level 1 and Level 2 Diversion Tunnel, Outlet Culverts								
C.I.1.1.1.01	Excavation and supports:								
1	Excavation, common	m ³	42 650.0	0.40	17 060	4.47	190 646	4.87	207 706
2	Excavation, rock	m ³	10 650.0	1.73	18 425	8.30	88 395	10.03	106 820
3	Excavation, common, under water (restor. the original riverbed)	m3	226 000.0	1.00	226 000	10.84	2 449 840	11.84	2 675 840
C.I.1.1.1.02	Concrete works:								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
1	Concrete, foundation and mat	m ³	65 070.0	6.14	399 530	33.64	2 188 955	39.78	2 588 485
2	Concrete, above foundation	m ³	87 950.0	8.30	729 985	34.10	2 999 095	42.40	3 729 080
3	Reinforcing steel	t	7 500.0	242.54	1 819 050	1 308.26	9 811 950	1 550.80	11 631 000
4	Formworks	m ²	47 600.0	6.06	288 453	17.78	846 192	23.84	1 134 645
5	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
6	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³	22 660.0	3.56	80 670	7.61	172 443	11.17	253 112
C.I.1.1.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	53 557.0	5.16	276 354	252.60	13 528 498	257.76	13 804 852
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	10%		385 553		3 227 601		3 613 154
	Total No. C.I.1.1.1				4 241 079		35 503 614		39 744 693
C.I.1.1.2	Diversion Tunnels River Crossing Culverts								
C.I.1.1.2.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	12 875.0	0.23	2 897	2.44	31 402	2.66	34 299
2	Excavation, rock	m ³	38 625.0	1.31	50 614	5.05	195 087	6.36	245 701
3	Overhauling in excess of 500 m, common material	m ³ /km	38 625.0	0.07	2 704	0.81	31 286	0.88	33 990
4	Overhauling in excess of 500 m, rock	m ³ /km	115 875.0	0.09	10 406	1.03	119 699	1.12	130 104
5	Rock bolts, 22 mm diameter	m	1 700.0	1.71	2 907	21.50	36 550	23.21	39 457
6	Rock bolts, 26.5 mm diameter	m	1 300.0	2.62	3 406	27.27	35 451	29.89	38 857
7	Rock bolts, 32 mm diameter	m	500.0	2.81	1 405	35.42	17 710	38.23	19 115
8	Shotcrete	m ³	360.0	15.10	5 436	93.73	33 743	108.83	39 179
9	Welded wire fabric	kg	9 000.0	0.50	4 500	1.93	17 370	2.43	21 870
C.I.1.1.2.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	31 200.0	5.10	159 120	29.54	921 648	34.64	1 080 768
2	Concrete elevation	m ³	151 380.0	8.30	1 256 454	34.10	5 162 058	42.40	6 418 512
3	Concrete, filling	m ³	20 400.0	6.35	129 540	34.33	700 332	40.68	829 872
4	Reinforcing steel	t	6 390.0	242.54	1 549 831	1 308.26	8 359 781	1 550.80	9 909 612
5	Flat type Formworks	m ²	15 670.0	6.06	94 959	17.78	278 568	23.84	373 527
6	Curved type Formworks	m ²	4 400.0	10.67	46 961	26.77	117 773	37.44	164 735
7	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
8	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³	28 450.0	3.56	101 282	7.61	216 505	11.17	317 787
9	Overhauling in excess of 1000 m from batching plant	m ³ /km	182 580.0	0.11	20 084	0.86	157 019	0.97	177 103
C.I.1.1.2.03	Sundries:								
1	Portland cement, type I or II ASTM	t	58 587.6	5.16	302 312	252.60	14 799 228	257.76	15 101 540
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Backfill, random material	m ³	7 800.0	0.26	2 063	1.83	14 262	2.09	16 325
4	Compaction of Backfill	m ³	7 800.0	0.12	936	0.97	7 566	1.09	8 502
5	Care of water and miscellaneous works	%	3%		112 434		937 591		1 050 026
	Total No. C.I.1.1.2				3 860 251		32 190 629		36 050 880
C.I.1.1.3	Stage 1 Power Tunnel Intake								
C.I.1.1.3.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	50.0	0.31	16	3.37	169	3.68	184
2	Excavation, rock	m ³	430.0	1.53	658	6.38	2 743	7.91	3 401
3	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
C.I.1.1.3.02	<u>Concrete works:</u>								
1	Concrete	m ³	1 620.0	13.00	21 060	38.28	62 014	51.28	83 074
2	Reinforcing steel	t	83.7	242.54	20 301	1 308.26	109 591	1 550.80	129 802
3	Miscellaneous steel works	kg	5 800.0	0.77	4 466	5.23	30 334	6.00	34 800
4	Formworks	m ²	570.0	6.73	3 836	20.10	11 457	26.83	15 293
C.I.1.1.3.03	Sundries:								
1	Portland cement, type I or II ASTM	t	567.0	5.16	2 926	252.60	143 224	257.76	146 150
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Miscellaneous	%	2%		1 065		7 189		8 254
	Total No. C.I.1.1.3				54 327		366 631		420 958
	Total No. C.I.1.1				8 155 657		68 060 875		76 216 531

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.I.1.2	POWER FACILITIES								
C.I.1.2.1	Stage 1 Power Tunnel								
C.I.1.2.1.01	Excavation and supports:								
	1 Excavation (up to gate chamber)	m ³	1 340.7	7.80	10 457	32.64	43 760	40.44	54 218
	2 Rock bolts, 26.5 mm diameter	m	29.0	2.83	82	31.18	905	34.01	987
C.I.1.2.1.02	Concrete works:								
	1 Concrete, full ring (up to gate chamber)	m ³	548.1	11.30	6 194	79.87	43 777	91.17	49 970
	2 Reinforcing steel	t	30.8	325.47	10 015	1 359.52	41 832	1 684.99	51 847
	3 Percussion contact grout holes, 40-48 mm min. diameter	m	34.8	4.04	141	18.36	639	22.40	780
	4 Rotary consolidation grout holes, 40-48 mm min. diameter	m	348.2	8.99	3 130	27.90	9 715	36.89	12 845
	5 Contact & consolidation cement grouting, excluding materials	t	18.6	42.60	791	124.85	2 317	167.45	3 108
C.I.1.2.1.03	Sundries:								
	1 Portland cement ASTM type I or II	t	107.9	5.16	557	252.60	27 265	257.76	27 822
	2 Portland cement ASTM type V (sulfate resistant)	t	107.9	6.06	654	296.70	32 025	302.76	32 679
	3 Care of water and miscellaneous works	%	3%		961		6 067		7 028
	Total No. C.I.1.2.1				32 981		208 303		241 284
C.I.1.2.2	Power Tunnel Stage 1 - Erection Chamber & Penstocks								
C.I.1.2.2.01	Concrete works:								
	1 Concrete, penstocks	m ³	1 660.0	5.99	9 943	40.60	67 396	46.59	77 339
	2 Reinforcing steel	t	41.5	325.47	13 507	1 399.52	58 080	1 724.99	71 587
C.I.1.2.2.02	Sundries:								
	1 Portland cement ASTM type I or II	t	257.3	5.16	1 328	252.60	64 994	257.76	66 322
	2 Portland cement ASTM type V (sulfate resistant)	t	257.3	6.06	1 559	296.70	76 341	302.76	77 900
	3 Care of water and miscellaneous	%	3%		790		8 004		8 794
	Total No. C.I.1.2.2				27 127		274 815		301 943
C.I.1.2.3	Powerhouse, Stage 2 below elevations 966.5 - 962.2 masl								
C.I.1.2.3.01	Excavation and supports:								
	1 Excavation								
	Units 5 and 6 from El. 962.20 to El. 946.90	m ³	23 818	7.00	166 726	43.00	1 024 174	50.00	1 190 900
	Units 5 and 6 from El. 946.90 to El. 932.50	m ³	5 082	12.00	60 984	53.00	269 346	65.00	330 330
	Units 1 to 4 from El. 966.50 to El. 946.90	m ³	35 597	7.00	249 179	43.00	1 530 671	50.00	1 779 850
	Units 1 to 4 from El. 946.90 to El. 932.50	m ³	9 073	12.00	108 876	53.00	480 869	65.00	589 745
	2 Grouted anchor bars, 36 mm diameter, lateral walls	m	9 410	2.05	19 299	22.48	211 576	24.54	230 875
C.I.1.2.3.02	Concrete Works								
	1 Concrete from Elevation 932.50 to 953.70 masl	m ³	12 600	8.00	100 800	63.00	793 800	71.00	894 600
	2 Concrete from Elevation 953.0 to 974.60 masl	m ³	25 200	10.00	252 000	79.00	1 990 800	89.00	2 242 800
	3 Concrete for Structures (stairways etc.)	m ³	786	51.00	40 086	120.00	94 320	171.00	134 406
	4 Reinforcing Steel	t	1 965	325.47	639 549	1 359.52	2 671 457	1 684.99	3 311 005
C.I.1.2.3.03	Drilling and grouting:								
	1 Percussion contact grout holes, 40-48 mm diameter	m	1 610	4.04	6 504	18.36	29 560	22.40	36 064
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	6 425	8.99	57 761	37.90	243 508	46.89	301 268
	3 Drain Holes 75 mm diameter, vault	m		5.68		28.91		34.59	
	4 Drain Holes 75 mm diameter, lateral walls	m		5.68		28.91		34.59	
	5 Contact pressure grouting excluding injected materials	t	32	39.94	1 278	121.05	3 874	160.99	5 152
	6 Consolidation pressure grouting excluding injected materials	t	321	45.26	14 528	127.52	40 934	172.78	55 462
C.I.1.2.3.04	Sundries:								
	1 Portland cement ASTM type I or II	t	6 929	5.16	35 754	252.60	1 750 278	257.76	1 786 032
	2 Portland cement ASTM type V (sulfate resistant)	t	6 929	6.06	41 990	296.70	2 055 849	302.76	2 097 839
	3 Tendons, 70 t capacity, PHA 7K7 15 mm L=12	ea		250.95		1 162.06		1 413.01	
	4 Tendons, 70 t capacity, PHA 7K7 15 mm L=15	ea		289.79		1 325.48		1 615.27	
	5 Tendons, 70 t capacity, PHA 7K7 15 mm L=19	ea	129	350.60	45 227	1 575.00	203 175	1 925.60	248 402
	6 Care of water and miscellaneous	%	10.0%		184 054		1 339 419		1 523 473
	Total No. C.I.1.2.3				2 024 596		14 733 608		16 758 204

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.I.1.2.4	Transformer Chamber								
C.I.1.2.4.01	Excavation and supports:								
1	Excavation	m ³	23 110	6.48	149 753	30.25	699 078	36.73	848 830
2	Rock bolts, 36 mm diameter	m	1 150	3.02	3 473	39.12	44 988	42.14	48 461
C.I.1.2.4.02	Concrete works:								
1	Concrete from Elevation 967.00 to 983.20 masl	m ³	18 570	8.00	148 560	63.00	1 169 910	71.00	1 318 470
2	Concrete from Elevation 983.2 to 991.30 masl	m ³	11 400	10.00	114 000	79.00	900 600	89.00	1 014 600
3	Concrete for Structures (stairways etc.)	m ³	3 731	51.00	190 281	120.00	447 720	171.00	638 001
4	Reinforcing steel	t	1 647	325.47	536 091	1 399.52	2 305 191	1 724.99	2 841 283
C.I.1.2.4.03	Drilling and grouting:								
1	Drain holes, 75 mm diameter	m		5.68		28.91		34.59	
C.I.1.2.4.04	Sundries:								
1	Portland cement ASTM type I or II	t	6 066	5.16	31 301	252.60	1 532 317	257.76	1 563 619
2	Portland cement ASTM type V (sulfate resistant)	t	6 066	6.06	36 761	296.70	1 799 836	302.76	1 836 597
3	Tendons, 70 t capacity, PHA 7K7 15 mm L=17	ea	62	313.60	19 443	1 408.80	87 346	1 722.40	106 789
4	Tendons, 70 t capacity, PHA 7K7 15 mm L=19	ea	48	350.60	16 829	1 575.00	75 600	1 925.60	92 429
5	Care of water and miscellaneous	%	10.0%		124 649		906 259		1 030 908
	Total No. C.I.1.2.4				1 371 142		9 968 844		11 339 986
C.I.1.2.5	Bus Duct Galleries (Units 1 to 4)								
C.I.1.2.5.01	Excavation and supports:								
1	Excavation	m ³	14 991	9.10	136 418	44.59	668 449	53.69	804 867
2	Rock bolts, 26.5 mm diameter	m	2 670	2.83	7 556	31.18	83 251	34.01	90 807
3	Rock bolts, 32 mm diameter	m	3 600	3.02	10 872	39.12	140 832	42.14	151 704
C.I.1.2.5.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	5 112	13.00	66 456	105.00	536 760	118.00	603 216
2	Concrete, invert	m ³	2 379	6.10	14 512	46.00	109 434	52.10	123 946
3	Reinforcing steel	t	504	325.47	164 037	1 359.52	685 198	1 684.99	849 235
C.I.1.2.5.03	Sundries:								
1	Portland cement ASTM type I or II	t	1 348	5.16	6 958	252.60	340 601	257.76	347 558
2	Portland cement ASTM type V (sulfate resistant)	t	1 348	6.06	8 171	296.70	400 064	302.76	408 236
3	Care of water and miscellaneous	%	3%		12 449		88 938		101 387
	Total No. C.I.1.2.5				427 429		3 053 526		3 480 955
C.I.1.2.6	Draft Tubes (Units 1 to 6)								
C.I.1.2.6.01	Excavation and supports:								
1	Excavation	m ³	45 384	11.99	543 973	58.71	2 664 404	70.69	3 208 376
2	Rock bolts, 32 mm diameter	m	17 256	3.02	52 112	39.12	675 036	42.14	727 148
C.I.1.2.6.02	Concrete works:								
1	Concrete lining	m ³	17 475	20.60	359 987	99.62	1 740 871	120.22	2 100 859
2	Reinforcing steel	t	745	325.47	242 462	1 359.52	1 012 788	1 684.99	1 255 250
C.I.1.2.6.03	Sundries:								
1	Portland cement ASTM type I or II	t	3 146	5.16	16 231	252.60	794 559	257.76	810 790
2	Portland cement ASTM type V (sulfate resistant)	t	3 146	6.06	19 062	296.70	933 276	302.76	952 338
3	Care of water and miscellaneous	%	3%		37 015		234 628		271 643
	Total No. C.I.1.2.6				1 270 841		8 055 562		9 326 404
C.I.1.2.7	Draft Tubes Collector of Units 1-2-3 (Upstream Stretch)								
C.I.1.2.7.01	Excavation and supports:								
1	Excavation	m ³	7 769.4	7.27	56 484	34.80	270 375	42.07	326 859
2	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
3	Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
4	Rock bolts, 32 mm diameter	m	2 046.3	3.02	6 180	39.12	80 051	42.14	86 231
5	Steel ribs	kg	44 727.9	0.13	5 815	2.94	131 500	3.07	137 315
C.I.1.2.7.02	Concrete works:								
1	Concrete, arch	m ³	609.1	14.65	8 921	165.48	100 787	180.13	109 708
2	Concrete, sidewalls	m ³	517.0	17.25	8 918	83.40	43 115	100.65	52 034

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
3	Concrete, invert and mat	m ³	263.6	6.04	1 592	45.14	11 901	51.18	13 493
4	Reinforcing steel	t	80.5	325.47	26 200	1 359.52	109 441	1 684.99	135 642
C.I.1.2.7.03	<u>Drilling and grouting:</u>								
1	Drain holes, 50-76 mm diameter	m		5.68		28.91		34.59	
2	Contact & consolidation cement grouting, excluding materials	t	4.8	42.60	204	124.85	599	167.45	804
C.I.1.2.7.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	252.5	5.16	1 303	252.60	63 792	257.76	65 095
2	Portland cement ASTM type V (sulfate resistant)	t	252.5	6.06	1 530	296.70	74 929	302.76	76 459
3	Care of water and miscellaneous works	%	3%		3 514		26 595		30 109
	Total No. C.I.1.2.7				120 662		913 086		1 033 748
C.I.1.2.8	Draft Tubes Main Collector of Units 1-2-3 (Downstream Stretch)								
C.I.1.2.8.01	<u>Excavation and supports:</u>								
1	Excavation	m ³	46 943.5	6.61	310 297	31.63	1 484 823	38.24	1 795 119
2	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
3	Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
4	Rock bolts, 32 mm diameter	m	22 384.9	3.02	67 602	39.12	875 697	42.14	943 300
5	Steel ribs	kg	54 873.1	0.13	7 134	2.94	161 327	3.07	168 460
C.I.1.2.8.02	<u>Concrete works:</u>								
1	Concrete, arch	m ³	2 836.2	13.95	39 565	157.60	446 985	171.55	486 550
2	Concrete, sidewalls	m ³	2 338.3	16.43	38 418	79.43	185 731	95.86	224 149
3	Concrete, invert and mat	m ³	1 686.5	5.75	9 697	42.99	72 503	48.74	82 200
4	Reinforcing steel	t	376.6	325.47	122 572	1 359.52	511 995	1684.99	634 567
C.I.1.2.8.03	<u>Drilling and grouting:</u>								
1	Drain holes, 50-76 mm diameter	m	3 128.2	5.68	17 768	28.91	90 435	34.59	108 203
2	Contact & consolidation cement grouting, excluding materials	t	21.9	42.60	933	124.85	2 734	167.45	3 667
C.I.1.2.8.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	1 245.9	5.16	6 429	252.60	314 722	257.76	321 151
2	Portland cement ASTM type V (sulfate resistant)	t	1 245.9	6.06	7 550	296.70	369 667	302.76	377 218
3	Care of water and miscellaneous works	%	3%		18 839		135 499		154 338
	Total No. C.I.1.2.8				646 804		4 652 119		5 298 923
C.I.1.2.9	Draft Tubes Collector of Units 4-5-6 (Upstream Stretch - Sections 1 and 2)								
C.I.1.2.9.01	<u>Excavation and supports:</u>								
1	Excavation	m ³		7.27		34.80		42.07	
2	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
3	Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
4	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
5	Steel ribs	kg		0.13		2.94		3.07	
C.I.1.2.9.02	<u>Concrete works:</u>								
1	Concrete, arch	m ³	970.0	14.65	14 208	165.48	160 516	180.13	174 724
2	Concrete, sidewalls	m ³	834.0	17.25	14 388	83.40	69 557	100.65	83 945
3	Concrete, invert and mat	m ³	425.0	6.04	2 566	45.14	19 184	51.18	21 750
4	Reinforcing steel	t	131.0	325.47	42 637	1 359.52	178 097	1 684.99	220 734
C.I.1.2.9.03	<u>Drilling and grouting:</u>								
1	Drain holes, 50-76 mm diameter	m		5.68		28.91		34.59	
2	Contact & consolidation cement grouting, excluding materials	t	4.6	42.60	196	124.85	574	167.45	770
C.I.1.2.9.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	404	5.16	2 082	252.60	101 929	257.76	104 011
2	Portland cement ASTM type V (sulfate resistant)	t	404	6.06	2 445	296.70	119 724	302.76	122 170
3	Care of water and miscellaneous works	%	3%		2 356		19 487		21 843
	Total No. C.I.1.2.9				80 877		669 069		749 947
C.I.1.2.10	Draft Tubes Main Collector of Units 4-5-6 (Downstream Stretch - Sections 3 and 4)								
C.I.1.2.10.01	<u>Excavation and supports:</u>								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
	1 Excavation	m ³		6.61		31.63		38.24	
	2 Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
	3 Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
	4 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	5 Steel ribs	kg		0.13		2.94		3.07	
C.I.1.2.10.02	<u>Concrete works:</u>								
	1 Concrete, arch	m ³	1 348.0	13.95	18 805	157.60	212 445	171.55	231 249
	2 Concrete, sidewalls	m ³	989.0	16.43	16 249	79.43	78 556	95.86	94 806
	3 Concrete, invert and mat	m ³	751.0	5.75	4 318	42.99	32 285	48.74	36 604
	4 Reinforcing steel	t	158.2	325.47	51 474	1 359.52	215 011	1 684.99	266 485
C.I.1.2.10.03	<u>Drilling and grouting:</u>								
	1 Drain holes, 50-76 mm diameter	m	1 565.4	5.68	8 891	28.91	45 256	34.59	54 147
	2 Contact & consolidation cement grouting, excluding materials	t	11.9	42.60	507	124.85	1 486	167.45	1 993
C.I.1.2.10.04	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	562	5.16	2 899	252.60	141 908	257.76	144 807
	2 Portland cement ASTM type V (sulfate resistant)	t	562	6.06	3 404	296.70	166 683	302.76	170 088
	3 Care of water and miscellaneous works	%	3%		3 196		26 809		30 005
	Total No. C.I.1.2.10				109 744		920 439		1 030 183
C.I.1.2.11	Switchyard								
C.I.1.2.11.01	<u>Excavation and supports:</u>								
	1 Excavation, common	m ³	265 000.0	0.40	106 000	4.47	1 184 550	4.87	1 290 550
	2 Excavation, rock	m ³	394 600.0	1.73	682 658	8.30	3 275 180	10.03	3 957 838
C.I.1.2.11.02	<u>Concrete works:</u>								
	1 Concrete, foundation and mat	m ³	11 985.0	6.14	73 588	33.64	403 175	39.78	476 763
	2 Concrete, above foundation	m ³	2 115.0	8.30	17 555	34.10	72 122	42.40	89 676
	3 Reinforcing steel	t	705.0	242.54	170 991	1 308.26	922 323	1 550.80	1 093 314
	4 Formworks	m ²	4 230.0	6.06	25 634	17.78	75 197	23.84	100 831
	5 Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
	6 Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.I.1.2.11.03	<u>Sundries:</u>								
	1 Portland cement, type I or II ASTM	t	4 935.0	5.16	25 465	252.60	1 246 581	257.76	1 272 046
	2 Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
	3 Care of water and miscellaneous works	%	3%		33 057		215 374		248 431
	Total No. C.I.1.2.11				1 134 946		7 394 502		8 529 448
C.I.1.2.12	Cables Duct								
C.I.1.2.12.01	<u>Excavation and supports:</u>								
	1 Excavation, common	m ³	4 375.5	0.40	1 750	4.47	19 558	4.87	21 309
	2 Excavation, rock	m ³	6 562.5	1.73	11 353	8.30	54 469	10.03	65 822
	3 Grouted anchor bars, 32 mm diameter	m	726.0	1.63	1 183	15.71	11 405	17.34	12 589
C.I.1.2.12.02	<u>Concrete works:</u>								
	1 Concrete, foundation and mat	m ³	2 481.0	6.14	15 233	33.64	83 461	39.78	98 694
	2 Concrete, above foundation	m ³	3 033.0	8.30	25 174	34.10	103 425	42.40	128 599
	3 Reinforcing steel	t	414.0	242.54	100 412	1 308.26	541 620	1 550.80	642 031
	4 Formworks	m ²	5 268.0	6.06	31 924	17.78	93 650	23.84	125 574
	5 Scaffolding for slab formworks, 20 KN/m ² max. load	m ³	1 350.0	2.98	4 023	4.57	6 170	7.55	10 193
	6 Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.I.1.2.12.03	<u>Sundries:</u>								
	1 Portland cement, type I or II ASTM	t	1 985.0	5.16	10 243	252.60	501 421	257.76	511 664
	2 Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
	3 Care of water and miscellaneous works	%	3%		6 039		42 455		48 494
	Total No. C.I.1.2.12				207 334		1 457 634		1 664 968
	Total No. C.I.1.2				7 454 485		52 301 508		59 755 992
C.I.1.3	DRAINAGE AND VENTILATION GALLERIES								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.I.1.3.1	Powerhouse Drainage Gallery, High Level								
C.I.1.3.1.01	Excavation and supports:								
1	Excavation	m ³	38 102.0	14.28	544 097	64.48	2 456 817	78.76	3 000 914
2	Rock bolts, 22 mm diameter	m	6 475.0	1.71	11 072	24.13	156 242	25.84	167 314
3	Rock bolts, 26.5 mm diameter	m	1 140.0	2.83	3 226	31.18	35 545	34.01	38 771
C.I.1.3.1.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	3 695.0	17.52	64 736	108.42	400 612	125.94	465 348
2	Concrete, invert	m ³	2 700.0	15.32	41 364	67.17	181 359	82.49	222 723
3	Reinforcing steel	t	241.0	325.47	78 438	1 359.52	327 644	1 684.99	406 083
C.I.1.3.1.03	Drilling and grouting:								
1	Drain holes, 75 mm diameter	m	25 335.0	5.68	143 903	28.91	732 435	34.59	876 338
2	Percussion contact grouting holes, 40-48 mm dia.	m	770.0	5.68	4 374	28.91	22 261	34.59	26 634
3	Contact pressure grouting (excluding injected materials)	t	21.9	42.60	934	124.85	2 739	167.45	3 673
C.I.1.3.1.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 162	5.16	5 996	252.60	293 538	257.76	299 535
2	Portland cement ASTM type V (sulfate resistant)	t	1 162	6.06	7 042	296.70	344 786	302.76	351 828
3	Care of water and miscellaneous works	%	3%		27 155		148 619		175 775
	Total No. C.I.1.3.1				932 338		5 102 597		6 034 935
C.I.1.3.2	Ventilation shaft								
C.I.1.3.2.01	Excavation and supports:								
1	Excavation	m ³	5 799.0	32.00	185 569	128.00	742 276	160.00	927 846
2	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
3	Rock bolts, 26.5 mm diameter	m	2 961.3	2.83	8 380	31.18	92 333	34.01	100 714
4	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
5	Shotcrete	m ³	178.9	14.59	2 610	103.39	18 498	117.98	21 108
6	Welded wire fabric	kg	4 472.8	0.58	2 594	2.16	9 661	2.74	12 256
7	Steel ribs	kg	1 789.1	0.13	233	2.94	5 260	3.07	5 493
C.I.1.3.2.02	Concrete works:								
1	Concrete, shaft	m ³	1 202.0	30.00	36 061	211.00	253 628	241.00	289 689
6	Reinforcing steel	t	72.1	325.47	23 473	1 359.52	98 051	1 684.99	121 524
C.I.1.3.2.03	Drilling and grouting:								
1	Drain holes, 50-76 mm diameter	m		5.68		28.91		34.59	
2	Contact & consolidation cement grouting, excluding materials	t	7.2	42.60	306	124.85	896	167.45	1 201
C.I.1.3.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	254	5.16	1 312	252.60	64 210	257.76	65 522
2	Portland cement ASTM type V (sulfate resistant)	t	254	6.06	1 540	296.70	75 420	302.76	76 961
3	Care of water and miscellaneous works	%	3%		7 862		40 807		48 669
	Total No. C.I.1.3.2				269 941		1 401 041		1 670 983
C.I.1.3.3	Ventilation Gallery								
C.I.1.3.3.01	Excavation and supports:								
1	Excavation	m ³	16 683.1	8.77	146 311	37.35	623 114	46.12	769 425
2	Rock bolts, 22 mm diameter	m	915.5	1.71	1 566	24.13	22 091	25.84	23 657
3	Rock bolts, 26.5 mm diameter	m	7 719.7	2.83	21 847	31.18	240 700	34.01	262 547
4	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
5	Shotcrete	m ³	490.0	14.59	7 149	103.39	50 661	117.98	57 810
6	Welded wire fabric	kg	12 250.0	0.58	7 105	2.16	26 460	2.74	33 565
7	Steel ribs	kg	25 933.0	0.13	3 371	2.94	76 243	3.07	79 614
C.I.1.3.3.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	2 800.0	9.10	25 480	83.30	233 240	92.40	258 720
2	Concrete, invert and mat	m ³	1 434.4	7.70	11 045	55.70	79 896	63.40	90 941
3	Reinforcing steel	t	232.9	325.47	75 799	1 359.52	316 621	1 684.99	392 421
C.I.1.3.3.03	Drilling and grouting:								
1	Drain holes, 50-76 mm diameter	m		5.68		28.91		34.59	
2	Contact & consolidation cement grouting, excluding materials	t	13.4	42.60	571	124.85	1 673	167.45	2 244
C.I.1.3.3.04	Sundries:								
1	Portland cement ASTM type I or II	t	851	5.16	4 393	252.60	215 031	257.76	219 423

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
2	Portland cement ASTM type V (sulfate resistant)	t	851	6.06	5 159	296.70	252 572	302.76	257 731
3	Care of water and miscellaneous works	%	3%		9 294		64 149		73 443
	Total No. C.I.1.3.3				319 089		2 202 451		2 521 540
	Total No. C.I.1.3				1 521 368		8 706 089		10 227 457
C.I.1.4	VARIOUS BUILDINGS								
	Control Building, Service Building, Administration Building				2 000 000		8 000 000		10 000 000
C.I.1.5	Powerhouse, Remedial Works								
3.01	Excavation and supports:								
1	Rock bolts, 36 mm diameter, crown	m	10 575	3.82	40 432	49.53	523 737	53.35	564 168
3.02	Concrete Works								
1	Concrete for Additional Crown Lining	m ³	1 515	41.64	63 091	97.99	148 449	139.63	211 539
2	Reinforcing Steel	t	135	325.47	43 938	1 359.52	183 535	1 684.99	227 474
3.03	Drilling and grouting:								
1	Consolidation pressure grouting excluding injected materials	t	3 646	45.26	165 018	127.52	464 938	172.78	629 956
3.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 088	5.16	10 775	252.60	527 460	257.76	538 235
2	Portland cement ASTM type V (sulfate resistant)	t	2 088	6.06	12 654	296.70	619 547	302.76	632 201
3	Tendons, 80 t capacity, PHA 7K7 15 mm L=35	ea	2 160	790.16	1 706 746	3 548.79	7 665 386	4 338.95	9 372 132
4	Multiple Packer Sleeved Pipes	m	34 040	19.50	663 780	370.50	12 611 820	390.00	13 275 600
5	Care of water and miscellaneous	%	10.0%		270 643		2 274 487		2 545 131
	Total No. C.I.1.5				2 977 076		25 019 359		27 996 436
	TOTAL AMOUNT OF POWERHOUSE, MISCELLANEOUS WORKS, REMEDIAL WORKS				22 108 586		162 087 831		184 196 417
C.I.2	UPSTREAM WATERWAYS								
C.I.2.1	SURFACE WORKS - Intake Structures								
C.I.2.1.01	Excavation and supports:								
1	Excavation, common	m ³	256 074.5	0.25	64 019	2.71	693 962	2.96	757 981
2	Excavation, rock	m ³	512 149.0	1.46	747 738	5.61	2 873 156	7.07	3 620 894
3	Overhauling in excess of 500 m, common material	m ³ /km	768 223.6	0.07	53 776	0.81	622 261	0.88	676 037
4	Overhauling in excess of 500 m, rock	m ³ /km	1 536 447.1	0.09	137 973	1.03	1 587 150	1.12	1 725 123
5	Rock bolts, 22 mm diameter	m	14 429.1	1.71	24 674	21.50	310 225	23.21	334 899
6	Rock bolts, 26.5 mm diameter	m	10 306.5	2.62	27 003	27.27	281 058	29.89	308 061
7	Rock bolts, 32 mm diameter	m	8 245.2	2.81	23 169	35.42	292 045	38.23	315 214
8	Grouted anchor bars, 22 mm diameter	m	22 674.3	1.44	32 651	10.97	248 737	12.41	281 388
9	Grouted anchor bars, 26 mm diameter	m	18 551.7	1.58	29 312	12.80	237 461	14.38	266 773
10	Grouted anchor bars, 32 mm diameter	m	32 828.3	1.63	53 510	15.71	515 733	17.34	569 243
11	Shotcrete	m ³	8 588.7	15.10	129 690	93.73	805 023	108.83	934 713
12	Welded wire fabric	kg	254 226.7	0.50	127 113	1.93	490 658	2.43	617 771
C.I.2.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	51 214.9	5.10	261 196	29.54	1 512 888	34.64	1 774 084
2	Concrete elevation	m ³	144 682.1	8.30	1 200 861	34.10	4 933 660	42.40	6 134 521
3	Reinforcing steel	t	9 794.9	242.54	2 375 643	1 308.26	12 814 211	1 550.80	15 189 854
4	Flat type Formworks	m ²	126 756.9	6.06	768 139	17.78	2 253 375	23.84	3 021 514
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³	40 971.9	3.56	145 860	7.61	311 796	11.17	457 656
C.I.2.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	66 552.0	5.16	343 408	252.60	16 811 029	257.76	17 154 437
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		196 372		1 427 833		1 624 205
	Total No. C.I.2.1				6 742 106		49 022 261		55 764 367
C.I.2.2	UNDERGROUND WORKS - Headrace Tunnels Stretch up to Gates Chamber (Circular) - six tunnels from 140 to 104 m								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.I.2.2.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	10 560	8.02	84 691	33.87	357 667	41.89	442 358
	c) Rock Class III	m ³	15 840	8.77	138 917	37.35	591 624	46.12	730 541
	d) Rock Class IV	m ³	18 480	9.24	170 755	40.89	755 647	50.13	926 402
	e) Rock Class V	m ³	7 920	10.24	81 101	45.20	357 984	55.44	439 085
2	Grouted anchor bars, 22 mm diameter	m	5 120	1.49	7 629	13.63	69 786	15.12	77 414
3	Grouted anchor bars, 26 mm diameter	m	3 200	1.58	5 056	15.28	48 896	16.86	53 952
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	2 560	1.71	4 378	24.13	61 773	25.84	66 150
6	Rock bolts, 26.5 mm diameter	m	1 280	2.83	3 622	31.18	39 910	34.01	43 533
7	Rock bolts, 32 mm diameter	m	640	3.02	1 933	39.12	25 037	42.14	26 970
8	Shotcrete	m ³	1 275	14.59	18 602	103.39	131 822	117.98	150 425
9	Welded wire fabric	kg	32 200	0.58	18 676	2.16	69 552	2.74	88 228
10	Steel ribs	kg	102 420	0.13	13 315	2.94	301 115	3.07	314 429
C.I.2.2.02	Concrete works:								
1	Concrete	m ³	19 215	12.90	247 874	91.50	1 758 173	104.40	2 006 046
2	Reinforcing steel	t	1 155	325.47	375 918	1 359.52	1 570 246	1 684.99	1 946 163
C.I.2.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 965	4.04	7 939	18.36	36 077	22.40	44 016
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	13 900	8.99	124 961	27.90	387 810	36.89	512 771
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	625	42.60	26 625	124.85	78 031	167.45	104 656
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.I.2.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	7 348	5.16	37 913	252.60	1 855 991	257.76	1 893 904
2	Portland cement ASTM type V (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		41 097		254 914		296 011
	Total No. C.I.2.2				1 411 001		8 752 055		10 163 056
C.I.2.3	UNDERGROUND WORKS - Gates Chamber and Gates Shaft (six structures)								
C.I.2.3.01	Excavation and supports:								
1	Excavation								
	a) Gates Chamber	m ³	29 000	9.20	266 800	41.70	1 209 300	50.90	1 476 100
	b) Gates Shaft	m ³	36 480	32.00	1 167 360	128.00	4 669 440	160.00	5 836 800
2	Grouted anchor bars, 22 mm diameter	m	6 300	1.49	9 387	13.63	85 869	15.12	95 256
3	Grouted anchor bars, 26 mm diameter	m	4 600	1.58	7 268	15.28	70 288	16.86	77 556
4	Grouted anchor bars, 32 mm diameter	m	2 000	1.62	3 240	17.76	35 520	19.38	38 760
5	Rock bolts, 22 mm diameter	m	3 700	1.71	6 327	24.13	89 281	25.84	95 608
6	Rock bolts, 26.5 mm diameter	m	1 900	2.83	5 377	31.18	59 242	34.01	64 619
7	Rock bolts, 32 mm diameter	m	920	3.02	2 778	39.12	35 990	42.14	38 769
8	Shotcrete	m ³	2 710	14.59	39 539	103.39	280 187	117.98	319 726
9	Welded wire fabric	kg	67 420	0.58	39 104	2.16	145 627	2.74	184 731
10	Steel ribs	kg		0.13		2.94		3.07	
C.I.2.3.02	Concrete works:								
1	Concrete of gates chamber, backfill	m ³	20 050	8.00	160 400	47.00	942 350	55.00	1 102 750
2	Concrete, gates shaft	m ³	17 400	30.00	522 000	211.00	3 671 400	241.00	4 193 400
3	Reinforcing steel	t	2 180	325.47	709 525	1 359.52	2 963 754	1 684.99	3 673 278
C.I.2.3.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 290	4.04	5 212	18.36	23 684	22.40	28 896
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	21 560	8.99	193 824	27.90	601 524	36.89	795 348
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	930	42.60	39 618	124.85	116 111	167.45	155 729

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	5 Cement grouting between concrete and steel lining	m ²	8 275	2.85	23 584	8.55	70 751	11.40	94 335
	6 Bentonite	t		8.93		437.33		446.26	
C.I.2.3.04	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	7 774	5.16	40 111	252.60	1 963 586	257.76	2 003 697
	2 Portland cement ASTM type V (sulfate resistant)	t	6 360	6.06	38 542	296.70	1 887 012	302.76	1 925 554
	3 Care of water and miscellaneous works	%	3%		98 400		567 627		666 027
	Total No. C.I.2.2				3 378 395		19 488 544		22 866 939
C.I.2.4	UNDERGROUND WORKS - Penstocks Erection Chamber (145 m)								
C.I.2.4.01	<u>Excavation and supports:</u>								
	1 Rock Excavation	m ³	65 000	9.20	598 000	41.70	2 710 500	50.90	3 308 500
	2 Grouted anchor bars, 22 mm diameter	m	1 920	1.49	2 861	13.63	26 170	15.12	29 030
	3 Grouted anchor bars, 26 mm diameter	m	1 600	1.58	2 528	15.28	24 448	16.86	26 976
	4 Grouted anchor bars, 32 mm diameter	m	670	1.62	1 085	17.76	11 899	19.38	12 985
	5 Rock bolts, 22 mm diameter	m	1 280	1.71	2 189	24.13	30 886	25.84	33 075
	6 Rock bolts, 26.5 mm diameter	m	670	2.83	1 896	31.18	20 891	34.01	22 787
	7 Rock bolts, 32 mm diameter	m	320	3.02	966	39.12	12 518	42.14	13 485
	8 Shotcrete	m ³	455	14.59	6 638	103.39	47 042	117.98	53 681
	9 Welded wire fabric	kg	11 350	0.58	6 583	2.16	24 516	2.74	31 099
	10 Steel ribs	kg		0.13		2.94		3.07	
C.I.2.4.02	<u>Concrete works:</u>								
	1 Concrete	m ³	18 800	16.00	300 800	150.00	2 820 000	166.00	3 120 800
	2 Reinforcing steel	t	1 315	325.47	427 993	1 359.52	1 787 769	1 684.99	2 215 762
C.I.2.4.03	<u>Drilling and grouting:</u>								
	1 Percussion contact grout holes, 40-48 mm diameter	m	275	4.04	1 111	18.36	5 049	22.40	6 160
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	7 100	8.99	63 829	27.90	198 090	36.89	261 919
	3 Drain holes, 76 mm diameter	m	5 080	5.68	28 854	28.91	146 863	34.59	175 717
	4 Contact & consolidation cement grouting, excluding materials	t	380	42.60	16 188	124.85	47 443	167.45	63 631
	5 Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
	6 Bentonite	t		8.93		437.33		446.26	
C.I.2.4.04	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	3 626	5.16	18 709	252.60	915 864	257.76	934 573
	2 Portland cement ASTM type V (sulfate resistant)	t	2 975	6.06	18 029	296.70	882 683	302.76	900 711
	3 Care of water and miscellaneous works	%	3%		44 948		291 379		336 327
	Total No. C.I.2.4				1 543 208		10 004 010		11 547 218
C.I.2.5	UNDERGROUND WORKS - Horizontal Penstocks								
C.I.2.5.01	<u>Excavation and supports:</u>								
	1 Excavation								
	a) Rock Class I	m ³		10.33		42.90		53.23	
	b) Rock Class II	m ³	4 175	11.31	47 219	48.00	200 400	59.31	247 619
	c) Rock Class III	m ³	3 350	12.43	41 641	54.70	183 245	67.13	224 886
	d) Rock Class IV	m ³	6 690	13.11	87 706	59.16	395 780	72.27	483 486
	e) Rock Class V	m ³	2 500	14.58	36 450	68.13	170 325	82.71	206 775
	2 Grouted anchor bars, 22 mm diameter	m	1 885	1.49	2 809	13.63	25 693	15.12	28 501
	3 Grouted anchor bars, 26 mm diameter	m	1 000	1.58	1 580	15.28	15 280	16.86	16 860
	4 Grouted anchor bars, 32 mm diameter	m	350	1.62	567	17.76	6 216	19.38	6 783
	5 Rock bolts, 22 mm diameter	m	800	1.71	1 368	24.13	19 304	25.84	20 672
	6 Rock bolts, 26.5 mm diameter	m	500	2.83	1 415	31.18	15 590	34.01	17 005
	7 Rock bolts, 32 mm diameter	m	150	3.02	453	39.12	5 868	42.14	6 321
	8 Shotcrete	m ³	465	14.59	6 784	103.39	48 076	117.98	54 861
	9 Welded wire fabric	kg	8 420	0.58	4 884	2.16	18 187	2.74	23 071
	10 Steel ribs	kg		0.13		2.94		3.07	
C.I.2.5.02	<u>Concrete works:</u>								
	1 Concrete, backfill	m ³	6 350	17.00	107 950	115.00	730 250	132.00	838 200

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
	Reinforcing steel	t		325.47		1 359.52		1 684.99	
C.I.2.5.03	Drilling and grouting:								
	1 Percussion contact grout holes, 40-48 mm diameter	m		4.04		18.36		22.40	
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m		8.99		27.90		36.89	
	3 Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
	4 Contact & consolidation cement grouting, excluding materials	t		42.60		124.85		167.45	
	5 Cement grouting between concrete and steel lining	m ²	6 280	2.85	17 898	8.55	53 694	11.40	71 592
	6 Bentonite	t		8.93		437.33		446.26	
C.I.2.5.04	Sundries:								
	1 Portland cement ASTM type I or II	t	1 241	5.16	6 405	252.60	313 540	257.76	319 945
	2 Portland cement ASTM type V (sulfate resistant)	t	1 000	6.06	6 060	296.70	296 700	302.76	302 760
	3 Care of water and miscellaneous works	%	3%		11 136		74 944		86 080
	Total No. C.I.2.5				382 324		2 573 093		2 955 416
C.I.2.6	UNDERGROUND WORKS - Penstocks shafts and blocks								
C.I.2.6.01	Excavation and supports:								
	1 Excavation of shaft, rock	m ³	49 080	28.00	1 374 240	112.00	5 496 960	140.00	6 871 200
	2 Excavation of blocks, rock	m ³	89 028	9.20	819 058	41.70	3 712 468	50.90	4 531 525
	3 Grouted anchor bars, 22 mm diameter	m	11 260	1.49	16 777	13.63	153 474	15.12	170 251
	4 Grouted anchor bars, 26 mm diameter	m	7 500	1.58	11 850	15.28	114 600	16.86	126 450
	5 Grouted anchor bars, 32 mm diameter	m	5 400	1.62	8 748	17.76	95 904	19.38	104 652
	6 Rock bolts, 22 mm diameter	m	7 500	1.71	12 825	24.13	180 975	25.84	193 800
	7 Rock bolts, 26.5 mm diameter	m	3 560	2.83	10 075	31.18	111 001	34.01	121 076
	8 Rock bolts, 32 mm diameter	m	1 830	3.02	5 527	39.12	71 590	42.14	77 116
	9 Shotcrete	m ³	5 116	14.59	74 642	103.39	528 943	117.98	603 586
	10 Welded wire fabric	kg	128 430	0.58	74 489	2.16	277 409	2.74	351 898
	11 Steel ribs	kg		0.13		2.94		3.07	
C.I.2.6.02	Concrete works:								
	1 Concrete, penstock shaft	m ³	15 075	17.00	256 275	115.00	1 733 625	132.00	1 989 900
	2 Concrete, blocks	m ³	68 610	9.00	617 490	52.00	3 567 720	61.00	4 185 210
	3 Reinforcing steel	t	140	325.47	45 566	1 359.52	190 333	1 684.99	235 899
C.I.2.6.03	Drilling and grouting:								
	1 Percussion contact grout holes, 40-48 mm diameter	m		4.04		18.36		22.40	
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m		8.99		27.90		36.89	
	3 Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
	4 Contact & consolidation cement grouting, excluding materials	t		42.60		124.85		167.45	
	5 Cement grouting between concrete and steel lining	m ²	42 325	2.85	120 626	8.55	361 879	11.40	482 505
	6 Bentonite	t		8.93		437.33		446.26	
C.I.2.6.04	Sundries:								
	1 Portland cement ASTM type I or II	t	15 211	5.16	78 491	252.60	3 842 400	257.76	3 920 890
	2 Portland cement ASTM type V (sulfate resistant)	t	13 870	6.06	84 052	296.70	4 115 229	302.76	4 199 281
	3 Care of water and miscellaneous works	%	3%		108 322		736 635		844 957
	Total No. C.I.2.5				3 719 053		25 291 143		29 010 197
	TOTAL AMOUNT OF UPSTREAM WATERWAYS				17 176 086		115 131 106		132 307 192
	TOTAL AMOUNT OF POWER SYSTEM STRUCTURES				39 284 672		277 218 937		316 503 609
C.II	RIVER DIVERSION STRUCTURES								
C.II.1	DIVERSION TUNNELS - REMEDIAL WORKS								
C.II.1.1	Tunnel Pressure Stretch (D-shaped) - 471.5 m								
C.II.1.1.01	Excavation and supports:								
	1 Grouted anchor bars, 26 mm diameter	m	15 850	1.58	25 043	15.28	242 188	16.86	267 231
C.II.1.1.02	Concrete works:								
	1 Concrete, arch and sidewalls	m ³	5 530	9.10	50 323	83.30	460 649	92.40	510 972
	2 Concrete, invert	m ³	2 370	7.70	18 249	55.70	132 009	63.40	150 258
	3 Reinforcing steel	t	237	325.47	77 136	1 359.52	322 206	1 684.99	399 343

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
4	Lattice Girders Ribs	kg	365 900	0.68	248 812	2.82	1 031 838	3.50	1 280 650
C.II.1.1.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	815	4.04	3 293	18.36	14 963	22.40	18 256
2	Drain holes, 76 mm diameter	m	21 125	5.68	119 990	28.91	610 724	34.59	730 714
3	Contact & consolidation cement grouting, excluding materials	t	33	42.60	1 389	124.85	4 070	167.45	5 459
C.II.1.1.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 538	5.16	7 934	252.60	388 398	257.76	396 332
2	Portland cement ASTM type V (sulfate resistant)	t	1 260	6.06	7 636	296.70	373 842	302.76	381 478
3	Care of water and miscellaneous works	%	3%		16 794		107 427		124 221
	Total N° C.II.1.1				576 598		3 688 314		4 264 912
C.II.1.2	Tunnel Free-flow Stretch (D-shaped) - 1010.9 m - 60 cm thick								
C.II.1.2.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	43 670	1.58	68 999	15.28	667 278	16.86	736 276
C.II.1.2.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	24 405	9.10	222 086	83.30	2 032 937	92.40	2 255 022
2	Concrete, invert	m ³	10 460	7.70	80 542	55.70	582 622	63.40	663 164
3	Reinforcing steel	t	1 046	325.47	340 442	1 359.52	1 422 058	1 684.99	1 762 500
4	Lattice Girders Ribs	kg	1 106 350	0.68	752 318	2.82	3 119 907	3.50	3 872 225
C.II.1.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	2 780	4.04	11 231	18.36	51 041	22.40	62 272
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	23 765	5.32	126 430	22.59	536 851	27.91	663 281
3	Drain holes, 76 mm diameter	m	48 520	5.68	275 594	28.91	1 402 713	34.59	1 678 307
4	Contact & consolidation cement grouting, excluding materials	t	1 100	42.60	46 860	124.85	137 335	167.45	184 195
C.II.1.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	7 771	5.16	40 097	252.60	1 962 891	257.76	2 002 989
2	Portland cement ASTM type V (sulfate resistant)	t	5 532	6.06	33 524	296.70	1 641 344	302.76	1 674 868
3	Care of water and miscellaneous works	%	3%		59 944		406 709		466 653
	Total N° C.II.1.2				2 058 065		13 963 687		16 021 751
C.II.1.3	Transition Downstream from Gates and Sloped Stretch - 392 m								
C.II.1.3.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	15 410	1.58	24 348	15.28	235 465	16.86	259 813
2	High strength rock bolts (Dywidag type), 26 mm, 60 t w.l.	m	22 565	5.66	127 718	62.36	1 407 153	68.02	1 534 871
C.II.1.3.02	Drilling and grouting:								
1	Drain holes, 76 mm diameter	m	19 260	5.68	109 397	28.91	556 807	34.59	666 203
C.II.1.3.03	Sundries:								
1	Care of water and miscellaneous works	%	3%		7 844		65 983		73 827
	Total N° C.II.1.3				269 306		2 265 408		2 534 714
C.II.1.4	Tunnel Free-flow Stretch (D-shaped) - 77.7 m - 180 cm thick								
C.II.1.4.01	Excavation and supports:								
1	High strength rock bolts (Dywidag type), 26 mm, 60 t w.l.	m	4 350	5.66	24 621	62.36	271 266	68.02	295 887
C.II.1.4.02	Drilling and grouting:								
1	Drain holes, 76 mm diameter	m	4 740	5.68	26 923	28.91	137 033	34.59	163 957
C.II.1.4.03	Sundries:								
1	Care of water and miscellaneous works	%	3%		1 546		12 249		13 795
	Total N° C.II.1.4				53 091		420 548		473 639
C.II.1.5	Maintenance, Emergency and Sector Gates Structures								
C.II.1.5.01	Drilling and grouting:								
1	Drain holes, 101 mm diameter	m	3 030	8.70	26 361	49.20	149 076	57.90	175 437
C.II.1.5.02	Sundries:								
1	Care of water and miscellaneous works	%	5%		1 318		7 454		8 772
	Total N° C.II.1.5				27 679		156 530		184 209
C.II.1.6	Drainage and Grouting Tunnels D/S from T-2 (D-shaped) - 450 m long								
C.II.1.6.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m ³		7.10		28.19		35.29	
b)	Rock Class II	m ³	1 875	8.02	15 038	33.87	63 506	41.89	78 544

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ITEM	Description of Works	Unit	Quantity	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	c) Rock Class III	m ³	1 210	8.77	10 612	37.35	45 194	46.12	55 805
	d) Rock Class IV	m ³	3 345	9.24	30 908	40.89	136 777	50.13	167 685
	e) Rock Class V	m ³	1 735	10.24	17 766	45.20	78 422	55.44	96 188
2	Grouted anchor bars, 22 mm diameter	m	1 800	1.49	2 682	13.63	24 534	15.12	27 216
3	Grouted anchor bars, 26 mm diameter	m	1 200	1.58	1 896	15.28	18 336	16.86	20 232
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	800	1.71	1 368	24.13	19 304	25.84	20 672
6	Rock bolts, 26.5 mm diameter	m	600	2.83	1 698	31.18	18 708	34.01	20 406
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	430	14.59	6 274	103.39	44 458	117.98	50 731
9	Welded wire fabric	kg	10 100	0.58	5 858	2.16	21 816	2.74	27 674
10	Steel ribs	kg	86 100	0.13	11 193	2.94	253 134	3.07	264 327
C.II.1.6.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	3 000	9.10	27 300	83.30	249 900	92.40	277 200
2	Concrete, invert	m ³	1 140	7.70	8 778	55.70	63 498	63.40	72 276
3	Reinforcing steel	t	224	325.47	72 905	1 359.52	304 532	1 684.99	377 438
C.II.1.6.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	375	4.04	1 515	18.36	6 885	22.40	8 400
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	7 185	5.32	38 224	22.59	162 309	27.91	200 533
3	Drain holes, 76 mm diameter	m	9 050	5.68	51 404	28.91	261 636	34.59	313 040
4	Contact & consolidation cement grouting, excluding materials	t	520	42.60	22 152	124.85	64 922	167.45	87 074
5	Bentonite	t		8.93		437.33		446.26	
C.II.1.6.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	1 183	5.16	6 102	252.60	298 700	257.76	304 801
2	Portland cement ASTM type V (sulfate resistant)	t	980	6.06	5 939	296.70	290 766	302.76	296 705
3	Care of water and miscellaneous works	%	3%		10 188		72 820		83 008
	Total N° C.II.1.6				349 799		2 500 156		2 849 956
	TOTAL AMOUNT OF DIVERSION TUNNELS - REMEDIAL WORKS				3 334 539		22 994 642		26 329 181
C.II.2	DIVERSION TUNNEL 3								
C.II.2.1	SURFACE WORKS - Intake Structure								
C.II.2.1.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	35 000.0	0.25	8 750	2.71	94 850	2.96	103 600
2	Excavation, rock	m ³	55 000.0	1.46	80 300	5.61	308 550	7.07	388 850
3	Overhauling in excess of 500 m, common material	m ³ /km	122 500.0	0.07	8 575	0.81	99 225	0.88	107 800
4	Overhauling in excess of 500 m, rock	m ³ /km	192 500.0	0.09	17 287	1.03	198 853	1.12	216 139
5	Rock bolts, 22 mm diameter	m	3 000.0	1.71	5 130	21.50	64 500	23.21	69 630
6	Rock bolts, 26.5 mm diameter	m	1 200.0	2.62	3 144	27.27	32 724	29.89	35 868
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	410.0	15.10	6 191	93.73	38 429	108.83	44 620
9	Welded wire fabric	kg	10 200.0	0.50	5 100	1.93	19 686	2.43	24 786
C.II.2.1.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	2 520.0	5.10	12 852	29.54	74 441	34.64	87 293
2	Concrete elevation	m ³	5 685.0	8.30	47 186	34.10	193 859	42.40	241 044
3	Reinforcing steel	t	492.5	242.54	119 451	1 308.26	644 318	1 550.80	763 769
4	Flat type Formworks	m ²	4 940.0	6.06	29 936	17.78	87 819	23.84	117 755
5	Curved type Formworks	m ²	950.0	10.67	10 139	26.77	25 428	37.44	35 568
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.II.2.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	2 810.1	5.16	14 500	252.60	709 831	257.76	724 331
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Backfill, random material	m ³	45 000.0	0.26	11 903	1.83	82 283	2.09	94 185
4	Care of water and miscellaneous works	%	3%		11 413		80 244		91 657
	Total No. C.II.2.1				391 856		2 755 039		3 146 896
C.II.2.2	SURFACE WORKS - Outlet Structures including chute and flip bucket								
C.II.2.2.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	108 000.0	0.25	27 000	2.71	292 680	2.96	319 680

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
2	Excavation, rock	m ³	217 000.0	1.46	316 820	5.61	1 217 370	7.07	1 534 190
3	Overhauling in excess of 500 m, common material	m ³ /km	378 000.0	0.07	26 460	0.81	306 180	0.88	332 640
4	Overhauling in excess of 500 m, rock	m ³ /km	759 500.0	0.09	68 203	1.03	784 564	1.12	852 767
5	Rock bolts, 22 mm diameter	m	4 700.0	1.71	8 037	21.50	101 050	23.21	109 087
6	Rock bolts, 26.5 mm diameter	m	3 500.0	2.62	9 170	27.27	95 445	29.89	104 615
7	Rock bolts, 32 mm diameter	m	1 500.0	2.81	4 215	35.42	53 130	38.23	57 345
8	Grouted anchor bars, 22 mm diameter	m	5 500.0	1.44	7 920	10.97	60 335	12.41	68 255
9	Grouted anchor bars, 26 mm diameter	m	4 000.0	1.58	6 320	12.80	51 200	14.38	57 520
10	Grouted anchor bars, 32 mm diameter	m	2 000.0	1.63	3 260	15.71	31 420	17.34	34 680
11	Shotcrete	m ³	2 220.0	15.10	33 522	93.73	208 081	108.83	241 603
12	Welded wire fabric	kg	55 500.0	0.50	27 750	1.93	107 115	2.43	134 865
C.II.2.2.02	Concrete works:								
1	Concrete, foundation and mat	m ³	20 950.0	5.10	106 845	29.54	618 863	34.64	725 708
2	Concrete elevation	m ³	6 000.0	8.30	49 800	34.10	204 600	42.40	254 400
3	Reinforcing steel	t	1 350.0	242.54	327 429	1 308.26	1 766 151	1 550.80	2 093 580
4	Flat type Formworks	m ²	8 140.0	6.06	49 328	17.78	144 706	23.84	194 034
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.II.2.2.03	Sundries:								
1	Portland cement, type I or II ASTM	t	9 623.0	5.16	49 655	252.60	2 430 770	257.76	2 480 424
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Tendons, 70 t capacity, PHA 7K7 15 mm L=18	ea	30.0	332.13	9 964	1 491.67	44 750	1 823.80	54 714
4	Care of water and miscellaneous works	%	3%		33 951		255 552		289 503
	Total No. C.II.2.2				1 165 648		8 773 961		9 939 610
C.II.2.3	SURFACE WORKS - Plunge Pool and Left Bank Slope								
C.II.2.3.01	Excavation and supports:								
1	Excavation, common	m ³	266 266.7	0.25	66 567	2.71	721 583	2.96	788 149
2	Excavation, rock	m ³	133 133.3	1.46	194 375	5.61	746 878	7.07	941 253
3	Excavation, common, under water	m ³	178 400.0	1.00	178 400	10.84	1 933 856	11.84	2 112 256
4	Excavation, rock, under water	m ³	89 200.0	3.29	293 022	12.62	1 125 927	15.91	1 418 949
5	Excavation, trench for cut-off	m ³	4 500.0	0.50	2 250	4.80	21 600	5.30	23 850
6	Overhauling in excess of 500 m, common material	m ³ /km	898 333.3	0.07	62 883	0.81	727 650	0.88	790 533
7	Overhauling in excess of 500 m, rock	m ³ /km	444 666.7	0.09	39 931	1.03	459 341	1.12	499 272
C.II.2.3.02	Concrete works:								
1	Concrete, cut-off	m ³	4 500.0	5.10	22 950	29.54	132 930	34.64	155 880
2	Reinforcing steel	t	135.0	242.54	32 743	1 308.26	176 615	1 550.80	209 358
C.II.2.3.03	Sundries:								
1	Rip-rap protection	m ³	3 000.0	2.88	8 640	16.32	48 960	19.20	57 600
2	Portland cement, type I or II ASTM	t	1 440.0	5.16	7 430	252.60	363 744	257.76	371 174
3	Care of water and miscellaneous works	%	5%		45 460		322 954		368 414
	Total No. C.II.2.3				954 651		6 782 038		7 736 688
C.II.2.4	UNDERGROUND WORKS - Tunnel Pressure Stretch (Circular) - 491 m - deducted executed works								
C.II.2.4.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m ³		4.97		26.97		31.94	
b)	Rock Class II	m ³		5.59		29.93		35.52	
c)	Rock Class III	m ³	6 793	6.20	42 132	33.10	224 879	39.31	267 011
d)	Rock Class IV	m ³	47 450	6.72	318 710	35.83	1 700 101	42.55	2 018 811
e)	Rock Class V	m ³	24 288	7.34	178 351	40.42	981 845	47.77	1 160 196
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m	3 173	1.58	5 014	15.28	48 491	16.86	53 505
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	29 752	1.71	50 875	24.13	717 904	25.84	768 779
6	Rock bolts, 26.5 mm diameter	m	3 570	2.83	10 104	31.18	111 318	34.01	121 422
7	Rock bolts, 32 mm diameter	m	992	3.02	2 995	39.12	38 796	42.14	41 791
8	Shotcrete	m ³	1 210	14.59	17 652	103.39	125 091	117.98	142 743
9	Welded wire fabric	kg	51 728	0.58	30 002	2.16	111 732	2.74	141 735
10	Steel ribs	kg	728 353	0.13	94 686	2.94	2 141 358	3.07	2 236 044

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.II.2.4.02	Concrete works:								
1	Concrete, arch	m ³	21 917	8.90	195 061	75.20	1 648 155	84.10	1 843 215
2	Concrete, sidewalls	m ³	17 534	11.40	199 883	54.70	959 086	66.10	1 158 968
3	Concrete, invert	m ³	13 150	6.00	78 901	43.00	565 457	49.00	644 358
4	Reinforcing steel	t	3 642	325.47	1 185 227	1 359.52	4 950 808	1 684.99	6 136 035
C.II.2.4.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	3 570	4.04	14 424	18.36	65 549	22.40	79 972
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	14 866	8.99	133 644	27.90	414 757	36.89	548 401
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	570	42.60	24 292	124.85	71 194	167.45	95 486
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.4.04	Sundries:								
1	Portland cement ASTM type I or II	t	10 025	5.16	51 731	252.60	2 532 433	257.76	2 584 164
2	Portland cement ASTM type V (sulfate resistant)	t	10 025	6.06	60 754	296.70	2 974 556	302.76	3 035 310
3	Care of water and miscellaneous works	%	3%		80 833		611 505		692 338
	Total No. C.II.2.4				2 775 272		20 995 017		23 770 288
C.II.2.5	UNDERGROUND WORKS - Tunnel Free-flow Stretch (horseshoe) - 588 m								
C.II.2.5.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		4.99		26.86		31.85	
	b) Rock Class II	m ³	104 638	5.54	579 928	29.57	3 093 746	35.11	3 673 674
	c) Rock Class III	m ³	38 960	6.14	239 108	32.70	1 273 962	38.84	1 513 069
	d) Rock Class IV	m ³	30 041	6.63	199 215	35.38	1 062 977	42.02	1 262 192
	e) Rock Class V	m ³	20 384	7.35	149 808	40.26	820 639	47.61	970 447
2	Grouted anchor bars, 22 mm diameter	m	4 275	1.49	6 370	13.63	58 267	15.12	64 637
3	Grouted anchor bars, 26 mm diameter	m	5 441	1.58	8 596	15.28	83 135	16.86	91 732
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	7 705	1.71	13 175	24.13	185 911	25.84	199 086
6	Rock bolts, 26.5 mm diameter	m	9 084	2.83	25 708	31.18	283 245	34.01	308 953
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	2 380	14.59	34 729	103.39	246 104	117.98	280 833
9	Welded wire fabric	kg	66 261	0.58	38 431	2.16	143 124	2.74	181 555
10	Steel ribs	kg	332 083	0.13	43 171	2.94	976 323	3.07	1 019 494
C.II.2.5.02	Concrete works:								
1	Concrete, arch	m ³	26 096	8.90	232 258	75.20	1 962 448	84.10	2 194 705
2	Concrete, sidewalls	m ³	14 680	11.40	167 357	54.70	803 019	66.10	970 376
3	Concrete, invert	m ³	24 474	6.00	146 843	43.00	1 052 376	49.00	1 199 219
4	Reinforcing steel	t	3 187	325.47	1 037 192	1 359.52	4 332 451	1 684.99	5 369 643
C.II.2.5.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	4 110	4.04	16 603	18.36	75 455	22.40	92 058
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 469	8.99	40 178	27.90	124 691	36.89	164 870
3	Drain holes, 76 mm diameter	m	10 085	5.68	57 282	28.91	291 554	34.59	348 837
4	Contact & consolidation cement grouting, excluding materials	t	233	42.60	9 933	124.85	29 112	167.45	39 045
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.5.04	Sundries:								
1	Portland cement ASTM type I or II	t	11 185	5.16	57 712	252.60	2 825 216	257.76	2 882 928
2	Portland cement ASTM type V (sulfate resistant)	t	11 000	6.06	66 660	296.70	3 263 700	302.76	3 330 360
3	Care of water and miscellaneous works	%	10%		317 026		2 298 745		2 615 771
	Total No. C.II.2.5				3 487 283		25 286 200		28 773 484
C.II.2.6	UNDERGROUND WORKS - Upstream Emergency Gates Chamber - 160 m								
C.II.2.6.01	Excavation and supports:								
1	Rock Excavation	m ³	70 110	9.20	645 012	41.70	2 923 587	50.90	3 568 599
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m		1.58		15.28		16.86	
4	Grouted anchor bars, 32 mm diameter	m	5 450	1.62	8 829	17.76	96 792	19.38	105 621
5	Rock bolts, 22 mm diameter	m	3 500	1.71	5 985	24.13	84 455	25.84	90 440
6	Rock bolts, 26.5 mm diameter	m	5 000	2.83	14 150	31.18	155 900	34.01	170 050

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
7	Rock bolts, 32 mm diameter	m	3 200	3.02	9 664	39.12	125 184	42.14	134 848
8	Shotcrete	m ³	415	14.59	6 055	103.39	42 907	117.98	48 962
9	Welded wire fabric	kg	10 300	0.58	5 974	2.16	22 248	2.74	28 222
10	Steel ribs	kg		0.13		2.94			3.07
C.II.2.6.02	Concrete works:								
1	Concrete	m ³	35 615	16.00	569 840	150.00	5 342 250	166.00	5 912 090
2	Reinforcing steel	t	1 960	325.47	637 921	1 359.52	2 664 659	1 684.99	3 302 580
C.II.2.6.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 720	4.04	6 949	18.36	31 579	22.40	38 528
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	3 300	8.99	29 667	27.90	92 070	36.89	121 737
3	Drain holes, 76 mm diameter	m	290	5.68	1 647	28.91	8 384	34.59	10 031
4	Contact & consolidation cement grouting, excluding materials	t	123	42.60	5 240	124.85	15 357	167.45	20 596
5	Cement grouting between concrete and steel lining	m ²	2 545	2.85	7 253	8.55	21 760	11.40	29 013
6	Bentonite	t		8.93		437.33			446.26
C.II.2.6.04	Sundries:								
1	Portland cement ASTM type I or II	t	6 192	5.16	31 948	252.60	1 563 986	257.76	1 595 934
2	Portland cement ASTM type V (sulfate resistant)	t	5 515	6.06	33 421	296.70	1 636 301	302.76	1 669 721
3	Steel lining	kg	499 460	0.77	384 584	5.23	2 612 176	6.00	2 996 760
4	Care of water and miscellaneous works	%	3%		72 124		523 188		595 312
	Total No. C.II.2.6				2 476 264		17 962 781		20 439 045
C.II.2.7	UNDERGROUND WORKS - Downstream Emergency & Sector Gates Chamber - 201 m								
C.II.2.7.01	Excavation and supports:								
1	Rock Excavation	m ³	100 220	9.20	922 024	41.70	4 179 174	50.90	5 101 198
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m		1.58		15.28		16.86	
4	Grouted anchor bars, 32 mm diameter	m	4 600	1.62	7 452	17.76	81 696	19.38	89 148
5	Rock bolts, 22 mm diameter	m	5 460	1.71	9 337	24.13	131 750	25.84	141 086
6	Rock bolts, 26.5 mm diameter	m	7 800	2.83	22 074	31.18	243 204	34.01	265 278
7	Rock bolts, 32 mm diameter	m	3 600	3.02	10 872	39.12	140 832	42.14	151 704
8	Shotcrete	m ³	560	14.59	8 170	103.39	57 898	117.98	66 069
9	Welded wire fabric	kg	14 050	0.58	8 149	2.16	30 348	2.74	38 497
10	Steel ribs	kg		0.13		2.94			3.07
C.II.2.7.02	Concrete works:								
1	Concrete	m ³	52 130	16.00	834 080	150.00	7 819 500	166.00	8 653 580
2	Reinforcing steel	t	2 870	325.47	934 099	1 359.52	3 901 822	1 684.99	4 835 921
C.II.2.7.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	2 340	4.04	9 454	18.36	42 962	22.40	52 416
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 500	8.99	40 455	27.90	125 550	36.89	166 005
3	Drain holes, 76 mm diameter	m	370	5.68	2 102	28.91	10 697	34.59	12 798
4	Contact & consolidation cement grouting, excluding materials	t	170	42.60	7 242	124.85	21 225	167.45	28 467
5	Cement grouting between concrete and steel lining	m ²	2 555	2.85	7 282	8.55	21 845	11.40	29 127
6	Bentonite	t		8.93		437.33			446.26
C.II.2.7.04	Sundries:								
1	Portland cement ASTM type I or II	t	8 874	5.16	45 788	252.60	2 241 471	257.76	2 287 259
2	Portland cement ASTM type V (sulfate resistant)	t	8 230	6.06	49 874	296.70	2 441 841	302.76	2 491 715
3	Steel lining	kg	500 950	0.77	385 732	5.23	2 619 969	6.00	3 005 700
4	Care of water and miscellaneous works	%	3%		99 126		723 354		822 479
	Total No. C.II.2.7				3 403 309		24 835 138		28 238 447
C.II.2.8	UNDERGROUND WORKS - Upstream Fault Crossing Stretch - 40 m								
C.II.2.8.01	Excavation and supports:								
1	Rock Excavation	m ³	21 600	9.20	198 720	41.70	900 720	50.90	1 099 440
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m		1.58		15.28		16.86	
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	2 800	1.71	4 788	24.13	67 564	25.84	72 352
6	Rock bolts, 26.5 mm diameter	m	3 700	2.83	10 471	31.18	115 366	34.01	125 837
7	Rock bolts, 32 mm diameter	m	2 300	3.02	6 946	39.12	89 976	42.14	96 922
8	Shotcrete	m ³	295	14.59	4 304	103.39	30 500	117.98	34 804
9	Welded wire fabric	kg	4 900	0.58	2 842	2.16	10 584	2.74	13 426

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ITEM	Description of Works	Unit	Quantity	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
10	Steel ribs	kg	160 000	0.13	20 800	2.94	470 400	3.07	491 200
C.II.2.8.02	Concrete works:								
1	Concrete	m ³	10 970	9.01	98 821	60.32	661 674	69.33	760 495
2	Reinforcing steel	t	880	325.47	286 414	1 359.52	1 196 378	1 684.99	1 482 791
3	Cellular Concrete Filling	m ³	10 660	16.00	170 560	150.00	1 599 000	166.00	1 769 560
C.II.2.8.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m		4.04		18.36		22.40	
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	3 500	8.99	31 465	27.90	97 650	36.89	129 115
3	Drain holes, 76 mm diameter	m	980	5.68	5 566	28.91	28 332	34.59	33 898
4	Contact & consolidation cement grouting, excluding materials	t	115	42.60	4 899	124.85	14 358	167.45	19 257
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.8.04	Sundries:								
1	Portland cement ASTM type I or II	t	3 944	5.16	20 353	252.60	996 343	257.76	1 016 696
2	Portland cement ASTM type V (sulfate resistant)	t	3 225	6.06	19 544	296.70	956 858	302.76	976 401
3	Steel lining	kg		0.77		5.23		6.00	
4	Care of water and miscellaneous works	%	3%		26 595		217 071		243 666
	Total No. C.II.2.8				913 088		7 452 772		8 365 860
C.II.2.9	UNDERGROUND WORKS - Downstream Fault Crossing Stretch - 40 m								
C.II.2.9.01	Excavation and supports:								
1	Rock Excavation	m ³	25 300	9.20	232 760	41.70	1 055 010	50.90	1 287 770
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m		1.58		15.28		16.86	
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	2 240	1.71	3 830	24.13	54 051	25.84	57 882
6	Rock bolts, 26.5 mm diameter	m	3 200	2.83	9 056	31.18	99 776	34.01	108 832
7	Rock bolts, 32 mm diameter	m	2 000	3.02	6 040	39.12	78 240	42.14	84 280
8	Shotcrete	m ³	325	14.59	4 742	103.39	33 602	117.98	38 344
9	Welded wire fabric	kg	6 000	0.58	3 480	2.16	12 960	2.74	16 440
10	Steel ribs	kg	165 000	0.13	21 450	2.94	485 100	3.07	506 550
C.II.2.9.02	Concrete works:								
1	Concrete	m ³	12 400	9.01	111 703	60.32	747 927	69.33	859 630
2	Reinforcing steel	t	980	325.47	318 961	1 359.52	1 332 330	1 684.99	1 651 290
3	Cellular Concrete Filling	m ³	10 660	16.00	170 560	150.00	1 599 000	166.00	1 769 560
C.II.2.9.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m		4.04		18.36		22.40	
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	3 450	8.99	31 016	27.90	96 255	36.89	127 271
3	Drain holes, 76 mm diameter	m	940	5.68	5 339	28.91	27 175	34.59	32 515
4	Contact & consolidation cement grouting, excluding materials	t	115	42.60	4 899	124.85	14 358	167.45	19 257
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.9.04	Sundries:								
1	Portland cement ASTM type I or II	t	4 200	5.16	21 674	252.60	1 061 034	257.76	1 082 708
2	Portland cement ASTM type V (sulfate resistant)	t	3 440	6.06	20 846	296.70	1 020 648	302.76	1 041 494
3	Steel lining	kg		0.77		5.23		6.00	
4	Care of water and miscellaneous works	%	3%		28 991		231 524		260 515
	Total No. C.II.2.9				995 347		7 948 989		8 944 336
C.II.2.10	UNDERGROUND WORKS - Drainage and Grouting Tunnels of Gates Chambers (D-shaped) - 2 tunnels 220 m long								
C.II.2.10.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m ³		7.10		28.19		35.29	
b)	Rock Class II	m ³	3 771	8.02	30 247	33.87	127 738	41.89	157 985
c)	Rock Class III	m ³	503	8.77	4 410	37.35	18 782	46.12	23 192
d)	Rock Class IV	m ³	4 735	9.24	43 754	40.89	193 624	50.13	237 377
e)	Rock Class V	m ³	1 090	10.24	11 157	45.20	49 246	55.44	60 403
2	Grouted anchor bars, 22 mm diameter	m	4 190	1.49	6 244	13.63	57 116	15.12	63 360
3	Grouted anchor bars, 26 mm diameter	m	534	1.58	844	15.28	8 164	16.86	9 008
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 048	1.71	1 791	24.13	25 279	25.84	27 070

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
6	Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	492	14.59	7 184	103.39	50 907	117.98	58 091
9	Welded wire fabric	kg	12 739	0.58	7 389	2.16	27 516	2.74	34 905
10	Steel ribs	kg	54 057	0.13	7 027	2.94	158 928	3.07	165 955
C.II.2.10.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	4 012	9.10	36 513	83.30	334 231	92.40	370 744
2	Concrete, invert	m ³	1 069	7.70	8 228	55.70	59 519	63.40	67 747
3	Reinforcing steel	t	270	325.47	87 970	1 359.52	367 459	1 684.99	455 429
C.II.2.10.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	471	4.04	1 905	18.36	8 655	22.40	10 560
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 327	8.99	38 897	27.90	120 714	36.89	159 611
3	Drain holes, 76 mm diameter	m	4 358	5.68	24 754	28.91	125 993	34.59	150 747
4	Contact & consolidation cement grouting, excluding materials	t	230	42.60	9 818	124.85	28 775	167.45	38 593
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.10.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 039	5.16	5 361	252.60	262 445	257.76	267 807
2	Portland cement ASTM type V (sulfate resistant)	t	1 039	6.06	6 296	296.70	308 264	302.76	314 560
3	Care of water and miscellaneous works	%	3%		10 194		70 001		80 194
	Total No. C.II.2.10				349 982		2 403 358		2 753 340
C.II.2.11	UNDERGROUND WORKS - Access Tunnel to Gates Chambers (D-shaped) - 800 m								
C.II.2.11.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	17 625	8.02	141 349	33.87	596 946	41.89	738 295
	c) Rock Class III	m ³	2 646	8.77	23 207	37.35	98 834	46.12	122 041
	d) Rock Class IV	m ³	21 969	9.24	202 996	40.89	898 322	50.13	1 101 318
	e) Rock Class V	m ³	11 249	10.24	115 192	45.20	508 465	55.44	623 657
2	Grouted anchor bars, 22 mm diameter	m	10 622	1.49	15 826	13.63	144 772	15.12	160 598
3	Grouted anchor bars, 26 mm diameter	m	7 015	1.58	11 084	15.28	107 195	16.86	118 279
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	775	1.71	1 326	24.13	18 710	25.84	20 036
6	Rock bolts, 26.5 mm diameter	m	511	2.83	1 445	31.18	15 926	34.01	17 371
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 618	14.59	23 613	103.39	167 333	117.98	190 946
9	Welded wire fabric	kg	39 692	0.58	23 022	2.16	85 735	2.74	108 757
10	Steel ribs	kg	333 969	0.13	43 416	2.94	981 870	3.07	1 025 286
C.II.2.11.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	21 692	9.10	197 400	83.30	1 806 969	92.40	2 004 369
2	Concrete, invert	m ³	5 415	7.70	41 698	55.70	301 637	63.40	343 335
3	Reinforcing steel	t	1 502	325.47	488 706	1 359.52	2 041 372	1 684.99	2 530 077
C.II.2.11.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	5 588	4.04	22 574	18.36	102 590	22.40	125 164
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 194	8.99	46 693	27.90	144 908	36.89	191 601
3	Drain holes, 76 mm diameter	m	5 600	5.68	31 808	28.91	161 896	34.59	193 704
4	Contact & consolidation cement grouting, excluding materials	t	324	42.60	13 789	124.85	40 413	167.45	54 202
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.11.04	Sundries:								
1	Portland cement ASTM type I or II	t	5 326	5.16	27 485	252.60	1 345 464	257.76	1 372 949
2	Portland cement ASTM type V (sulfate resistant)	t	4 400	6.06	26 664	296.70	1 305 480	302.76	1 332 144
3	Care of water and miscellaneous works	%	3%		44 979		326 245		371 224
	Total No. C.II.2.11				1 544 272		11 201 081		12 745 354
C.II.2.12	UNDERGROUND WORKS - Ventilation Tunnel (180 m) and Ventilation Shaft (15 m)								
C.II.2.12.01	Excavation and supports:								
1	Excavation, Tunnel								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	2 093	8.02	16 783	33.87	70 879	41.89	87 663

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ITEM	Description of Works	Unit	Quantity	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
			(1)	(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	c) Rock Class III	m ³	614	8.77	5 388	37.35	22 945	46.12	28 333
	d) Rock Class IV	m ³	2 844	9.24	26 282	40.89	116 308	50.13	142 590
	e) Rock Class V	m ³	652	10.24	6 681	45.20	29 489	55.44	36 170
2	Excavation, Shaft	m ³	561	32.00	17 949	128.00	71 794	160.00	89 743
3	Grouted anchor bars, 22 mm diameter	m	1 374	1.49	2 047	13.63	18 722	15.12	20 769
4	Grouted anchor bars, 26 mm diameter	m	687	1.58	1 085	15.28	10 494	16.86	11 579
5	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
6	Rock bolts, 22 mm diameter	m	858	1.71	1 468	24.13	20 715	25.84	22 183
7	Rock bolts, 26.5 mm diameter	m	515	2.83	1 458	31.18	16 061	34.01	17 518
8	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
9	Shotcrete	m ³	299	14.59	4 369	103.39	30 961	117.98	35 330
10	Welded wire fabric	kg	7 365	0.58	4 272	2.16	15 908	2.74	20 180
11	Steel ribs	kg	28 893	0.13	3 756	2.94	84 945	3.07	88 701
C.II.2.12.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	1 393	9.10	12 676	83.30	116 037	92.40	128 713
2	Concrete, invert	m ³	542	7.70	4 173	55.70	30 189	63.40	34 363
3	Concrete, shaft	m ³	157	30.00	4 704	211.00	33 086	241.00	37 790
4	Reinforcing steel	t	111	325.47	36 207	1 359.52	151 240	1 684.99	187 448
C.II.2.12.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	246	4.04	994	18.36	4 518	22.40	5 513
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	977	8.99	8 787	27.90	27 269	36.89	36 055
3	Drain holes, 76 mm diameter	m	905	5.68	5 139	28.91	26 157	34.59	31 296
4	Contact & consolidation cement grouting, excluding materials	t	75	42.60	3 203	124.85	9 388	167.45	12 591
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.II.2.12.04	Sundries:								
1	Portland cement ASTM type I or II	t	482	5.16	2 485	252.60	121 627	257.76	124 111
2	Portland cement ASTM type V (sulfate resistant)	t	482	6.06	2 918	296.70	142 861	302.76	145 779
3	Care of water and miscellaneous works	%	3%		5 185		35 148		40 333
	Total No. C.II.2.12				178 008		1 206 743		1 384 751
	TOTAL AMOUNT OF DIVERSION TUNNEL 3				18 634 981		137 603 117		156 238 098
	TOTAL AMOUNT OF RIVER DIVERSION STRUCTURES				21 969 520		160 597 760		182 567 279
C.III	FLOOD MANAGEMENT STRUCTURES								
C.III.1	MIDDLE OUTLET LEVEL 1								
C.III.1.1	SURFACE WORKS - Intake Culvert Structure								
C.III.1.1.01	Excavation and supports:								
1	Excavation, common	m ³	108 000.0	0.25	27 000	2.71	292 680	2.96	319 680
2	Excavation, rock	m ³	217 000.0	1.46	316 820	5.61	1 217 370	7.07	1 534 190
3	Overhauling in excess of 500 m, common material	m ³ /km	378 000.0	0.07	26 460	0.81	306 180	0.88	332 640
4	Overhauling in excess of 500 m, rock	m ³ /km	759 500.0	0.09	68 203	1.03	784 564	1.12	852 767
5	Rock bolts, 22 mm diameter	m	9 130.0	1.71	15 612	21.50	196 295	23.21	211 907
6	Rock bolts, 26.5 mm diameter	m	4 000.0	2.62	10 480	27.27	109 080	29.89	119 560
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	1 535.0	15.10	23 179	93.73	143 876	108.83	167 054
9	Welded wire fabric	kg	38 300.0	0.50	19 150	1.93	73 919	2.43	93 069
C.III.1.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	26 250.0	5.10	133 875	29.54	775 425	34.64	909 300
2	Concrete elevation	m ³	58 900.0	8.30	488 870	34.10	2 008 490	42.40	2 497 360
3	Reinforcing steel	t	5 955.0	242.54	1 444 326	1 308.26	7 790 688	1 550.80	9 235 014
4	Flat type Formworks	m ²	19 880.0	6.06	120 472	17.78	353 410	23.84	473 881
5	Curved type Formworks	m ²	8 500.0	10.67	90 721	26.77	227 517	37.44	318 238
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
8	RCC filling below concrete culvert	m ³	14 750.0	3.06	45 135	17.72	261 370	20.78	306 505
C.III.1.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	27 938.8	5.16	144 164	252.60	7 057 328	257.76	7 201 492
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		89 234		647 946		737 180
	Total No. C.III.1.1				3 063 700		22 246 137		25 309 837
C.III.1.2	SURFACE WORKS - Outlet Structures and flip buckets								
C.III.1.2.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	430 313.3	0.25	107 578	2.71	1 166 149	2.96	1 273 727
2	Excavation, rock	m ³	860 626.7	1.46	1 256 515	5.61	4 828 116	7.07	6 084 631
3	Overhauling in excess of 500 m, common material	m ³ /km	2 151 566.7	0.07	150 610	0.81	1 742 769	0.88	1 893 379
4	Overhauling in excess of 500 m, rock	m ³ /km	4 303 133.3	0.09	386 421	1.03	4 445 137	1.12	4 831 558
5	Rock bolts, 22 mm diameter	m		1.71		21.50		23.21	
6	Rock bolts, 26.5 mm diameter	m	17 247.0	2.62	45 187	27.27	470 326	29.89	515 513
7	Rock bolts, 32 mm diameter	m	14 111.2	2.81	39 652	35.42	499 818	38.23	539 471
8	Grouted anchor bars, 22 mm diameter	m		1.44		10.97		12.41	
9	Grouted anchor bars, 26 mm diameter	m	20 239.9	1.58	31 979	12.80	259 071	14.38	291 050
10	Grouted anchor bars, 32 mm diameter	m	16 559.9	1.63	26 993	15.71	260 156	17.34	287 149
11	Shotcrete	m ³	3 056.9	15.10	46 158	93.73	286 519	108.83	332 677
12	Welded wire fabric	kg	90 482.8	0.50	45 241	1.93	174 632	2.43	219 873
C.III.1.2.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	107 544.5	5.10	548 477	29.54	3 176 866	34.64	3 725 343
2	Concrete elevation	m ³	10 955.8	8.30	90 933	34.10	373 594	42.40	464 528
3	Reinforcing steel	t	4 539.5	242.54	1 101 010	1 308.26	5 938 846	1 550.80	7 039 857
4	Flat type Formworks	m ²	11 769.2	6.06	71 321	17.78	209 223	23.84	280 544
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.III.1.2.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	39 295.7	5.16	202 766	252.60	9 926 095	257.76	10 128 861
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Tendons, 70 t capacity, L=40	ea	20.0	722.33	14 447	3 244.14	64 883	3 966.47	79 329
4	Care of water and miscellaneous works	%	3%		124 959		1 014 666		1 139 625
	Total No. C.III.1.2				4 290 248		34 836 865		39 127 114
C.III.1.3	SURFACE WORKS - Plunge Pool and Left Bank Slope								
C.III.1.3.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	67 733.3	0.25	16 933	2.71	183 557	2.96	200 491
2	Excavation, rock	m ³	33 866.7	1.46	49 445	5.61	189 992	7.07	239 437
3	Excavation, common, under water	m ³	200 700.0	1.00	200 700	10.84	2 175 588	11.84	2 376 288
4	Excavation, rock, under water	m ³	100 300.0	3.29	329 486	12.62	1 266 037	15.91	1 595 522
5	Overhauling in excess of 500 m, common material	m ³ /km	671 083.3	0.07	46 976	0.81	543 578	0.88	590 553
6	Overhauling in excess of 500 m, rock	m ³ /km	335 416.7	0.09	30 120	1.03	346 485	1.12	376 606
7	Care of water and miscellaneous works	%	10%		67 366		470 524		537 890
	Total No. C.III.1.3				741 026		5 175 761		5 916 787
C.III.1.4	UNDERGROUND WORKS - Tunnel Pressure Stretch (Circular 15 m) - 535 m								
C.III.1.4.01	<u>Excavation and supports:</u>								
1	Excavation								
	a) Rock Class I	m ³		4.97		26.97		31.94	
	b) Rock Class II	m ³	64 153	5.59	358 882	29.93	1 920 084	35.52	2 278 966
	c) Rock Class III	m ³	29 616	6.20	183 678	33.10	980 378	39.31	1 164 055
	d) Rock Class IV	m ³	23 168	6.72	155 614	35.83	830 096	42.55	985 710
	e) Rock Class V	m ³	31 556	7.34	231 717	40.42	1 275 631	47.77	1 507 349
2	Grouted anchor bars, 22 mm diameter	m	7 034	1.49	10 481	13.63	95 875	15.12	106 355

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
3	Grouted anchor bars, 26 mm diameter	m	5 694	1.58	8 997	15.28	87 008	16.86	96 005
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	8 625	1.71	14 749	24.13	208 124	25.84	222 873
6	Rock bolts, 26.5 mm diameter	m	1 163	2.83	3 291	31.18	36 264	34.01	39 555
7	Rock bolts, 32 mm diameter	m	930	3.02	2 810	39.12	36 399	42.14	39 209
8	Shotcrete	m ³	2 038	14.59	29 729	103.39	210 673	117.98	240 402
9	Welded wire fabric	kg	53 398	0.58	30 971	2.16	115 339	2.74	146 310
10	Steel ribs	kg	587 104	0.13	76 324	2.94	1 726 087	3.07	1 802 410
C.III.1.4.02	<u>Concrete works:</u>								
1	Concrete, arch	m ³	21 633	8.90	192 530	75.20	1 626 772	84.10	1 819 302
2	Concrete, sidewalls	m ³	17 306	11.40	197 289	54.70	946 643	66.10	1 143 932
3	Concrete, invert	m ³	12 980	6.00	77 877	43.00	558 121	49.00	635 999
4	Reinforcing steel	t	2 884	325.47	938 769	1 359.52	3 921 329	1 684.99	4 860 097
C.III.1.4.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	3 908	4.04	15 788	18.36	71 748	22.40	87 535
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	6 792	8.99	61 062	27.90	189 502	36.89	250 563
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	307	42.60	13 080	124.85	38 334	167.45	51 414
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.4.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	8 918	5.16	46 016	252.60	2 252 644	257.76	2 298 660
2	Portland cement ASTM type V (sulfate resistant)	t	8 920	6.06	54 055	296.70	2 646 564	302.76	2 700 619
3	Care of water and miscellaneous works	%	3%		81 111		593 208		674 320
	Total No. C.III.1.4				2 784 820		20 366 822		23 151 642
C.III.1.5	UNDERGROUND WORKS - Tunnels Pressure Stretches (n°2 Circular 10.8 m) - 250 m total								
C.III.1.5.01	<u>Excavation and supports:</u>								
1	Excavation								
	a) Rock Class I	m ³		5.14		25.46		30.60	
	b) Rock Class II	m ³	6 820	5.43	37 056	29.47	200 988	34.90	238 044
	c) Rock Class III	m ³	7 191	5.98	43 025	32.37	232 743	38.35	275 769
	d) Rock Class IV	m ³	11 275	6.48	73 097	35.05	395 213	41.54	468 310
	e) Rock Class V	m ³	11 440	7.15	81 825	39.58	452 796	46.73	534 621
2	Grouted anchor bars, 22 mm diameter	m	2 440	1.49	3 635	13.63	33 254	15.12	36 889
3	Grouted anchor bars, 26 mm diameter	m	3 416	1.58	5 397	15.28	52 191	16.86	57 588
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 464	1.71	2 503	24.13	35 323	25.84	37 826
6	Rock bolts, 26.5 mm diameter	m	2 440	2.83	6 905	31.18	76 072	34.01	82 976
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	874	14.59	12 758	103.39	90 405	117.98	103 163
9	Welded wire fabric	kg	18 314	0.58	10 622	2.16	39 559	2.74	50 181
10	Steel ribs	kg	294 589	0.13	38 297	2.94	866 092	3.07	904 388
C.III.1.5.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	9 562	9.10	87 016	83.30	796 530	92.40	883 545
2	Concrete, invert	m ³	3 360	7.70	25 870	55.70	187 134	63.40	213 004
3	Reinforcing steel	t	750	325.47	244 164	1 359.52	1 019 898	1 684.99	1 264 063
C.III.1.5.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 025	4.04	4 140	18.36	18 816	22.40	22 956
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 283	8.99	38 504	27.90	119 494	36.89	157 997
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	267	42.60	11 373	124.85	33 330	167.45	44 703
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.5.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	2 395	5.16	12 360	252.60	605 089	257.76	617 450

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
2	Portland cement ASTM type V (sulfate resistant)	t	2 400	6.06	14 544	296.70	712 080	302.76	726 624
3	Care of water and miscellaneous works	%	3%		22 593		179 010		201 603
	Total No. C.III.1.5				775 683		6 146 018		6 921 701
C.III.1.6	UNDERGROUND WORKS - Upstream Maintenance Gates Chamber - 90 m								
C.III.1.6.01	<u>Excavation and supports:</u>								
1	Rock Excavation	m ³	34 915	9.20	321 218	41.70	1 455 956	50.90	1 777 174
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m		1.58		15.28		16.86	
4	Grouted anchor bars, 32 mm diameter	m	4 080	1.62	6 610	17.76	72 461	19.38	79 070
5	Rock bolts, 22 mm diameter	m	2 000	1.71	3 420	24.13	48 260	25.84	51 680
6	Rock bolts, 26.5 mm diameter	m	2 600	2.83	7 358	31.18	81 068	34.01	88 426
7	Rock bolts, 32 mm diameter	m	1 000	3.02	3 020	39.12	39 120	42.14	42 140
8	Shotcrete	m ³	187	14.59	2 728	103.39	19 334	117.98	22 062
9	Welded wire fabric	kg	4 660	0.58	2 703	2.16	10 066	2.74	12 768
10	Steel ribs	kg		0.13		2.94		3.07	
C.III.1.6.02	<u>Concrete works:</u>								
1	Concrete	m ³	15 225	16.00	243 600	150.00	2 283 750	166.00	2 527 350
2	Reinforcing steel	t	837	325.47	272 418	1 359.52	1 137 918	1 684.99	1 410 337
C.III.1.6.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	780	4.04	3 151	18.36	14 321	22.40	17 472
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1 500	8.99	13 485	27.90	41 850	36.89	55 335
3	Drain holes, 76 mm diameter	m	190	5.68	1 079	28.91	5 493	34.59	6 572
4	Contact & consolidation cement grouting, excluding materials	t	56	42.60	2 386	124.85	6 992	167.45	9 377
5	Cement grouting between concrete and steel lining	m ²	2 350	2.85	6 698	8.55	20 093	11.40	26 790
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.6.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	2 752	5.16	14 201	252.60	695 193	257.76	709 394
2	Portland cement ASTM type V (sulfate resistant)	t	2 260	6.06	13 696	296.70	670 542	302.76	684 238
3	Steel lining	kg	461 200	0.77	355 124	5.23	2 412 076	6.00	2 767 200
4	Care of water and miscellaneous works	%	3%		38 187		270 435		308 622
	Total No. C.III.1.6				1 311 081		9 284 926		10 596 007
C.III.1.7	UNDERGROUND WORKS - Downstream Emergency & Sector Gates Chambers - 118 m each								
C.III.1.7.01	<u>Excavation and supports:</u>								
1	Rock Excavation	m ³	81 618	9.20	750 885	41.70	3 403 468	50.90	4 154 353
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m	7 000	1.58	11 060	15.28	106 960	16.86	118 020
4	Grouted anchor bars, 32 mm diameter	m	10 330	1.62	16 735	17.76	183 461	19.38	200 195
5	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
6	Rock bolts, 26.5 mm diameter	m	5 000	2.83	14 150	31.18	155 900	34.01	170 050
7	Rock bolts, 32 mm diameter	m	6 062	3.02	18 307	39.12	237 145	42.14	255 453
8	Shotcrete	m ³	770	14.59	11 239	103.39	79 645	117.98	90 885
9	Welded wire fabric	kg	22 802	0.58	13 225	2.16	49 252	2.74	62 478
10	Steel ribs	kg		0.13		2.94		3.07	
C.III.1.7.02	<u>Concrete works:</u>								
1	Concrete	m ³	42 966	16.00	687 455	150.00	6 444 887	166.00	7 132 342
2	Reinforcing steel	t	2 363	325.47	769 110	1 359.52	3 212 648	1 684.99	3 981 758
C.III.1.7.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	3 300	4.04	13 333	18.36	60 593	22.40	73 926
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 760	8.99	51 787	27.90	160 717	36.89	212 504
3	Drain holes, 76 mm diameter	m	950	5.68	5 394	28.91	27 457	34.59	32 851
4	Contact & consolidation cement grouting, excluding materials	t	440	42.60	18 754	124.85	54 965	167.45	73 719
5	Cement grouting between concrete and steel lining	m ²	2 628	2.85	7 491	8.55	22 473	11.40	29 964
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.7.04	<u>Sundries:</u>								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
1	Portland cement ASTM type I or II	t	7 268	5.16	37 503	252.60	1 835 896	257.76	1 873 399
2	Portland cement ASTM type V (sulfate resistant)	t	7 268	6.06	44 044	296.70	2 156 414	302.76	2 200 459
3	Steel lining	kg	515 824	0.77	397 184	5.23	2 697 757	6.00	3 094 941
4	Care of water and miscellaneous works	%	3%		86 030		626 689		712 719
	Total No. C.III.1.7				2 953 686		21 516 328		24 470 015
C.III.1.8	UNDERGROUND WORKS - Tunnels Free-flow Stretches (D-shaped) - 2 tunnels 405 m total								
C.III.1.8.01	<u>Excavation and supports:</u>								
1	Excavation								
	a) Rock Class I	m ³		4.99		26.86		31.85	
	b) Rock Class II	m ³	18 836	5.54	104 394	29.57	556 914	35.11	661 308
	c) Rock Class III	m ³	15 743	6.14	96 616	32.70	514 770	38.84	611 387
	d) Rock Class IV	m ³	28 913	6.63	191 732	35.38	1 023 052	42.02	1 214 785
	e) Rock Class V	m ³	16 899	7.35	124 200	40.26	680 361	47.61	804 562
2	Grouted anchor bars, 22 mm diameter	m	4 533	1.49	6 755	13.63	61 789	15.12	68 544
3	Grouted anchor bars, 26 mm diameter	m	6 347	1.58	10 028	15.28	96 977	16.86	107 005
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	2 720	1.71	4 651	24.13	65 633	25.84	70 285
6	Rock bolts, 26.5 mm diameter	m	4 533	2.83	12 829	31.18	141 349	34.01	154 178
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 749	14.59	25 523	103.39	180 865	117.98	206 388
9	Welded wire fabric	kg	36 918	0.58	21 412	2.16	79 742	2.74	101 154
10	Steel ribs	kg	350 652	0.13	45 585	2.94	1 030 917	3.07	1 076 502
C.III.1.8.02	<u>Concrete works:</u>								
1	Concrete, arch	m ³	12 261	8.90	109 122	75.20	922 016	84.10	1 031 138
2	Concrete, sidewalls	m ³	7 806	11.40	88 983	54.70	426 961	66.10	515 944
3	Concrete, invert	m ³	7 806	6.00	46 833	43.00	335 637	49.00	382 470
4	Reinforcing steel	t	1 573	325.47	512 095	1 359.52	2 139 070	1 684.99	2 651 164
C.III.1.8.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 959	4.04	7 916	18.36	35 975	22.40	43 891
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 249	8.99	47 184	27.90	146 434	36.89	193 619
3	Drain holes, 76 mm diameter	m	5 878	5.68	33 388	28.91	169 940	34.59	203 328
4	Contact & consolidation cement grouting, excluding materials	t	322	42.60	13 714	124.85	40 194	167.45	53 908
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.8.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	5 014	5.16	25 873	252.60	1 266 553	257.76	1 292 426
2	Portland cement ASTM type V (sulfate resistant)	t	5 014	6.06	30 385	296.70	1 487 674	302.76	1 518 059
3	Care of water and miscellaneous works	%	10%		155 922		1 140 282		1 296 204
	Total No. C.III.1.8				1 715 141		12 543 105		14 258 246
C.III.1.9	UNDERGROUND WORKS - Ventilation Tunnel (120 m) and Ventilation Shaft (100 m)								
C.III.1.9.01	<u>Excavation and supports:</u>								
1	Excavation, Tunnel								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	997	8.02	7 992	33.87	33 752	41.89	41 744
	c) Rock Class III	m ³	614	8.77	5 388	37.35	22 945	46.12	28 333
	d) Rock Class IV	m ³	1 686	9.24	15 575	40.89	68 923	50.13	84 498
	e) Rock Class V	m ³	870	10.24	8 908	45.20	39 319	55.44	48 226
2	Excavation, Shaft	m ³	3 739	32.00	119 657	128.00	478 628	160.00	598 285
3	Grouted anchor bars, 22 mm diameter	m	2 034	1.49	3 031	13.63	27 726	15.12	30 757
4	Grouted anchor bars, 26 mm diameter	m	1 017	1.58	1 607	15.28	15 541	16.86	17 148
5	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
6	Rock bolts, 22 mm diameter	m	1 271	1.71	2 174	24.13	30 678	25.84	32 852
7	Rock bolts, 26.5 mm diameter	m	763	2.83	2 159	31.18	23 785	34.01	25 944
8	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
9	Shotcrete	m ³	498	14.59	7 262	103.39	51 461	117.98	58 723
10	Welded wire fabric	kg	10 732	0.58	6 224	2.16	23 180	2.74	29 405
11	Steel ribs	kg	37 845	0.13	4 920	2.94	111 265	3.07	116 185
C.III.1.9.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	942	9.10	8 573	83.30	78 477	92.40	87 050
2	Concrete, invert	m ³	366	7.70	2 822	55.70	20 412	63.40	23 234
3	Concrete, shaft	m ³	1 045	30.00	31 361	211.00	220 572	241.00	251 933
4	Reinforcing steel	t	126	325.47	40 871	1 359.52	170 722	1 684.99	211 593
C.III.1.9.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	164	4.04	663	18.36	3 012	22.40	3 675
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 119	8.99	19 046	27.90	59 108	36.89	78 153
3	Drain holes, 76 mm diameter	m	603	5.68	3 426	28.91	17 438	34.59	20 864
4	Contact & consolidation cement grouting, excluding materials	t	136	42.60	5 805	124.85	17 014	167.45	22 820
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.9.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	604	5.16	3 116	252.60	152 529	257.76	155 645
2	Portland cement ASTM type V (sulfate resistant)	t	604	6.06	3 659	296.70	179 158	302.76	182 818
3	Care of water and miscellaneous works	%	3%		9 127		55 369		64 497
	Total No. C.III.1.9				313 365		1 901 017		2 214 382
C.III.1.10	UNDERGROUND WORKS - Drainage and Grouting Tunnels of Gates Chambers (D-shaped) - 2 tunnels 215 and 325 m long								
C.III.1.10.01	<u>Excavation and supports:</u>								
1	Excavation								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	4 629	8.02	37 121	33.87	156 770	41.89	193 891
	c) Rock Class III	m ³	617	8.77	5 412	37.35	23 050	46.12	28 463
	d) Rock Class IV	m ³	5 811	9.24	53 698	40.89	237 629	50.13	291 327
	e) Rock Class V	m ³	1 337	10.24	13 692	45.20	60 439	55.44	74 131
2	Grouted anchor bars, 22 mm diameter	m	5 143	1.49	7 663	13.63	70 097	15.12	77 760
3	Grouted anchor bars, 26 mm diameter	m	656	1.58	1 036	15.28	10 019	16.86	11 055
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 286	1.71	2 199	24.13	31 024	25.84	33 223
6	Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	604	14.59	8 817	103.39	62 477	117.98	71 294
9	Welded wire fabric	kg	15 634	0.58	9 068	2.16	33 770	2.74	42 838
10	Steel ribs	kg	66 343	0.13	8 625	2.94	195 048	3.07	203 673
C.III.1.10.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	4 924	9.10	44 811	83.30	410 193	92.40	455 004
2	Concrete, invert	m ³	1 311	7.70	10 098	55.70	73 047	63.40	83 145
3	Reinforcing steel	t	332	325.47	107 963	1 359.52	450 972	1 684.99	558 935
C.III.1.10.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	579	4.04	2 337	18.36	10 623	22.40	12 960
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 439	8.99	48 894	27.90	151 739	36.89	200 633
3	Drain holes, 76 mm diameter	m	5 450	5.68	30 954	28.91	157 550	34.59	188 504
4	Contact & consolidation cement grouting, excluding materials	t	413	42.60	17 595	124.85	51 566	167.45	69 160
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.10.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	1 340	5.16	6 916	252.60	338 579	257.76	345 496
2	Portland cement ASTM type V (sulfate resistant)	t	1 340	6.06	8 120	296.70	397 578	302.76	405 698
3	Care of water and miscellaneous works	%	3%		12 751		87 665		100 416
	Total No. C.III.1.10				437 769		3 009 835		3 447 604
C.III.1.11	UNDERGROUND WORKS - Access Tunnel to Gates Chambers (D-shaped) - 835 m								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.III.1.11.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	21 050	8.02	168 817	33.87	712 949	41.89	881 766
	c) Rock Class III	m ³	5 495	8.77	48 195	37.35	205 253	46.12	253 448
	d) Rock Class IV	m ³	20 082	9.24	185 561	40.89	821 168	50.13	1 006 729
	e) Rock Class V	m ³	8 801	10.24	90 127	45.20	397 824	55.44	487 951
2	Grouted anchor bars, 22 mm diameter	m	7 825	1.49	11 660	13.63	106 661	15.12	118 321
3	Grouted anchor bars, 26 mm diameter	m	4 344	1.58	6 863	15.28	66 370	16.86	73 232
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	5 803	1.71	9 923	24.13	140 030	25.84	149 953
6	Rock bolts, 26.5 mm diameter	m	1 055	2.83	2 986	31.18	32 899	34.01	35 884
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 591	14.59	23 219	103.39	164 542	117.98	187 761
9	Welded wire fabric	kg	41 308	0.58	23 959	2.16	89 225	2.74	113 183
10	Steel ribs	kg	261 528	0.13	33 999	2.94	768 892	3.07	802 891
C.III.1.11.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	22 289	9.10	202 833	83.30	1 856 700	92.40	2 059 533
2	Concrete, invert	m ³	5 575	7.70	42 924	55.70	310 501	63.40	353 425
3	Reinforcing steel	t	1 489	325.47	484 778	1 359.52	2 024 967	1 684.99	2 509 745
C.III.1.11.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 556	4.04	6 287	18.36	28 574	22.40	34 861
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 484	8.99	40 313	27.90	125 110	36.89	165 424
3	Drain holes, 76 mm diameter	m	5 838	5.68	33 162	28.91	168 785	34.59	201 947
4	Contact & consolidation cement grouting, excluding materials	t	242	42.60	10 301	124.85	30 188	167.45	40 489
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.1.11.04	Sundries:								
1	Portland cement ASTM type I or II	t	4 122	5.16	21 272	252.60	1 041 315	257.76	1 062 587
2	Portland cement ASTM type V (sulfate resistant)	t	5 752	6.06	34 857	296.70	1 706 618	302.76	1 741 476
3	Care of water and miscellaneous works	%	3%		44 461		323 957		368 418
	Total No. C.III.1.11				1 526 496		11 122 529		12 649 025
	TOTAL AMOUNT OF MIDDLE OUTLET LEVEL 1				19 913 017		148 149 343		168 062 360
C.III.3	HIGH LEVEL TUNNEL SPILLWAYS (ONE TUNNEL)								
C.III.3.1	SURFACE WORKS - Intake Structures								
C.III.3.1.01	Excavation and supports:								
1	Excavation, common	m ³	18 333.3	0.25	4 583	2.71	49 683	2.96	54 267
2	Excavation, rock	m ³	36 666.7	1.46	53 533	5.61	205 700	7.07	259 233
3	Overhauling in excess of 500 m, common material	m ³ /km	82 500.0	0.07	5 775	0.81	66 825	0.88	72 600
4	Overhauling in excess of 500 m, rock	m ³ /km	165 000.0	0.09	14 817	1.03	170 445	1.12	185 262
5	Rock bolts, 22 mm diameter	m	3 200.0	1.71	5 472	21.50	68 800	23.21	74 272
6	Rock bolts, 26.5 mm diameter	m	2 500.0	2.62	6 550	27.27	68 175	29.89	74 725
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	540.0	15.10	8 154	93.73	50 614	108.83	58 768
9	Welded wire fabric	kg	13 500.0	0.50	6 750	1.93	26 055	2.43	32 805
C.III.3.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	1 093.0	5.10	5 574	29.54	32 287	34.64	37 862
2	Concrete elevation	m ³	1 958.8	8.30	16 258	34.10	66 793	42.40	83 051
3	Reinforcing steel	t	176.0	242.54	42 687	1 308.26	230 254	1 550.80	272 941
4	Flat type Formworks	m ²	2 572.5	6.06	15 589	17.78	45 732	23.84	61 321
5	Curved type Formworks	m ²	470.0	10.67	5 016	26.77	12 580	37.44	17 597
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.III.3.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	1 219.6	5.16	6 293	252.60	308 061	257.76	314 354

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		5 912		42 060		47 972
	Total No. C.III.3.1				202 964		1 444 065		1 647 029
C.III.3.2	SURFACE WORKS - Outlet Structures including chutes, stilling basins and flip buckets								
C.III.3.2.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	169 940.0	0.25	42 485	2.71	460 537	2.96	503 022
2	Excavation, rock	m ³	396 525.0	1.46	578 927	5.61	2 224 505	7.07	2 803 432
3	Overhauling in excess of 500 m, common material	m ³ /km	679 760.0	0.07	47 583	0.81	550 606	0.88	598 189
4	Overhauling in excess of 500 m, rock	m ³ /km	1 586 100.0	0.09	142 432	1.03	1 638 441	1.12	1 780 873
5	Rock bolts, 22 mm diameter	m	6 100.0	1.71	10 431	21.50	131 150	23.21	141 581
6	Rock bolts, 26.5 mm diameter	m	22 000.0	2.62	57 640	27.27	599 940	29.89	657 580
7	Rock bolts, 32 mm diameter	m	21 000.0	2.81	59 010	35.42	743 820	38.23	802 830
8	Grouted anchor bars, 22 mm diameter	m		1.44		10.97		12.41	
9	Grouted anchor bars, 26 mm diameter	m	34 300.0	1.58	54 194	12.80	439 040	14.38	493 234
10	Grouted anchor bars, 32 mm diameter	m	37 400.0	1.63	60 962	15.71	587 554	17.34	648 516
11	Shotcrete	m ³	7 725.0	15.10	116 648	93.73	724 064	108.83	840 712
12	Welded wire fabric	kg	204 610.0	0.50	102 305	1.93	394 897	2.43	497 202
C.III.3.2.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	74 680.0	5.10	380 868	29.54	2 206 047	34.64	2 586 915
2	Concrete elevation	m ³	29 000.0	8.30	240 700	34.10	988 800	42.40	1 229 600
3	Reinforcing steel	t	5 575.0	242.54	1 352 161	1 308.26	7 293 550	1 550.80	8 645 710
4	Flat type Formworks	m ²	27 645.0	6.06	167 527	17.78	491 449	23.84	658 976
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.III.3.2.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	36 653.9	5.16	189 134	252.60	9 258 763	257.76	9 447 896
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Tendons, 70 t capacity, PHA 7K7 15 mm L=18	ea	650.0	332.13	215 885	1 491.67	969 586	1 823.80	1 185 470
4	Tendons, 70 t capacity, PHA 7K7 15 mm L=30	ea	900.0	576.06	518 454	2 416.47	2 174 823	2 992.53	2 693 277
5	Tendons, 70 t capacity, PHA 7K7 15 mm L=40	ea	667.0	779.33	519 813	3 187.14	2 125 822	3 966.47	2 645 635
6	Care of water and miscellaneous works	%	5%	242 858		1 700 175		1 943 033	
	Total No. C.III.3.2				5 100 015		35 703 669		40 803 684
C.III.3.3	SURFACE WORKS - Plunge Pools and Right Bank Slope Protections								
C.III.3.3.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	19 453.5	0.25	4 863	2.71	52 719	2.96	57 582
2	Excavation, rock	m ³	15 916.5	1.46	23 238	5.61	89 292	7.07	112 530
3	Excavation, common, under water	m ³	6 484.5	1.00	6 485	10.84	70 292	11.84	76 776
4	Excavation, rock, under water	m ³	5 305.5	3.29	17 429	12.62	66 969	15.91	84 397
5	Excavation, trench for cut-off	m ³	9 187.3	0.50	4 594	4.80	44 099	5.30	48 692
6	Overhauling in excess of 500 m, common material	m ³ /km	70 250.5	0.07	4 918	0.81	56 903	0.88	61 820
7	Overhauling in excess of 500 m, rock	m ³ /km	42 444.0	0.09	3 811	1.03	43 845	1.12	47 656
C.III.3.3.02	<u>Concrete works:</u>								
1	Concrete, cut-off	m ³	10 695.3	5.10	54 546	29.54	315 938	34.64	370 483
2	Reinforcing steel	t	481.3	242.54	116 731	1 308.26	629 648	1 550.80	746 379
C.III.3.3.03	<u>Sundries:</u>								
1	Tendons, 70 t capacity, PHA 7K7 15 mm L=15	ea	100.0	289.79	28 979	1 325.48	132 548	1 615.27	161 527
2	Portland cement ASTM type I or II	t	3 422	5.16	17 660	252.60	864 518	257.76	882 178
3	Portland cement ASTM type V (sulfate resistant)	t		6.06		296.70		302.76	
4	Care of water and miscellaneous works	%	10%	28 325		236 677		265 002	
	Total No. C.III.3.3				311 578		2 603 446		2 915 025
C.III.3.4	UNDERGROUND WORKS - Tunnel Pressure Stretch (Horseshoe) - 1302 m (three tunnels)								
C.III.3.4.01	<u>Excavation and supports:</u>								
1	Excavation								
a)	Rock Class I	m ³		4.97		26.97		31.94	
b)	Rock Class II	m ³	14 380	5.59	80 443	29.93	430 387	35.52	510 830
c)	Rock Class III	m ³	4 960	6.20	30 762	33.10	164 192	39.31	194 954
d)	Rock Class IV	m ³	23 800	6.72	159 860	35.83	852 746	42.55	1 012 607

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	e) Rock Class V	m ³	8 060	7.34	59 186	40.42	325 824	47.77	385 009
2	Grouted anchor bars, 22 mm diameter	m	8 350	1.49	12 442	13.63	113 811	15.12	126 252
3	Grouted anchor bars, 26 mm diameter	m	5 250	1.58	8 295	15.28	80 220	16.86	88 515
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	3 000	1.71	5 130	24.13	72 390	25.84	77 520
6	Rock bolts, 26.5 mm diameter	m	2 100	2.83	5 943	31.18	65 478	34.01	71 421
7	Rock bolts, 32 mm diameter	m	850	3.02	2 567	39.12	33 252	42.14	35 819
8	Shotcrete	m ³	1 285	14.59	18 748	103.39	132 856	117.98	151 604
9	Welded wire fabric	kg	28 780	0.58	16 692	2.16	62 165	2.74	78 857
10	Steel ribs	kg	208 860	0.13	27 152	2.94	614 048	3.07	641 200
C.III.3.4.02	Concrete works:								
1	Concrete, arch	m ³	6 710	8.90	59 719	75.20	504 592	84.10	564 311
2	Concrete, sidewalls	m ³	5 370	11.40	61 218	54.70	293 739	66.10	354 957
3	Concrete, invert	m ³	4 025	6.00	24 150	43.00	173 075	49.00	197 225
4	Reinforcing steel	t	898	325.47	292 272	1 359.52	1 220 849	1 684.99	1 513 121
C.III.3.4.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 335	4.04	5 393	18.36	24 511	22.40	29 904
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 320	8.99	47 827	27.90	148 428	36.89	196 255
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	250	42.60	10 650	124.85	31 213	167.45	41 863
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.3.4.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 991	5.16	15 433	252.60	755 508	257.76	770 941
2	Portland cement ASTM type V (sulfate resistant)	t	2 991	6.06	18 125	296.70	887 407	302.76	905 532
3	Care of water and miscellaneous works	%	3%		28 860		209 601		238 461
	Total No. C.III.3.4				990 868		7 196 290		8 187 158
C.III.3.5	UNDERGROUND WORKS - Tunnels Free-flow Stretch (D-shaped) - 2574 m (three tunnels)								
C.III.3.5.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		4.99		26.86		31.85	
	b) Rock Class II	m ³	34 920	5.54	193 535	29.57	1 032 451	35.11	1 225 985
	c) Rock Class III	m ³	47 889	6.14	293 908	32.70	1 565 936	38.84	1 859 844
	d) Rock Class IV	m ³	25 004	6.63	165 812	35.38	884 748	42.02	1 050 560
	e) Rock Class V	m ³	12 689	7.35	93 256	40.26	510 850	47.61	604 106
2	Grouted anchor bars, 22 mm diameter	m	11 848	1.49	17 654	13.63	161 490	15.12	179 144
3	Grouted anchor bars, 26 mm diameter	m	7 202	1.58	11 380	15.28	110 051	16.86	121 431
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	6 047	1.71	10 340	24.13	145 913	25.84	156 254
6	Rock bolts, 26.5 mm diameter	m	4 523	2.83	12 800	31.18	141 025	34.01	153 825
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	2 611	14.59	38 088	103.39	269 902	117.98	307 989
9	Welded wire fabric	kg	62 972	0.58	36 524	2.16	136 020	2.74	172 544
10	Steel ribs	kg	304 084	0.13	39 531	2.94	894 007	3.07	933 538
C.III.3.5.02	Concrete works:								
1	Concrete, arch	m ³	14 296	8.90	127 238	75.20	1 075 091	84.10	1 202 329
2	Concrete, sidewalls	m ³	8 043	11.40	91 690	54.70	439 950	66.10	531 640
3	Concrete, invert	m ³	13 411	6.00	80 469	43.00	576 694	49.00	657 163
4	Reinforcing steel	t	1 861	325.47	605 793	1 359.52	2 530 457	1 684.99	3 136 251
C.III.3.5.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	2 497	4.04	10 090	18.36	45 853	22.40	55 943
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 680	8.99	42 076	27.90	130 579	36.89	172 655
3	Drain holes, 76 mm diameter	m	9 061	5.68	51 464	28.91	261 943	34.59	313 407
4	Contact & consolidation cement grouting, excluding materials	t	256	42.60	10 890	124.85	31 917	167.45	42 808
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.3.5.04	Sundries:								
1	Portland cement ASTM type I or II	t	6 435	5.16	33 206	252.60	1 625 564	257.76	1 658 771
2	Portland cement ASTM type V (sulfate resistant)	t	6 435	6.06	38 998	296.70	1 909 362	302.76	1 948 360
3	Care of water and miscellaneous works	%	10%		200 474		1 447 980		1 648 455

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	Total No. C.III.3.5				2 205 215		15 927 785		18 133 000
C.III.3.6	UNDERGROUND WORKS - Upstream Maintenance Gates Chambers (70 m each)								
C.III.3.6.01	Excavation and supports:								
1	Rock Excavation	m ³	16 140	9.20	148 488	41.70	673 038	50.90	821 526
2	Grouted anchor bars, 22 mm diameter	m	1 000	1.49	1 490	13.63	13 630	15.12	15 120
3	Grouted anchor bars, 26 mm diameter	m	660	1.58	1 043	15.28	10 085	16.86	11 128
4	Grouted anchor bars, 32 mm diameter	m	1 500	1.62	2 430	17.76	26 640	19.38	29 070
5	Rock bolts, 22 mm diameter	m	500	1.71	855	24.13	12 065	25.84	12 920
6	Rock bolts, 26.5 mm diameter	m	1 300	2.83	3 679	31.18	40 534	34.01	44 213
7	Rock bolts, 32 mm diameter	m	5 000	3.02	15 100	39.12	195 600	42.14	210 700
8	Shotcrete	m ³	97	14.59	1 415	103.39	10 029	117.98	11 444
9	Welded wire fabric	kg	2 420	0.58	1 404	2.16	5 227	2.74	6 631
10	Steel ribs	kg		0.13		2.94		3.07	
C.III.3.6.02	Concrete works:								
1	Concrete	m ³	7 800	16.00	124 800	150.00	1 170 000	166.00	1 294 800
2	Reinforcing steel	t	390	325.47	126 933	1 359.52	530 213	1 684.99	657 146
C.III.3.6.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	405	4.04	1 636	18.36	7 436	22.40	9 072
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	780	8.99	7 012	27.90	21 762	36.89	28 774
3	Drain holes, 76 mm diameter	m	140	5.68	795	28.91	4 047	34.59	4 843
4	Contact & consolidation cement grouting, excluding materials	t	25	42.60	1 065	124.85	3 121	167.45	4 186
5	Cement grouting between concrete and steel lining	m ²	1 350	2.85	3 848	8.55	11 543	11.40	15 390
6	Bentonite	t		8.93		437.33		446.26	
C.III.3.6.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 282	5.16	6 617	252.60	323 915	257.76	330 532
2	Portland cement ASTM type V (sulfate resistant)	t	1 282	6.06	7 771	296.70	380 466	302.76	388 237
3	Steel lining	kg	265 000	0.77	204 050	5.23	1 385 950	6.00	1 590 000
4	Care of water and miscellaneous works	%	3%		19 813		144 759		164 572
	Total No. C.III.3.6				680 244		4 970 060		5 650 303
C.III.3.7	UNDERGROUND WORKS - Downstream Emergency & Sector Gates Chambers (136 m each)								
C.III.3.7.01	Excavation and supports:								
1	Rock Excavation	m ³	39 705	9.20	365 286	41.70	1 655 699	50.90	2 020 985
2	Grouted anchor bars, 22 mm diameter	m	1 125	1.49	1 676	13.63	15 334	15.12	17 010
3	Grouted anchor bars, 26 mm diameter	m	875	1.58	1 383	15.28	13 370	16.86	14 753
4	Grouted anchor bars, 32 mm diameter	m	2 750	1.62	4 455	17.76	48 840	19.38	53 295
5	Rock bolts, 22 mm diameter	m	1 500	1.71	2 565	24.13	36 195	25.84	38 760
6	Rock bolts, 26.5 mm diameter	m	2 075	2.83	5 872	31.18	64 699	34.01	70 571
7	Rock bolts, 32 mm diameter	m	1 875	3.02	5 663	39.12	73 350	42.14	79 013
8	Shotcrete	m ³	245	14.59	3 575	103.39	25 331	117.98	28 905
9	Welded wire fabric	kg	6 100	0.58	3 538	2.16	13 176	2.74	16 714
10	Steel ribs	kg		0.13		2.94		3.07	
C.III.3.7.02	Concrete works:								
1	Concrete	m ³	24 450	16.00	391 200	150.00	3 667 500	166.00	4 058 700
2	Reinforcing steel	t	1 350	325.47	439 385	1 359.52	1 835 352	1 684.99	2 274 737
C.III.3.7.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 020	4.04	4 121	18.36	18 727	22.40	22 848
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1 950	8.99	17 531	27.90	54 405	36.89	71 936
3	Drain holes, 76 mm diameter	m	225	5.68	1 278	28.91	6 505	34.59	7 783
4	Contact & consolidation cement grouting, excluding materials	t	65	42.60	2 769	124.85	8 115	167.45	10 884
5	Cement grouting between concrete and steel lining	m ²	1 695	2.85	4 831	8.55	14 492	11.40	19 323
6	Bentonite	t		8.93		437.33		446.26	
C.III.3.7.04	Sundries:								
1	Portland cement ASTM type I or II	t	4 000	5.16	20 638	252.60	1 010 305	257.76	1 030 943
2	Portland cement ASTM type V (sulfate resistant)	t	4 000	6.06	24 238	296.70	1 186 689	302.76	1 210 926
3	Steel lining	kg	333 000	0.77	256 410	5.23	1 741 590	6.00	1 998 000
4	Care of water and miscellaneous works	%	3%		46 692		344 690		391 383
	Total No. C.III.3.7				1 603 104		11 834 363		13 437 467
C.III.3.8	UNDERGROUND WORKS - Drainage and Grouting Tunnels of Gates Chambers (D-shaped) - 2 tunnels each 270 m long								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.III.3.8.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	3 771	8.02	30 247	33.87	127 738	41.89	157 985
	c) Rock Class III	m ³	503	8.77	4 410	37.35	18 782	46.12	23 192
	d) Rock Class IV	m ³	4 735	9.24	43 754	40.89	193 624	50.13	237 377
	e) Rock Class V	m ³	1 090	10.24	11 157	45.20	49 246	55.44	60 403
2	Grouted anchor bars, 22 mm diameter	m	4 190	1.49	6 244	13.63	57 116	15.12	63 360
3	Grouted anchor bars, 26 mm diameter	m	534	1.58	844	15.28	8 164	16.86	9 008
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 048	1.71	1 791	24.13	25 279	25.84	27 070
6	Rock bolts, 26.5 mm diameter	m		2.83		31.18		34.01	
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	492	14.59	7 184	103.39	50 907	117.98	58 091
9	Welded wire fabric	kg	12 739	0.58	7 389	2.16	27 516	2.74	34 905
10	Steel ribs	kg	54 057	0.13	7 027	2.94	158 928	3.07	165 955
C.III.3.8.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	4 012	9.10	36 513	83.30	334 231	92.40	370 744
2	Concrete, invert	m ³	1 069	7.70	8 228	55.70	59 519	63.40	67 747
3	Reinforcing steel	t	270	325.47	87 970	1 359.52	367 459	1 684.99	455 429
C.III.3.8.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	471	4.04	1 905	18.36	8 655	22.40	10 560
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 653	8.99	41 827	27.90	129 807	36.89	171 634
3	Drain holes, 76 mm diameter	m	4 701	5.68	26 704	28.91	135 920	34.59	162 624
4	Contact & consolidation cement grouting, excluding materials	t	242	42.60	10 309	124.85	30 214	167.45	40 523
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.3.8.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 045	5.16	5 391	252.60	263 901	257.76	269 292
2	Portland cement ASTM type V (sulfate resistant)	t	1 045	6.06	6 331	296.70	309 974	302.76	316 305
3	Care of water and miscellaneous works	%	3%		10 357		70 709		81 066
	Total No. C.III.3.8				355 581		2 427 691		2 783 272
C.III.3.9	UNDERGROUND WORKS - Access Tunnel to Gates Chambers (D-shaped) - 415 m								
C.III.3.9.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	9 151	8.02	73 389	33.87	309 936	41.89	383 325
	c) Rock Class III	m ³	4 095	8.77	35 910	37.35	152 936	46.12	188 846
	d) Rock Class IV	m ³	9 981	9.24	92 222	40.89	408 113	50.13	500 335
	e) Rock Class V	m ³	4 371	10.24	44 762	45.20	197 584	55.44	242 347
2	Grouted anchor bars, 22 mm diameter	m	4 703	1.49	7 008	13.63	64 106	15.12	71 114
3	Grouted anchor bars, 26 mm diameter	m	2 213	1.58	3 497	15.28	33 820	16.86	37 317
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	2 144	1.71	3 667	24.13	51 739	25.84	55 405
6	Rock bolts, 26.5 mm diameter	m	553	2.83	1 566	31.18	17 253	34.01	18 819
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	830	14.59	12 110	103.39	85 814	117.98	97 923
9	Welded wire fabric	kg	20 750	0.58	12 035	2.16	44 820	2.74	56 855
10	Steel ribs	kg	130 033	0.13	16 904	2.94	382 298	3.07	399 202
C.III.3.9.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	11 108	9.10	101 084	83.30	925 310	92.40	1 026 395
2	Concrete, invert	m ³	2 767	7.70	21 303	55.70	154 103	63.40	175 407
3	Reinforcing steel	t	748	325.47	243 351	1 359.52	1 016 502	1 684.99	1 259 853
C.III.3.9.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	775	4.04	3 130	18.36	14 223	22.40	17 353
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 227	8.99	20 022	27.90	62 138	36.89	82 160
3	Drain holes, 76 mm diameter	m	2 905	5.68	16 500	28.91	83 984	34.59	100 484
4	Contact & consolidation cement grouting, excluding materials	t	120	42.60	5 127	124.85	15 026	167.45	20 153
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.III.3.9.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 467	5.16	12 729	252.60	623 139	257.76	635 868
2	Portland cement ASTM type V (sulfate resistant)	t	2 467	6.06	14 949	296.70	731 929	302.76	746 878
3	Care of water and miscellaneous works	%	3%		22 238		161 243		183 481
	Total No. C.III.3.9				763 505		5 536 014		6 299 519
C.III.3.10	UNDERGROUND WORKS - Ventilation Tunnel (210 m)								
C.III.3.10.01	Excavation and supports:								
1	Excavation, Tunnel								
	a) Rock Class I	m ³		7.10		28.19		35.29	
	b) Rock Class II	m ³	1 163	8.02	9 324	33.87	39 377	41.89	48 702
	c) Rock Class III	m ³	478	8.77	4 190	37.35	17 846	46.12	22 037
	d) Rock Class IV	m ³	2 212	9.24	20 442	40.89	90 462	50.13	110 904
	e) Rock Class V	m ³	1 015	10.24	10 392	45.20	45 872	55.44	56 264
2	Grouted anchor bars, 22 mm diameter	m	895	1.49	1 334	13.63	12 205	15.12	13 540
3	Grouted anchor bars, 26 mm diameter	m	448	1.58	707	15.28	6 841	16.86	7 549
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	560	1.71	957	24.13	13 505	25.84	14 462
6	Rock bolts, 26.5 mm diameter	m	336	2.83	950	31.18	10 470	34.01	11 421
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	214	14.59	3 124	103.39	22 135	117.98	25 259
9	Welded wire fabric	kg	4 991	0.58	2 895	2.16	10 780	2.74	13 675
10	Steel ribs	kg	41 777	0.13	5 431	2.94	122 824	3.07	128 256
C.III.3.10.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	1 101	9.10	10 018	83.30	91 700	92.40	101 718
2	Concrete, invert	m ³	428	7.70	3 297	55.70	23 851	63.40	27 149
3	Reinforcing steel	t	86	325.47	28 130	1 359.52	117 500	1 684.99	145 630
C.III.3.10.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	191	4.04	773	18.36	3 514	22.40	4 288
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	701	8.99	6 305	27.90	19 567	36.89	25 872
3	Drain holes, 76 mm diameter	m	704	5.68	3 997	28.91	20 344	34.59	24 342
4	Contact & consolidation cement grouting, excluding materials	t	53	42.60	2 259	124.85	6 620	167.45	8 879
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.3.10.04	Sundries:								
1	Portland cement ASTM type I or II	t	350	5.16	1 806	252.60	88 388	257.76	90 194
2	Portland cement ASTM type V (sulfate resistant)	t	350	6.06	2 120	296.70	103 819	302.76	105 940
3	Care of water and miscellaneous works	%	3%		3 554		26 029		29 582
	Total No. C.III.3.10				122 005		893 653		1 015 658
	TOTAL AMOUNT OF HIGH LEVEL TUNNEL SPILLWAYS (ONE TUNNEL)				12 335 078		88 537 036		100 872 114
C.III.4	SURFACE SPILLWAY								
C.III.4.1	SURFACE WORKS - Spillway Structures including ogee, chute and flip bucket								
C.III.4.1.01	Excavation and supports:								
1	Excavation, common	m ³	1 746 753	0.23	393 019	2.44	4 260 331	2.66	4 653 350
2	Excavation, rock	m ³	4 075 757	1.31	5 340 873	5.05	20 585 836	6.36	25 926 708
3	Overhauling in excess of 500 m, common material	m ³ /km	8 733 765.9	0.07	611 364	0.81	7 074 350	0.88	7 685 714
4	Overhauling in excess of 500 m, rock	m ³ /km	20 378 787.1	0.09	1 830 015	1.03	21 051 287	1.12	22 881 302
5	Rock bolts, 25 mm diameter	m	201 033	2.62	526 707	27.27	5 482 171	29.89	6 008 878
6	Rock bolts, 32 mm diameter	m	171 296	2.81	481 341	35.42	6 067 290	38.23	6 548 631
7	Grouted anchor bars, 25 mm diameter	m	402 066	1.58	635 264	12.80	5 146 446	14.38	5 781 711
8	Grouted anchor bars, 32 mm diameter	m	342 591	1.63	558 424	15.71	5 382 108	17.34	5 940 531
9	Shotcrete	m ³	31 170	15.10	470 667	93.73	2 921 565	108.83	3 392 233
10	Welded wire fabric	kg	1 053 997.4	0.50	526 999	1.93	2 034 215	2.43	2 561 214
C.III.4.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	176 404	5.10	899 660	29.54	5 210 974	34.64	6 110 635
2	Concrete elevation	m ³	29 730	8.30	246 759	34.10	1 013 793	42.40	1 260 552
3	Reinforcing steel (50 kg/m ³)	t	8 245	242.54	1 999 830	1 308.26	10 787 075	1 550.80	12 786 904
4	Flat type Formworks	m ²	68 711	6.06	416 386	17.78	1 221 491	23.84	1 637 878
5	Curved type Formworks	m ²		10.67		26.77		37.44	

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m3		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m3		3.56		7.61		11.17	
8	Overhauling in excess of 1000 m from batching plant	m3/km	206 134	0.11	22 675	0.86	177 275	0.97	199 950
C.III.4.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	43 959.3	5.16	226 830	252.60	11 104 124	257.76	11 330 954
2	Portland cement, type V ASTM (sulfate resistant)	t	36 030.1	6.06	218 342	296.70	10 690 121	302.76	10 908 464
3	Tendons, L=40m	ea	41	779.33	31 953	3 187.14	130 673	3 966.47	162 625
4	Backfill, random material	m3		0.26		1.83		2.09	
5	Compaction of Backfill	m3		0.12		0.97		1.09	
6	Care of water and miscellaneous works	%	3%		463 113		3 610 234		4 073 347
	Total No. C.III.4.1				15 900 220		123 951 360		139 851 580
C.III.4.2	UNDERGROUND WORKS								
C.III.4.2.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m3		7.10		28.19		35.29	
b)	Rock Class II	m3	117 571	8.02	942 919	33.87	3 982 128	41.89	4 925 047
c)	Rock Class III	m3	235 142	8.77	2 062 194	37.35	8 782 549	46.12	10 844 743
d)	Rock Class IV	m3	117 571	9.24	1 086 355	40.89	4 807 476	50.13	5 893 831
e)	Rock Class V	m3		10.24		45.20		55.44	
2	Grouted anchor bars, 22 mm diameter	m	47 917	1.49	71 397	13.63	653 112	15.12	724 508
3	Grouted anchor bars, 26 mm diameter	m	25 668	1.58	40 556	15.28	392 208	16.86	432 764
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	23 956	1.71	40 965	24.13	578 064	25.84	619 030
6	Rock bolts, 26.5 mm diameter	m	18 012	2.83	50 974	31.18	561 610	34.01	612 584
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m3	10 191	14.59	148 687	103.39	1 053 653	117.98	1 202 340
9	Welded wire fabric	kg	245 911	0.58	142 629	2.16	531 169	2.74	673 797
10	Steel ribs	kg	1 185 962	0.13	154 175	2.94	3 486 727	3.07	3 640 902
C.III.4.2.02	Concrete works:								
1	Concrete, arch	m3	40 131	8.90	357 165	75.20	3 017 842	84.10	3 375 007
2	Concrete, sidewalls	m3	50 606	11.40	576 911	54.70	2 768 160	66.10	3 345 071
3	Concrete, invert	m3	56 803	6.00	340 817	43.00	2 442 525	49.00	2 783 342
4	Reinforcing steel (50kg/m3)	t	7 377	325.47	2 400 992	1 359.52	10 029 179	1 684.99	12 430 171
C.III.4.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	9 876	4.04	39 899	18.36	181 323	22.40	221 221
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	15 408	8.99	138 520	37.90	583 971	46.89	722 490
3	Drain holes, 76 mm diameter	m	24 314	5.68	138 102	28.91	702 908	34.59	841 010
4	Contact & consolidation cement grouting, excluding materials	t	710	42.60	30 251	124.85	88 660	167.45	118 911
5	Cement grouting between concrete and steel lining	m2		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.III.4.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	28 857	5.16	148 901	252.60	7 289 209	257.76	7 438 110
2	Portland cement ASTM type V (sulfate resistant)	t	23 652	6.06	143 332	296.70	7 017 600	302.76	7 160 932
3	Care of water and miscellaneous works	%	3%		271 672		1 768 502		2 040 174
	Total No. C.III.4.2				9 327 413		60 718 573		70 045 986
C.III.4.3	Amount to be deducted (Outlet similar with MLO1)								
	TOTAL AMOUNT OF SURFACE SPILLWAY				23 082 509		167 251 501		190 334 009
	TOTAL AMOUNT OF FLOOD MANAGMENT STRUCTURES				55 330 604		403 937 880		459 268 484
C.IV	TRANSPORTATION TUNNELS AND GALLERIES								
C.IV.1	TRANSPORTATION TUNNEL T-10 (access from dam d/s shoulder to left bank)								
C.IV.1.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.1.1.01	Excavation and supports:								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
1	Excavation, common	m ³	5 100.0	0.25	1 275	2.71	13 821	2.96	15 096
2	Excavation, rock	m ³	10 100.0	1.46	14 746	5.61	56 661	7.07	71 407
3	Overhauling in excess of 500 m, common material	m ³ /km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
4	Overhauling in excess of 500 m, rock	m ³ /km	35 350.0	0.09	3 174	1.03	36 517	1.12	39 691
5	Rock bolts, 22 mm diameter	m	950.0	1.71	1 625	21.50	20 425	23.21	22 050
6	Rock bolts, 26.5 mm diameter	m	510.0	2.62	1 336	27.27	13 908	29.89	15 244
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	165.0	15.10	2 492	93.73	15 465	108.83	17 957
9	Welded wire fabric	kg	6 080.0	0.50	3 040	1.93	11 734	2.43	14 774
C.IV.1.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	502.0	5.10	2 560	29.54	14 829	34.64	17 389
2	Concrete elevation	m ³	850.0	8.30	7 055	34.10	28 985	42.40	36 040
3	Reinforcing steel	t	91.2	242.54	22 120	1 308.26	119 313	1 550.80	141 433
4	Flat type Formworks	m ²	1 490.0	6.06	9 029	17.78	26 488	23.84	35 517
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.1.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	506.9	5.16	2 616	252.60	128 040	257.76	130 656
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		2 170		15 019		17 189
	Total No. C.IV.1				74 486		515 665		590 151
C.IV.1.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 255 m								
C.IV.1.2.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		5.14		25.65		30.79	
	b) Rock Class II	m ³	6 720.0	5.92	39 786	29.97	201 410	35.89	241 197
	c) Rock Class III	m ³	5 700.0	6.67	38 020	33.91	193 288	40.58	231 308
	d) Rock Class IV	m ³	5 920.0	7.15	42 324	36.60	216 666	43.75	258 990
	e) Rock Class V	m ³	4 920.0	8.01	39 413	42.58	209 515	50.60	248 928
2	Grouted anchor bars, 22 mm diameter	m	2 000	1.49	2 980	13.63	27 260	15.12	30 240
3	Grouted anchor bars, 26 mm diameter	m	1 700	1.58	2 686	15.28	25 976	16.86	28 662
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 150	1.71	1 967	24.13	27 750	25.84	29 716
6	Rock bolts, 26.5 mm diameter	m	850	2.83	2 406	31.18	26 503	34.01	28 909
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	590	14.59	8 608	103.39	61 000	117.98	69 608
9	Welded wire fabric	kg	14 670	0.58	8 509	2.16	31 687	2.74	40 196
10	Steel ribs	kg	123 870	0.13	16 103	2.94	364 178	3.07	380 281
C.IV.1.2.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	9 175	9.10	83 493	83.30	764 278	92.40	847 770
2	Concrete, invert	m ³	2 295	7.70	17 672	55.70	127 832	63.40	145 503
3	Reinforcing steel	t	625	325.47	203 419	1 359.52	849 700	1 684.99	1 053 119
C.IV.1.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	770	4.04	3 111	18.36	14 137	22.40	17 248
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1 500	8.99	13 485	27.90	41 850	36.89	55 335
3	Drain holes, 76 mm diameter	m	2 265	5.68	12 865	28.91	65 481	34.59	78 346
4	Contact & consolidation cement grouting, excluding materials	t	81	42.60	3 451	124.85	10 113	167.45	13 563
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.IV.1.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 008	5.16	10 364	252.60	507 334	257.76	517 698
2	Portland cement ASTM type V (sulfate resistant)	t	2 008	6.06	12 171	296.70	595 907	302.76	608 078
3	Care of water and miscellaneous works	%	3%		16 885		130 856		147 741
	Total No. C.IV.1.2				579 716		4 492 721		5 072 437
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-10				654 202		5 008 385		5 662 588

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.IV.2	TRANSPORTATION TUNNEL T-18 (access to chamber of waterways penstocks shafts)								
C.IV.2.1	SURFACE WORKS - Inlet portal								
C.IV.2.1.01	<u>Excavation and supports:</u>								
	1 Excavation, common	m ³	2 550.0	0.25	638	2.71	6 911	2.96	7 548
	2 Excavation, rock	m ³	5 050.0	1.46	7 373	5.61	28 331	7.07	35 704
	3 Overhauling in excess of 500 m, common material	m ³ /km	8 925.0	0.07	625	0.81	7 229	0.88	7 854
	4 Overhauling in excess of 500 m, rock	m ³ /km	17 675.0	0.09	1 587	1.03	18 258	1.12	19 845
	5 Rock bolts, 22 mm diameter	m	475.0	1.71	812	21.50	10 213	23.21	11 025
	6 Rock bolts, 26.5 mm diameter	m	255.0	2.62	668	27.27	6 954	29.89	7 622
	7 Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
	8 Shotcrete	m ³	82.5	15.10	1 246	93.73	7 733	108.83	8 978
	9 Welded wire fabric	kg	3 040.0	0.50	1 520	1.93	5 867	2.43	7 387
C.IV.2.1.02	<u>Concrete works:</u>								
	1 Concrete, foundation and mat	m ³	251.0	5.10	1 280	29.54	7 415	34.64	8 695
	2 Concrete elevation	m ³	425.0	8.30	3 528	34.10	14 493	42.40	18 020
	3 Reinforcing steel	t	45.6	242.54	11 060	1 308.26	59 657	1 550.80	70 716
	4 Flat type Formworks	m ²	745.0	6.06	4 515	17.78	13 244	23.84	17 759
	5 Curved type Formworks	m ²		10.67		26.77		37.44	
	6 Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
	7 Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.2.1.03	<u>Sundries:</u>								
	1 Portland cement, type I or II ASTM	t	253.4	5.16	1 308	252.60	64 020	257.76	65 328
	2 Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
	3 Care of water and miscellaneous works	%	3%		1 085		7 510		8 594
	Total No. C.IV.2.1				37 243		257 832		295 076
C.IV.2.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 695 m								
C.IV.2.2.01	<u>Excavation and supports:</u>								
	1 Excavation								
	a) Rock Class I	m ³		5.14		25.65		30.79	
	b) Rock Class II	m ³	21 390.1	5.92	126 642	29.97	641 098	35.89	767 740
	c) Rock Class III	m ³	12 425.9	6.67	82 883	33.91	421 365	40.58	504 248
	d) Rock Class IV	m ³	19 344.9	7.15	138 304	36.60	708 004	43.75	846 308
	e) Rock Class V	m ³	10 057.6	8.01	80 569	42.58	428 295	50.60	508 864
	2 Grouted anchor bars, 22 mm diameter	m	5 834	1.49	8 693	13.63	79 524	15.12	88 217
	3 Grouted anchor bars, 26 mm diameter	m	5 002	1.58	7 904	15.28	76 434	16.86	84 338
	4 Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
	5 Rock bolts, 22 mm diameter	m	3 329	1.71	5 692	24.13	80 327	25.84	86 019
	6 Rock bolts, 26.5 mm diameter	m	2 497	2.83	7 066	31.18	77 847	34.01	84 912
	7 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	8 Shotcrete	m ³	1 549	14.59	22 605	103.39	160 189	117.98	182 794
	9 Welded wire fabric	kg	40 036	0.58	23 221	2.16	86 477	2.74	109 697
	10 Steel ribs	kg	253 210	0.13	32 917	2.94	744 438	3.07	777 355
C.IV.2.2.02	<u>Concrete works:</u>								
	1 Concrete, arch and sidewalls	m ³	24 905	9.10	226 635	83.30	2 074 579	92.40	2 301 213
	2 Concrete, invert	m ³	6 224	7.70	47 925	55.70	346 678	63.40	394 602
	3 Reinforcing steel	t	1 660	325.47	540 291	1 359.52	2 256 846	1 684.99	2 797 137
C.IV.2.2.03	<u>Drilling and grouting:</u>								
	1 Percussion contact grout holes, 40-48 mm diameter	m	2 125	4.04	8 584	18.36	39 012	22.40	47 596
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 002	8.99	35 976	27.90	111 650	36.89	147 626
	3 Drain holes, 76 mm diameter	m	6 171	5.68	35 051	28.91	178 400	34.59	213 451
	4 Contact & consolidation cement grouting, excluding materials	t	217	42.60	9 240	124.85	27 081	167.45	36 322
	5 Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
	6 Bentonite	t		8.93		437.33		446.26	
C.IV.2.2.04	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	5 438	5.16	28 058	252.60	1 373 560	257.76	1 401 619

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
2	Portland cement ASTM type V (sulfate resistant)	t	5 438	6.06	32 952	296.70	1 613 362	302.76	1 646 315
3	Care of water and miscellaneous works	%	3%		45 036		345 755		390 791
	Total No. C.IV.2.2				1 546 246		11 870 920		13 417 165
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-18				1 583 489		12 128 752		13 712 241
C.IV.3	TRANSPORTATION TUNNEL T-39 (access to dam d/s shoulder from right bank access road)								
C.IV.3.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.3.1.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	5 100.0	0.25	1 275	2.71	13 821	2.96	15 096
2	Excavation, rock	m ³	10 100.0	1.46	14 746	5.61	56 661	7.07	71 407
3	Overhauling in excess of 500 m, common material	m ³ /km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
4	Overhauling in excess of 500 m, rock	m ³ /km	35 350.0	0.09	3 174	1.03	36 517	1.12	39 691
5	Rock bolts, 22 mm diameter	m	950.0	1.71	1 625	21.50	20 425	23.21	22 050
6	Rock bolts, 26.5 mm diameter	m	510.0	2.62	1 336	27.27	13 908	29.89	15 244
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	165.0	15.10	2 492	93.73	15 465	108.83	17 957
9	Welded wire fabric	kg	6 080.0	0.50	3 040	1.93	11 734	2.43	14 774
C.IV.3.1.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	502.0	5.10	2 560	29.54	14 829	34.64	17 389
2	Concrete elevation	m ³	850.0	8.30	7 055	34.10	28 985	42.40	36 040
3	Reinforcing steel	t	91.2	242.54	22 120	1 308.26	119 313	1 550.80	141 433
4	Flat type Formworks	m ²	1 490.0	6.06	9 029	17.78	26 488	23.84	35 517
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.3.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	506.9	5.16	2 616	252.60	128 040	257.76	130 656
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		2 170		15 019		17 189
	Total No. C.IV.3.1				74 486		515 665		590 151
C.IV.3.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 2082 m								
C.IV.3.2.01	<u>Excavation and supports:</u>								
1	Excavation								
a)	Rock Class I	m ³		5.14		25.65		30.79	
b)	Rock Class II	m ³	54 921	5.92	325 163	29.97	1 646 066	35.89	1 971 229
c)	Rock Class III	m ³	46 514	6.67	310 259	33.91	1 577 304	40.58	1 887 563
d)	Rock Class IV	m ³	67 604	7.15	483 329	36.60	2 474 245	43.75	2 957 574
e)	Rock Class V	m ³	20 078	8.01	160 837	42.58	854 993	50.60	1 015 830
2	Grouted anchor bars, 22 mm diameter	m	19 293	1.49	28 746	13.63	262 960	15.12	291 706
3	Grouted anchor bars, 26 mm diameter	m	16 540	1.58	26 133	15.28	252 729	16.86	278 862
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	11 034	1.71	18 868	24.13	266 254	25.84	285 123
6	Rock bolts, 26.5 mm diameter	m	8 247	2.83	23 340	31.18	257 147	34.01	280 487
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	4 789	14.59	69 872	103.39	495 141	117.98	565 013
9	Welded wire fabric	kg	122 172	0.58	70 860	2.16	263 892	2.74	334 752
10	Steel ribs	kg	505 604	0.13	65 728	2.94	1 486 475	3.07	1 552 204
C.IV.3.2.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	74 282	9.10	675 962	83.30	6 187 654	92.40	6 863 616
2	Concrete, invert	m ³	18 576	7.70	143 036	55.70	1 034 688	63.40	1 177 723
3	Reinforcing steel	t	4 948	325.47	1 610 527	1 359.52	6 727 329	1 684.99	8 337 857
C.IV.3.2.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	6 291	4.04	25 414	18.36	115 496	22.40	140 910
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	11 717	8.99	105 333	27.90	326 896	36.89	432 229
3	Drain holes, 76 mm diameter	m	18 474	5.68	104 931	28.91	534 075	34.59	639 005

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
4	Contact & consolidation cement grouting, excluding materials	t	637	42.60	27 137	124.85	79 532	167.45	106 670
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.IV.3.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	16 253	5.16	83 867	252.60	4 105 576	257.76	4 189 443
2	Portland cement ASTM type V (sulfate resistant)	t	16 253	6.06	98 495	296.70	4 822 346	302.76	4 920 841
3	Care of water and miscellaneous works	%	3%		133 735		1 013 124		1 146 859
	Total No. C.IV.3.2				4 591 573		34 783 922		39 375 495
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-39				4 666 060		35 299 586		39 965 646
C.IV.4	TRANSPORTATION TUNNEL T-22 (access to Stage 1 dam crest from left bank) - partly constructed								
C.IV.4.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.4.1.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	2 550.0	0.25	638	2.71	6 911	2.96	7 548
2	Excavation, rock	m ³	5 050.0	1.46	7 373	5.61	28 331	7.07	35 704
3	Overhauling in excess of 500 m, common material	m ³ /km	8 925.0	0.07	625	0.81	7 229	0.88	7 854
4	Overhauling in excess of 500 m, rock	m ³ /km	17 675.0	0.09	1 587	1.03	18 258	1.12	19 845
5	Rock bolts, 22 mm diameter	m	475.0	1.71	812	21.50	10 213	23.21	11 025
6	Rock bolts, 26.5 mm diameter	m	255.0	2.62	668	27.27	6 954	29.89	7 622
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	82.5	15.10	1 246	93.73	7 733	108.83	8 978
9	Welded wire fabric	kg	3 040.0	0.50	1 520	1.93	5 867	2.43	7 387
C.IV.4.1.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	502.0	5.10	2 560	29.54	14 829	34.64	17 389
2	Concrete elevation	m ³	665.0	8.30	5 520	34.10	22 677	42.40	28 196
3	Reinforcing steel	t	45.6	242.54	11 060	1 308.26	59 657	1 550.80	70 716
4	Flat type Formworks	m ²	745.0	6.06	4 515	17.78	13 244	23.84	17 759
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.4.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	410.6	5.16	2 119	252.60	103 709	257.76	105 827
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		1 207		9 168		10 376
	Total No. C.IV.4.1				41 448		314 778		356 227
C.IV.4.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped)								
C.IV.4.2.01	<u>Excavation and supports:</u>								
1	Excavation	m ³	19 287.2	6.76	130 381	29.84	575 530	36.60	705 911
2	Rock bolts, 26.5 mm diameter	m	1 664.6	2.83	4 711	31.18	51 903	34.01	56 614
3	Steel ribs	kg	185 885.6	0.13	24 165	2.94	546 504	3.07	570 669
C.IV.4.2.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	1 441.0	11.68	16 831	87.51	126 105	99.19	142 936
2	Concrete, invert	m ³	1 080.7	6.06	6 549	42.99	46 459	49.05	53 008
3	Reinforcing steel	t	129.9	325.47	42 278	1 359.52	176 601	1 684.99	218 880
C.IV.4.2.03	<u>Drilling and grouting:</u>								
1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	220.5	4.04	891	18.36	4 048	22.40	4 939
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1 959.0	5.32	10 422	22.59	44 254	27.91	54 676
3	Contact and cons. grouting (excluding injected materials)	t	167.7	39.94	6 699	121.05	20 305	160.99	27 004
4	Drain holes, 75 mm diameter	m	72.1	5.68	409	28.91	2 084	34.59	2 493
C.IV.4.2.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	538	5.16	2 775	252.60	135 843	257.76	138 618
2	Portland cement ASTM type V (sulfate resistant)	t	538	6.06	3 259	296.70	159 560	302.76	162 819
3	Care of water and miscellaneous works	%	3%		7 481		56 676		64 157
	Total No. C.IV.4.2				256 853		1 945 872		2 202 724
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-22				298 301		2 260 650		2 558 951

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.IV.5	TRANSPORTATION TUNNEL T-10A (Construction Tunnel)								
C.IV.5.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.5.1.01	<u>Excavation and supports:</u>								
	1 Excavation, common	m ³	5 100.0	0.25	1 275	2.71	13 821	2.96	15 096
	2 Excavation, rock	m ³	10 100.0	1.46	14 746	5.61	56 661	7.07	71 407
	3 Overhauling in excess of 500 m, common material	m ³ /km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
	4 Overhauling in excess of 500 m, rock	m ³ /km	35 350.0	0.09	3 174	1.03	36 517	1.12	39 691
	5 Rock bolts, 22 mm diameter	m	950.0	1.71	1 625	21.50	20 425	23.21	22 050
	6 Rock bolts, 26.5 mm diameter	m	510.0	2.62	1 336	27.27	13 908	29.89	15 244
	7 Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
	8 Shotcrete	m ³	165.0	15.10	2 492	93.73	15 465	108.83	17 957
	9 Welded wire fabric	kg	6 080.0	0.50	3 040	1.93	11 734	2.43	14 774
C.IV.5.1.02	<u>Concrete works:</u>								
	1 Concrete, foundation and mat	m ³		5.10		29.54		34.64	
	2 Concrete elevation	m ³	370.0	8.30	3 071	34.10	12 617	42.40	15 688
	3 Reinforcing steel	t	22.2	242.54	5 384	1 308.26	29 043	1 550.80	34 428
	4 Flat type Formworks	m ²	210.0	6.06	1 273	17.78	3 733	23.84	5 006
	5 Curved type Formworks	m ²		10.67		26.77		37.44	
	6 Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
	7 Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.5.1.03	<u>Sundries:</u>								
	1 Portland cement, type I or II ASTM	t	192.7	5.16	994	252.60	48 663	257.76	49 657
	2 Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
	3 Care of water and miscellaneous works	%	3%		1 190		8 311		9 501
	Total No. C.IV.5.1				40 849		285 358		326 207
C.IV.5.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 200 m								
C.IV.5.2.01	<u>Excavation and supports:</u>								
	1 Excavation								
	a) Rock Class I	m ³		5.14		25.65		30.79	
	b) Rock Class II	m ³	4 620.8	5.92	27 358	29.97	138 494	35.89	165 852
	c) Rock Class III	m ³	3 919.5	6.67	26 144	33.91	132 909	40.58	159 053
	d) Rock Class IV	m ³	4 070.7	7.15	29 103	36.60	148 985	43.75	178 088
	e) Rock Class V	m ³	3 383.1	8.01	27 101	42.58	144 067	50.60	171 169
	2 Grouted anchor bars, 22 mm diameter	m	1 569	1.49	2 337	13.63	21 380	15.12	23 718
	3 Grouted anchor bars, 26 mm diameter	m	1 333	1.58	2 107	15.28	20 373	16.86	22 480
	4 Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
	5 Rock bolts, 22 mm diameter	m	902	1.71	1 542	24.13	21 764	25.84	23 307
	6 Rock bolts, 26.5 mm diameter	m	667	2.83	1 887	31.18	20 787	34.01	22 673
	7 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	8 Shotcrete	m ³	463	14.59	6 751	103.39	47 843	117.98	54 595
	9 Welded wire fabric	kg	11 506	0.58	6 673	2.16	24 853	2.74	31 526
	10 Steel ribs	kg	97 153	0.13	12 630	2.94	285 630	3.07	298 260
C.IV.5.2.02	<u>Concrete works:</u>								
	1 Concrete, arch and sidewalls	m ³	5 397	9.10	49 113	83.30	449 575	92.40	498 688
	2 Concrete, invert	m ³	1 350	7.70	10 395	55.70	75 195	63.40	85 590
	3 Reinforcing steel	t	368	325.47	119 658	1 359.52	499 824	1 684.99	619 482
C.IV.5.2.03	<u>Drilling and grouting:</u>								
	1 Percussion contact grout holes, 40-48 mm diameter	m	453	4.04	1 830	18.36	8 316	22.40	10 146
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	882	8.99	7 932	27.90	24 618	36.89	32 550
	3 Drain holes, 76 mm diameter	m	1 332	5.68	7 568	28.91	38 518	34.59	46 086
	4 Contact & consolidation cement grouting, excluding materials	t	48	42.60	2 030	124.85	5 949	167.45	7 979
	5 Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
	6 Bentonite	t		8.93		437.33		446.26	
C.IV.5.2.04	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	1 207	5.16	6 231	252.60	305 007	257.76	311 238

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
2	Portland cement ASTM type V (sulfate resistant)	t	1 207	6.06	7 317	296.70	358 257	302.76	365 574
3	Care of water and miscellaneous works	%	3%		10 671		83 170		93 842
	Total No. C.IV.5.2				366 379		2 855 514		3 221 893
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-10A				407 228		3 140 872		3 548 100
C.IV.6	TRANSPORTATION TUNNEL T-3a (Construction Tunnel)								
C.IV.6.1	SURFACE WORKS - Upstream portal								
C.IV.6.1.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	6 800.0	0.25	1 700	2.71	18 428	2.96	20 128
2	Excavation, rock	m ³	13 466.7	1.46	19 661	5.61	75 548	7.07	95 209
3	Overhauling in excess of 500 m, common material	m ³ /km	23 800.0	0.07	1 666	0.81	19 278	0.88	20 944
4	Overhauling in excess of 500 m, rock	m ³ /km	47 133.3	0.09	4 233	1.03	48 689	1.12	52 921
5	Rock bolts, 22 mm diameter	m	1 266.7	1.71	2 166	21.50	27 233	23.21	29 399
6	Rock bolts, 26.5 mm diameter	m	680.0	2.62	1 782	27.27	18 544	29.89	20 325
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	220.0	15.10	3 322	93.73	20 621	108.83	23 943
9	Welded wire fabric	kg	8 106.7	0.50	4 053	1.93	15 646	2.43	19 699
C.IV.6.1.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³		5.10		29.54		34.64	
2	Concrete elevation	m ³	493.3	8.30	4 095	34.10	16 823	42.40	20 917
3	Reinforcing steel	t	29.6	242.54	7 179	1 308.26	38 724	1 550.80	45 904
4	Flat type Formworks	m ²	280.0	6.06	1 697	17.78	4 978	23.84	6 674
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.6.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	256.9	5.16	1 325	252.60	64 885	257.76	66 210
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		1 586		11 082		12 668
	Total No. C.IV.6.1				54 465		380 477		434 943
C.IV.6.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 450 m								
C.IV.6.2.01	<u>Excavation and supports:</u>								
1	Excavation								
a)	Rock Class I	m ³		5.14		25.65		30.79	
b)	Rock Class II	m ³	17 950.0	5.92	106 275	29.97	537 993	35.89	644 268
c)	Rock Class III	m ³	18 190.0	6.67	121 331	33.91	616 827	40.58	738 158
d)	Rock Class IV	m ³	18 760.0	7.15	134 123	36.60	686 597	43.75	820 720
e)	Rock Class V	m ³	6 355.0	8.01	50 908	42.58	270 623	50.60	321 532
2	Grouted anchor bars, 22 mm diameter	m	6 588	1.49	9 816	13.63	89 791	15.12	99 606
3	Grouted anchor bars, 26 mm diameter	m	5 600	1.58	8 847	15.28	85 561	16.86	94 409
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	3 788	1.71	6 477	24.13	91 403	25.84	97 880
6	Rock bolts, 26.5 mm diameter	m	2 800	2.83	7 923	31.18	87 297	34.01	95 221
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 240	14.59	18 092	103.39	128 204	117.98	146 295
9	Welded wire fabric	kg	32 100	0.58	18 618	2.16	69 336	2.74	87 954
10	Steel ribs	kg	132 165	0.13	17 181	2.94	388 565	3.07	405 747
C.IV.6.2.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	16 274	9.10	148 089	83.30	1 355 583	92.40	1 503 671
2	Concrete, invert	m ³	4 070	7.70	31 341	55.70	226 713	63.40	258 054
3	Reinforcing steel	t	815	325.47	265 258	1 359.52	1 108 009	1 684.99	1 373 267
C.IV.6.2.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 300	4.04	5 252	18.36	23 868	22.40	29 120
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 400	8.99	21 576	27.90	66 960	36.89	88 536
3	Drain holes, 76 mm diameter	m	3 800	5.68	21 584	28.91	109 858	34.59	131 442

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
4	Contact & consolidation cement grouting, excluding materials	t	100	42.60	4 260	124.85	12 485	167.45	16 745
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.IV.6.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	3 584	5.16	18 493	252.60	905 318	257.76	923 812
2	Portland cement ASTM type V (sulfate resistant)	t	3 584	6.06	21 719	296.70	1 063 373	302.76	1 085 092
3	Care of water and miscellaneous works	%	3%		31 115		237 731		268 846
	Total No. C.IV.6.2				1 068 279		8 162 094		9 230 374
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-3a				1 122 744		8 542 572		9 665 316
C.IV.7	TRANSPORTATION TUNNEL T-50A (access to dam crest from left bank)								
C.IV.7.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.7.1.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	5 100.0	0.25	1 275	2.71	13 821	2.96	15 096
2	Excavation, rock	m ³	10 100.0	1.46	14 746	5.61	56 661	7.07	71 407
3	Overhauling in excess of 500 m, common material	m ³ /km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
4	Overhauling in excess of 500 m, rock	m ³ /km	35 350.0	0.09	3 174	1.03	36 517	1.12	39 691
5	Rock bolts, 22 mm diameter	m	950.0	1.71	1 625	21.50	20 425	23.21	22 050
6	Rock bolts, 26.5 mm diameter	m	510.0	2.62	1 336	27.27	13 908	29.89	15 244
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	165.0	15.10	2 492	93.73	15 465	108.83	17 957
9	Welded wire fabric	kg	6 080.0	0.50	3 040	1.93	11 734	2.43	14 774
C.IV.7.1.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	502.0	5.10	2 560	29.54	14 829	34.64	17 389
2	Concrete elevation	m ³	850.0	8.30	7 055	34.10	28 985	42.40	36 040
3	Reinforcing steel	t	91.2	242.54	22 120	1 308.26	119 313	1 550.80	141 433
4	Flat type Formworks	m ²	1 490.0	6.06	9 029	17.78	26 488	23.84	35 517
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.7.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	253.4	5.16	1 308	252.60	64 020	257.76	65 328
2	Portland cement, type V ASTM (sulfate resistant)	t	253.4	6.06	1 536	296.70	75 197	302.76	76 733
3	Care of water and miscellaneous works	%	3%		2 176		15 355		17 531
	Total No. C.IV.7.1				74 721		527 177		601 898
C.IV.7.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 370 m								
C.IV.7.2.01	<u>Excavation and supports:</u>								
1	Excavation								
a)	Rock Class I	m ³		5.14		25.65		30.79	
b)	Rock Class II	m ³	8 140.0	5.92	48 194	29.97	243 970	35.89	292 164
c)	Rock Class III	m ³	6 612.3	6.67	44 105	33.91	224 223	40.58	268 328
d)	Rock Class IV	m ³	10 300.3	7.15	73 641	36.60	376 982	43.75	450 623
e)	Rock Class V	m ³	8 927.7	8.01	71 518	42.58	380 182	50.60	451 700
2	Grouted anchor bars, 22 mm diameter	m	2 984	1.49	4 446	13.63	40 670	15.12	45 116
3	Grouted anchor bars, 26 mm diameter	m	2 554	1.58	4 036	15.28	39 028	16.86	43 064
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 707	1.71	2 919	24.13	41 184	25.84	44 103
6	Rock bolts, 26.5 mm diameter	m	1 277	2.83	3 614	31.18	39 820	34.01	43 434
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	907	14.59	13 235	103.39	93 785	117.98	107 019
9	Welded wire fabric	kg	21 305	0.58	12 357	2.16	46 018	2.74	58 375
10	Steel ribs	kg	224 685	0.13	29 209	2.94	660 575	3.07	689 784
C.IV.7.2.02	<u>Concrete works:</u>								
1	Concrete, arch and sidewalls	m ³	13 535	9.10	123 167	83.30	1 127 452	92.40	1 250 619
2	Concrete, invert	m ³	3 390	7.70	26 101	55.70	188 805	63.40	214 906

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
3	Reinforcing steel	t	955	325.47	310 771	1 359.52	1 298 122	1 684.99	1 608 894
C.IV.7.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 122	4.04	4 533	18.36	20 599	22.40	25 131
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 674	8.99	24 035	27.90	74 592	36.89	98 627
3	Drain holes, 76 mm diameter	m	3 282	5.68	18 643	28.91	94 890	34.59	113 533
4	Contact & consolidation cement grouting, excluding materials	t	137	42.60	5 847	124.85	17 137	167.45	22 984
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.IV.7.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 981	5.16	15 380	252.60	752 912	257.76	768 292
2	Portland cement ASTM type V (sulfate resistant)	t	2 981	6.06	18 063	296.70	884 358	302.76	902 421
3	Care of water and miscellaneous works	%	3%		25 614		199 359		224 974
	Total No. C.IV.7.2				879 427		6 844 664		7 724 091
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-50A				954 149		7 371 841		8 325 989
C.IV.8	TRANSPORTATION TUNNEL T-2 (access to DT Gates Chambers, Saline Gallery and Dam Curtain Gallery)								
C.IV.8.1	PERMANENT LINING ACTIVITIES								
C.IV.8.01	Excavation and supports								
1	Excavation	m ³		8.42		43.85		52.27	
C.IV.8.02	Concrete works								
1	Concrete, arch and sidewalls	m ³	10 583.0	10.19	107 841	89.32	945 274	99.51	1 053 114
2	Concrete, invert	m ³	5 905.0	6.39	37 733	41.51	245 117	47.90	282 850
3	Reinforcing steel	t	659.5	325.47	214 647	1 359.52	896 603	1 684.99	1 111 251
C.IV.8.03	Drilling and grouting								
1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	3 000.0	4.04	12 120	18.36	55 080	22.40	67 200
2	Contact pressure grouting (excluding injected materials)	t	100.0	39.94	3 994	121.05	12 105	160.99	16 099
C.IV.8.04	Sundries								
1	Portland cement ASTM type I or II	t	3 017.8	5.16	15 572	252.60	762 306	257.76	777 878
2	Portland cement ASTM type V (sulfate resistant)	t	3 017.8	6.06	18 288	296.70	895 393	302.76	913 681
3	Care of water and miscellaneous works	%	3.0%		12 306		114 356		126 662
	Total No. C.IV.8.1				422 501		3 926 234		4 348 736
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-2				422 501		3 926 234		4 348 736
C.IV.9	TRANSPORTATION TUNNEL T-8 (access to DT Gates Chambers from Tunnel T-8)								
C.IV.9.1	PERMANENT LINING ACTIVITIES								
C.IV.9.01	Excavation and supports								
1	Excavation	m ³		7.67		33.65		41.32	
C.IV.9.02	Concrete works								
1	Concrete, arch and sidewalls	m ³	2 843.9	10.43	29 662	84.40	240 027	94.83	269 690
2	Concrete, invert	m ³	1 044.1	8.90	9 292	56.53	59 023	65.43	68 315
3	Reinforcing steel	t	242.4	325.47	78 899	1 359.52	329 569	1 684.99	408 468
C.IV.9.03	Drilling and grouting								
1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	1 000.0	4.04	4 040	18.36	18 360	22.40	22 400
2	Contact pressure grouting (excluding injected materials)	t	35.0	39.94	1 398	121.05	4 237	160.99	5 635
C.IV.9.04	Sundries								
1	Portland cement ASTM type I or II	t	699.8	5.16	3 611	252.60	176 781	257.76	180 392
2	Portland cement ASTM type V (sulfate resistant)	t	699.8	6.06	4 241	296.70	207 644	302.76	211 885
3	Care of water and miscellaneous works	%	3.0%		3 934		31 069		35 004
	Total No. C.IV.9.1				135 078		1 066 710		1 201 788
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-8				135 078		1 066 710		1 201 788
C.IV.10	CONVEYOR BELT TUNNEL N. 3								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.IV.10.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.10.1.01	Excavation and supports:								
1	Excavation, common	m ³	4 050.0	0.25	1 013	2.71	10 976	2.96	11 988
2	Excavation, rock	m ³	8 100.0	1.46	11 826	5.61	45 441	7.07	57 267
3	Overhauling in excess of 500 m, common material	m ³ /km	14 175.0	0.07	992	0.81	11 482	0.88	12 474
4	Overhauling in excess of 500 m, rock	m ³ /km	28 350.0	0.09	2 546	1.03	29 286	1.12	31 831
5	Rock bolts, 22 mm diameter	m	760.0	1.71	1 300	21.50	16 340	23.21	17 640
6	Rock bolts, 26.5 mm diameter	m	410.0	2.62	1 074	27.27	11 181	29.89	12 255
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	130.0	15.10	1 963	93.73	12 185	108.83	14 148
9	Welded wire fabric	kg	4 850.0	0.50	2 425	1.93	9 361	2.43	11 786
C.IV.10.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	400.0	5.10	2 040	29.54	11 816	34.64	13 856
2	Concrete elevation	m ³	775.0	8.30	6 433	34.10	26 428	42.40	32 860
3	Reinforcing steel	t	90.0	242.54	21 829	1 308.26	117 743	1 550.80	139 572
4	Flat type Formworks	m ²	1 235.0	6.06	7 484	17.78	21 955	23.84	29 439
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.10.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	217.3	5.16	1 121	252.60	54 877	257.76	55 998
2	Portland cement, type V ASTM (sulfate resistant)	t	217.3	6.06	1 317	296.70	64 458	302.76	65 775
3	Care of water and miscellaneous works	%	3%		1 901		13 306		15 207
	Total No. C.IV.10.1				65 262		456 833		522 095
C.IV.10.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 1100 m								
C.IV.10.2.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m ³		5.14		25.65		30.79	
b)	Rock Class II	m ³	21 445.0	5.92	126 967	29.97	642 744	35.89	769 711
c)	Rock Class III	m ³	25 610.0	6.67	170 824	33.91	868 440	40.58	1 039 265
d)	Rock Class IV	m ³	18 590.0	7.15	132 907	36.60	680 375	43.75	813 283
e)	Rock Class V	m ³	7 660.0	8.01	61 362	42.58	326 196	50.60	387 558
2	Grouted anchor bars, 22 mm diameter	m	12 500	1.49	18 625	13.63	170 375	15.12	189 000
3	Grouted anchor bars, 26 mm diameter	m	7 500	1.58	11 850	15.28	114 600	16.86	126 450
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	4 250	1.71	7 268	24.13	102 553	25.84	109 820
6	Rock bolts, 26.5 mm diameter	m	2 250	2.83	6 368	31.18	70 155	34.01	76 523
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	2 870	14.59	41 873	103.39	296 729	117.98	338 603
9	Welded wire fabric	kg	103 450	0.58	60 001	2.16	223 452	2.74	283 453
10	Steel ribs	kg	226 770	0.13	29 480	2.94	666 704	3.07	696 184
C.IV.10.2.02	Concrete works:								
1	Concrete, invert	m ³	3 310	7.70	25 487	55.70	184 367	63.40	209 854
2	Reinforcing steel	t	268	325.47	87 226	1 359.52	364 351	1 684.99	451 577
C.IV.10.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m		4.04		18.36		22.40	
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 720	8.99	42 433	27.90	131 688	36.89	174 121
3	Drain holes, 76 mm diameter	m	9 850	5.68	55 948	28.91	284 764	34.59	340 712
4	Contact & consolidation cement grouting, excluding materials	t	270	42.60	11 502	124.85	33 710	167.45	45 212
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.IV.10.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 310	5.16	6 761	252.60	330 994	257.76	337 756
2	Portland cement ASTM type V (sulfate resistant)	t	1 310	6.06	7 941	296.70	388 781	302.76	396 722
3	Care of water and miscellaneous works	%	3%		27 145		176 429		203 574
	Total No. C.IV.10.2				931 968		6 057 408		6 989 376

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
	TOTAL AMOUNT OF CONVEYOR BELT TUNNEL N. 3				997 230		6 514 240		7 511 471
C.IV.11	CONVEYOR BELT TUNNEL N. 4								
C.IV.11.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.11.1.01	<u>Excavation and supports:</u>								
1	Excavation, common	m ³	4 050.0	0.25	1 013	2.71	10 976	2.96	11 988
2	Excavation, rock	m ³	8 100.0	1.46	11 826	5.61	45 441	7.07	57 267
3	Overhauling in excess of 500 m, common material	m3/km	14 175.0	0.07	992	0.81	11 482	0.88	12 474
4	Overhauling in excess of 500 m, rock	m3/km	28 350.0	0.09	2 546	1.03	29 286	1.12	31 831
5	Rock bolts, 22 mm diameter	m	760.0	1.71	1 300	21.50	16 340	23.21	17 640
6	Rock bolts, 26.5 mm diameter	m	410.0	2.62	1 074	27.27	11 181	29.89	12 255
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	130.0	15.10	1 963	93.73	12 185	108.83	14 148
9	Welded wire fabric	kg	4 850.0	0.50	2 425	1.93	9 361	2.43	11 786
C.IV.11.1.02	<u>Concrete works:</u>								
1	Concrete, foundation and mat	m ³	400.0	5.10	2 040	29.54	11 816	34.64	13 856
2	Concrete elevation	m ³	775.0	8.30	6 433	34.10	26 428	42.40	32 860
3	Reinforcing steel	t	90.0	242.54	21 829	1 308.26	117 743	1 550.80	139 572
4	Flat type Formworks	m ²	1 235.0	6.06	7 484	17.78	21 955	23.84	29 439
5	Curved type Formworks	m ²		10.67		26.77		37.44	
6	Scaffolding for slab formworks, 20 KN/m ² max. load	m ³		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.IV.11.1.03	<u>Sundries:</u>								
1	Portland cement, type I or II ASTM	t	217.3	5.16	1 121	252.60	54 877	257.76	55 998
2	Portland cement, type V ASTM (sulfate resistant)	t	217.3	6.06	1 317	296.70	64 458	302.76	65 775
3	Care of water and miscellaneous works	%	3%		1 901		13 306		15 207
	Total No. C.IV.11.1				65 262		456 833		522 095
C.IV.11.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 700 m								
C.IV.11.2.01	<u>Excavation and supports:</u>								
1	Excavation								
a)	Rock Class I	m ³		5.14		25.65		30.79	
b)	Rock Class II	m ³	13 646.8	5.92	80 797	29.97	409 019	35.89	489 816
c)	Rock Class III	m ³	16 297.3	6.67	108 706	33.91	552 644	40.58	661 350
d)	Rock Class IV	m ³	11 830.0	7.15	84 577	36.60	432 966	43.75	517 543
e)	Rock Class V	m ³	4 874.5	8.01	39 049	42.58	207 579	50.60	246 628
2	Grouted anchor bars, 22 mm diameter	m	7 955	1.49	11 852	13.63	108 420	15.12	120 273
3	Grouted anchor bars, 26 mm diameter	m	4 773	1.58	7 541	15.28	72 927	16.86	80 468
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	2 705	1.71	4 625	24.13	65 261	25.84	69 885
6	Rock bolts, 26.5 mm diameter	m	1 432	2.83	4 052	31.18	44 644	34.01	48 696
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 826	14.59	26 647	103.39	188 828	117.98	215 474
9	Welded wire fabric	kg	65 832	0.58	38 182	2.16	142 197	2.74	180 379
10	Steel ribs	kg	144 308	0.13	18 760	2.94	424 266	3.07	443 026
C.IV.11.2.02	<u>Concrete works:</u>								
1	Concrete, invert	m ³	2 106	7.70	16 219	55.70	117 324	63.40	133 543
2	Reinforcing steel	t	171	325.47	55 507	1 359.52	231 860	1 684.99	287 367
C.IV.11.2.03	<u>Drilling and grouting:</u>								
1	Percussion contact grout holes, 40-48 mm diameter	m		4.04		18.36		22.40	
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	3 004	8.99	27 003	27.90	83 801	36.89	110 804
3	Drain holes, 76 mm diameter	m	6 268	5.68	35 603	28.91	181 213	34.59	216 816
4	Contact & consolidation cement grouting, excluding materials	t	172	42.60	7 319	124.85	21 452	167.45	28 771
5	Cement grouting between concrete and steel lining	m ²		2.85		8.55		11.40	
6	Bentonite	t		8.93		437.33		446.26	
C.IV.11.2.04	<u>Sundries:</u>								
1	Portland cement ASTM type I or II	t	834	5.16	4 303	252.60	210 633	257.76	214 936

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
2	Portland cement ASTM type V (sulfate resistant)	t	834	6.06	5 053	296.70	247 406	302.76	252 459
3	Care of water and miscellaneous works	%	3%		17 274		112 273		129 547
	Total No. C.IV.11.2				593 071		3 854 714		4 447 785
	TOTAL AMOUNT OF CONVEYOR BELT TUNNEL N. 4				658 333		4 311 547		4 969 879
C.IV.12	ACCESS ADIT P37 (to powerhouse draft tubes and drainage gallery - 2nd stretch) - 114 m								
C.IV.12.01	Excavation and supports:								
1	Excavation	m3	8 977.2	8.25	74 062	37.94	340 595	46.19	414 657
2	Rock bolts, 22 mm diameter	m	7 703.0	1.71	13 172	24.13	185 873	25.84	199 045
3	Rock bolts, 26.5 mm diameter	m	750.0	2.83	2 123	31.18	23 385	34.01	25 508
4	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
5	Shotcrete	m ³	210	14.59	3 064	103.39	21 712	117.98	24 776
6	Welded wire fabric	kg	7 020	0.58	4 072	2.16	15 163	2.74	19 235
7	Steel ribs	kg		0.13		2.94		3.07	
C.IV.12.02	Concrete works:								
1	Concrete, arch and sidewalls	m3	854.7	11.39	9 735	89.06	76 116	100.45	85 851
2	Concrete, lean and backfill	m3	8 000.0	6.35	50 800	34.33	274 640	40.68	325 440
3	Concrete, invert and mat	m3	228.6	10.71	2 448	60.91	13 921	71.62	16 369
4	Reinforcing steel	t	43.3	325.47	14 103	1 359.52	58 911	1 684.99	73 014
C.IV.12.03	Drilling and grouting:								
1	Drain holes, 50-76 mm diameter	m		5.68		28.91		34.59	
2	Percussion contact grout holes, 40-48 mm diameter	m	285.0	4.04	1 151	18.36	5 233	22.40	6 384
3	Contact & consolidation cement grouting, excluding materials	t	5.0	42.60	215	124.85	629	167.45	844
C.IV.12.04	Sundries:								
1	Portland cement ASTM type I or II	t	1 639	5.16	8 459	252.60	414 095	257.76	422 554
2	Portland cement ASTM type V (sulfate resistant)	t	1 639	6.06	9 934	296.70	486 390	302.76	496 324
3	Care of water and miscellaneous works	%	3%		5 800		57 500		63 300
	Total No. C.IV.12				199 137		1 974 163		2 173 301
	TOTAL AMOUNT OF ACCESS ADIT P37				199 137		1 974 163		2 173 301
C.IV.13	PROVISIONAL SUM FOR TUNNELS PLUGGING				500 000		4 500 000		5 000 000
C.IV.14	TRANSPORTATION TUNNELS AND GALLERIES REMEDIAL WORKS								
C.IV.14.1	ACCESS TUNNEL T-4 - REMEDIAL WORKS								
C.IV.14.1.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	15 880	1.58	25 090	15.28	242 646	16.86	267 737
C.IV.14.1.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	10 075	9.10	91 683	83.30	839 248	92.40	930 930
2	Concrete, invert	m ³	3 820	7.70	29 414	55.70	212 774	63.40	242 188
3	Reinforcing steel	t	1 045	325.47	340 116	1 359.52	1 420 698	1 684.99	1 760 815
4	Lattice Girders Ribs	kg		0.68		2.82		3.50	
C.IV.14.1.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 945	4.04	7 858	18.36	35 710	22.40	43 568
2	Drain holes, 76 mm diameter	m	11 120	5.68	63 162	28.91	321 479	34.59	384 641
3	Contact & consolidation cement grouting, excluding materials	t	62	42.60	2 641	124.85	7 741	167.45	10 382
C.IV.14.1.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 705	5.16	13 959	252.60	683 346	257.76	697 305
2	Portland cement ASTM type V (sulfate resistant)	t	2 220	6.06	13 453	296.70	658 674	302.76	672 127
3	Care of water and miscellaneous works	%	3%		17 621		132 669		150 291
	Total N° C.IV.14.1				604 997		4 554 986		5 159 983
C.IV.14.2	Access Tunnel T- 4 Fault 35 Crossing Stretch - 80 m								
C.IV.14.2.01	Excavation and supports:								

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
1	Rock Excavation	m ³	2 955	32.00	94 560	128.00	378 240	160.00	472 800
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m	1 000	1.58	1 580	15.28	15 280	16.86	16 860
4	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
5	Rock bolts, 26.5 mm diameter	m	945	2.83	2 674	31.18	29 465	34.01	32 139
6	Shotcrete	m ³	305	14.59	4 450	103.39	31 534	117.98	35 984
7	Welded wire fabric	kg	5 990	0.58	3 474	2.16	12 938	2.74	16 413
8	Steel ribs	kg	98 145	0.13	12 759	2.94	288 546	3.07	301 305
C.IV.14.2.02	Concrete works:								
1	Concrete	m ³	4 350	9.01	39 186	60.32	262 378	69.33	301 564
2	Reinforcing steel	t	310	325.47	100 896	1 359.52	421 451	1 684.99	522 347
C.IV.14.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	465	4.04	1 879	18.36	8 537	22.40	10 416
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 555	5.32	13 593	22.59	57 717	27.91	71 310
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	198	42.60	8 435	124.85	24 720	167.45	33 155
5	Bentonite	t		8.93		437.33		446.26	
C.IV.14.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	951	5.16	4 905	252.60	240 128	257.76	245 033
2	Portland cement ASTM type V (sulfate resistant)	t	951	6.06	5 761	296.70	282 050	302.76	287 811
3	Demolition of existing Concrete Lining	m ³	1 700	45.04	76 568	301.58	512 686	346.62	589 254
4	Care of water and miscellaneous works	%	5%		18 536		128 284		146 820
	Total N° C.IV.14.2				389 255		2 693 956		3 083 211
C.IV.14.3	ACCESS TUNNEL T-3' - REMEDIAL WORKS								
C.IV.14.3.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	14 840	1.58	23 447	15.28	226 755	16.86	250 202
C.IV.14.3.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	7 940	9.10	72 254	83.30	661 402	92.40	733 656
2	Concrete, invert	m ³	3 015	7.70	23 216	55.70	167 936	63.40	191 151
3	Reinforcing steel	t	830	325.47	270 140	1 359.52	1 128 402	1 684.99	1 398 542
4	Lattice Girders Ribs	kg		0.68		2.82		3.50	
C.IV.14.3.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 650	4.04	6 666	18.36	30 294	22.40	36 960
2	Drain holes, 76 mm diameter	m	11 790	5.68	66 967	28.91	340 849	34.59	407 816
3	Contact & consolidation cement grouting, excluding materials	t	52	42.60	2 215	124.85	6 492	167.45	8 707
C.IV.14.3.04	Sundries:								
1	Portland cement ASTM type I or II	t	2 136	5.16	11 023	252.60	539 617	257.76	550 640
2	Portland cement ASTM type V (sulfate resistant)	t	1 750	6.06	10 605	296.70	519 225	302.76	529 830
3	Care of water and miscellaneous works	%	3%		14 596		108 629		123 225
	Total N° C.IV.14.3				501 129		3 729 600		4 230 730
C.IV.14.4	Access Tunnel T- 3' Fault 35 Crossing Stretch - 80 m								
C.IV.14.4.01	Excavation and supports:								
1	Rock Excavation	m ³	2 725	32.00	87 200	128.00	348 800	160.00	436 000
2	Grouted anchor bars, 22 mm diameter	m		1.49		13.63		15.12	
3	Grouted anchor bars, 26 mm diameter	m	850	1.58	1 343	15.28	12 988	16.86	14 331
4	Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
5	Rock bolts, 26.5 mm diameter	m	722	2.83	2 043	31.18	22 512	34.01	24 555
6	Shotcrete	m ³	246	14.59	3 589	103.39	25 434	117.98	29 023
7	Welded wire fabric	kg	4 850	0.58	2 813	2.16	10 476	2.74	13 289
8	Steel ribs	kg	76 565	0.13	9 953	2.94	225 101	3.07	235 055
C.IV.14.4.02	Concrete works:								
1	Concrete	m ³	3 785	9.01	34 097	60.32	228 299	69.33	262 395
2	Reinforcing steel	t	265	325.47	86 250	1 359.52	360 273	1 684.99	446 522
C.IV.14.4.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	460	4.04	1 858	18.36	8 446	22.40	10 304
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 580	5.32	13 726	22.59	58 282	27.91	72 008
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	200	42.60	8 520	124.85	24 970	167.45	33 490
5	Bentonite	t		8.93		437.33		446.26	

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price	Amount	Price	Amount	Price	Amount
				(2)	(1 x 2)	(3)	(1 x 3)	(2+3)	(1 x (2+3))
C.IV.14.4.04	Sundries:								
1	Portland cement ASTM type I or II	t	837	5.16	4 317	252.60	211 338	257.76	215 655
2	Portland cement ASTM type V (sulfate resistant)	t	837	6.06	5 070	296.70	248 234	302.76	253 304
3	Demolition of existing Concrete Lining	m ³	1 305	45.04	58 777	301.58	393 562	346.62	452 339
4	Care of water and miscellaneous works	%	5%		15 978		108 936		124 914
	Total N° C.IV.14.4				335 534		2 287 650		2 623 184
C.IV.14.5	CABLES GALLERIES - REMEDIAL WORKS								
C.IV.14.5.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	17 980	1.58	28 408	15.28	274 734	16.86	303 143
2	Shotcrete	m ³	2 500	15.10	37 750	93.73	234 325	108.83	272 075
3	Welded wire fabric	kg	111 000	0.50	55 500	1.93	214 230	2.43	269 730
C.IV.14.5.03	Drilling and grouting:								
1	Drain holes, 76 mm diameter	m	24 000	5.68	136 320	28.91	693 840	34.59	830 160
2	Contact & consolidation cement grouting, excluding materials	t		42.60		124.85		167.45	
C.IV.14.5.04	Sundries:								
1	Portland cement ASTM type I or II	t	615	5.16	3 173	252.60	155 349	257.76	158 522
2	Portland cement ASTM type V (sulfate resistant)	t	510	6.06	3 091	296.70	151 317	302.76	154 408
3	Care of water and miscellaneous works	%	3%		7 927		51 714		59 641
	Total N° C.IV.14.5				272 170		1 775 509		2 047 679
C.IV.14.6	POWERHOUSE DRAINAGE GALLERIES - REMEDIAL WORKS (738 + 447+ 395 m)								
C.IV.14.6.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	13 275	1.58	20 975	15.28	202 842	16.86	223 817
2	Shotcrete	m ³	1 865	15.10	28 162	93.73	174 806	108.83	202 968
3	Welded wire fabric	kg	82 860	0.50	41 430	1.93	159 920	2.43	201 350
C.IV.14.6.03	Drilling and grouting:								
1	Drain holes, 76 mm diameter	m	18 660	5.68	105 989	28.91	539 461	34.59	645 449
2	Contact & consolidation cement grouting, excluding materials	t		42.60		124.85		167.45	
C.IV.14.6.04	Sundries:								
1	Portland cement ASTM type I or II	t	459	5.16	2 370	252.60	116 007	257.76	118 376
2	Portland cement ASTM type V (sulfate resistant)	t	380	6.06	2 303	296.70	112 746	302.76	115 049
3	Care of water and miscellaneous works	%	3%		6 037		39 173		45 210
	Total N° C.IV.14.6				207 264		1 344 955		1 552 219
C.IV.14.7	STAGE 1 HEADRACE TUNNEL - GATES CHAMBER DRAINAGE GALLERIES - REMEDIAL WORKS (97 + 77 m)								
C.IV.14.7.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	1 460	1.58	2 307	15.28	22 309	16.86	24 616
2	Shotcrete	m ³	205	15.10	3 096	93.73	19 215	108.83	22 310
3	Welded wire fabric	kg	9 115	0.50	4 558	1.93	17 592	2.43	22 149
C.IV.14.7.03	Drilling and grouting:								
1	Drain holes, 76 mm diameter	m	2 055	5.68	11 672	28.91	59 410	34.59	71 082
2	Contact & consolidation cement grouting, excluding materials	t		42.60		124.85		167.45	
C.IV.14.7.04	Sundries:								
1	Portland cement ASTM type I or II	t	47	5.16	244	252.60	11 935	257.76	12 179
2	Portland cement ASTM type V (sulfate resistant)	t	45	6.06	273	296.70	13 352	302.76	13 624
3	Care of water and miscellaneous works	%	3%		664		4 314		4 979
	Total N° C.IV.14.7				22 813		148 127		170 940
C.IV.14.8	DIVERSION TUNNELS GATES CHAMBERS DRAINAGE GALLERIES - REMEDIAL WORKS (385 +108 m)								
C.IV.14.8.01	Excavation and supports:								
1	Grouted anchor bars, 26 mm diameter	m	4 950	1.58	7 821	15.28	75 636	16.86	83 457
2	Shotcrete	m ³	700	15.10	10 570	93.73	65 611	108.83	76 181
3	Welded wire fabric	kg	31 000	0.50	15 500	1.93	59 830	2.43	75 330
C.IV.14.8.03	Drilling and grouting:								
1	Drain holes, 76 mm diameter	m	7 000	5.68	39 760	28.91	202 370	34.59	242 130
2	Contact & consolidation cement grouting, excluding materials	t		42.60		124.85		167.45	
C.IV.14.8.04	Sundries:								
1	Portland cement ASTM type I or II	t	170	5.16	877	252.60	42 942	257.76	43 819
2	Portland cement ASTM type V (sulfate resistant)	t	145	6.06	879	296.70	43 022	302.76	43 900
3	Care of water and miscellaneous works	%	3%		2 262		14 682		16 945

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ITEM	Description of Works	Unit	Quantity (1)	Local Curr. (US\$ equiv.)		Foreign Curren. (US\$)		Total (US\$ equivalent)	
				Price (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
	Total N° C.IV.14.8						77 669	504 093	581 762
C.IV.14.9	ACCESS TUNNEL T-3 - REMEDIAL WORKS - 1535 m								
C.IV.14.9.01	Excavation and supports:								
1	Expansion bolts	unit	25 725	1.20	30 870	11.80	303 555	13.00	334 425
2	Steel Wire Mesh	kg	73 080	0.50	36 540	1.93	141 044	2.43	177 584
C.IV.14.9.02	Concrete works:								
1	Concrete, repair of damages	m ³	4 840	11.32	54 769	103.11	499 048	114.42	553 817
C.IV.14.9.03	Sundries:								
1	Portland cement ASTM type I or II	t	924	5.16	4 768	252.60	233 402	257.76	238 170
2	Portland cement ASTM type V (sulfate resistant)	t	770	6.06	4 666	296.70	228 459	302.76	233 125
3	Reshaping of damaged concrete portions	m ³	635	27.30	17 336	249.90	158 687	277.20	176 022
4	Care of water and miscellaneous works	%	3%		4 468		46 926		51 394
	Total N° C.IV.14.9				153 417		1 611 121		1 764 538
C.IV.14.10	ACCESS TUNNEL T-37 - REMEDIAL WORKS - 640 m								
C.IV.14.10.01	Excavation and supports:								
1	Expansion bolts	unit	7 957	1.20	9 548	11.80	93 887	13.00	103 435
2	Steel Wire Mesh	kg	22 603	0.50	11 301	1.93	43 624	2.43	54 925
C.IV.14.10.02	Concrete works:								
1	Concrete, repair of damages	m ³	1 497	11.32	16 940	103.11	154 351	114.42	171 291
C.IV.14.10.03	Sundries:								
1	Portland cement ASTM type I or II	t	284	5.16	1 465	252.60	71 723	257.76	73 188
2	Portland cement ASTM type V (sulfate resistant)	t	240	6.06	1 454	296.70	71 208	302.76	72 662
3	Reshaping of damaged concrete portions	m ³	196	27.30	5 362	249.90	49 080	277.20	54 442
4	Care of water and miscellaneous works	%	3%		1 382		14 516		15 898
	Total N° C.IV.14.10				47 452		498 389		545 841
C.IV.14.11	ACCESS TUNNEL T-37* - REMEDIAL WORKS - 170 m								
C.IV.14.11.01	Excavation and supports:								
1	Expansion bolts	unit	1 960	1.20	2 352	11.80	23 128	13.00	25 479
2	Steel Wire Mesh	kg	5 568	0.50	2 784	1.93	10 746	2.43	13 530
C.IV.14.11.02	Concrete works:								
1	Concrete, repair of damages	m ³	369	11.32	4 173	103.11	38 022	114.42	42 195
C.IV.14.11.03	Sundries:								
1	Portland cement ASTM type I or II	t	69	5.16	356	252.60	17 446	257.76	17 802
2	Portland cement ASTM type V (sulfate resistant)	t	60	6.06	364	296.70	17 802	302.76	18 166
3	Reshaping of damaged concrete portions	m ³	48	27.30	1 321	249.90	12 090	277.20	13 411
4	Care of water and miscellaneous works	%	3%		340		3 577		3 917
	Total N° C.IV.14.11				11 690		122 810		134 500
	TOTAL AMOUNT OF TRANSPORTATION TUNNELS AND GALLERIES REMEDIAL WORKS						2 623 391	19 271 195	21 894 586
	TOTAL AMOUNT OF TRANSPORTATION TUNNELS AND GALLERIES						15 221 843	115 316 748	130 538 591
	TOTAL AMOUNT OF UNDERGROUND WORKS						131 806 639	957 071 324	1 088 877 963
	GRAND TOTAL OF CIVIL WORKS						223 143 708	1 746 390 810	1 969 534 518

PART VII – Alt 3: PRICE BILL OF QUANTITIES & COST SUMMARY (Permanent equipment)

ITEM	E&M COSTS - 2000 MW INSTALLED CAPACITY - 6 UNITS - FSL 1220 Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
1	REUTILIZATION OF UNIT 6											
1.1	REUTILIZATION OF UNIT 6 - UNIT											
1.1.1	Hydraulic Turbine and Governor											
	Hydraulic Turbines and Governors - unit 6, based on existing final capacity	MW	1	333.3	600.0	33 345	20 007 000	7 202 520	800 280	12 004 200		
1.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 6, based on existing final capacity	MW	1	333.3	600.0	43 349	26 009 100	10 803 780	1 200 420	14 004 900		
	Total N°1.1 ----->>							18 006 300	2 000 700	26 009 100	46 016 100	
	Total N°1 ----->>>							18 006 300	2 000 700	26 009 100		46 016 100
2	REUTILIZATION OF UNIT 5											
2.1	REUTILIZATION OF UNIT 5 - UNIT											
2.1.1	Hydraulic Turbine and Governor											
	Hydraulic Turbines and Governors - unit 5, based on existing final capacity	MW	1	333.3	600.0	33 345	20 007 000	7 202 520	800 280	12 004 200		
2.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 5, based on existing final capacity	MW	1	333.3	600.0	66 690	40 014 000	23 408 190	2 600 910	14 004 900		
	Total N°2.1 ----->>							30 610 710	3 401 190	26 009 100	60 021 000	
	Total N°2 ----->>>							30 610 710	3 401 190	26 009 100		60 021 000
3	FOUR NEW UNITS											
3.1	NEW UNITS 4, 3, 2, 1 - UNIT											
3.1.1	Hydraulic Turbine and Governor											
	Units 4, 3, 2, 1	MW	4	333.3	1 333.3	66 690	88 920 000	64 022 400	7 113 600	17 784 000		
3.1.2	Generator and Excitation Equipment											
	Units 4, 3, 2, 1	MW	4	333.3	1 333.3	66 690	88 920 000	59 576 400	7 113 600	22 230 000		
	Total N°3.1 ----->>							123 598 800	14 227 200	40 014 000	177 840 000	

ITEM	E&M COSTS - 2000 MW INSTALLED CAPACITY - 6 UNITS - FSL 1220 Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
3.2	NEW UNITS 6, 5, 4, 3, 2, 1 - BOP											
3.2.1	Automation											
	Units 6, 5, 4, 3, 2, 1	MW	1	2000.0	2 000.0	13 353	26 706 000	20 563 620	2 136 480	4 005 900		
3.2.2	BOP Mechanical (including PH Cranes)											
	Units 6, 5, 4, 3, 2, 1	MW	1	2000.0	2 000.0	16 023	32 046 000	24 675 420	2 563 680	4 806 900		
3.2.3	BOP Electrical											
	Units 6, 5, 4, 3, 2, 1	MW	1	2000.0	2 000.0	20 029	40 058 000	30 844 660	3 204 640	6 008 700		
3.2.4	HV Transformers											
	Units 6, 5, 4, 3, 2, 1	MW	1	2000.0	2 000.0	26 706	53 412 000	42 729 600	7 477 680	3 204 720		
3.2.4	Switchward and Links											
	Units 6, 5, 4, 3, 2, 1	MW	1	2000.0	2 000.0	17 359	34 718 000	26 732 860	2 777 440	5 207 700		
	Total N°3.2 ----->>>							145 546 160	18 159 920	23 233 920	186 940 000	
	Total N°3 ----->>>>							317 761 970	37 789 010	115 266 120		364 780 000
2	MISCELLANEA											
	Miscellanea on EM equipment	%		5.0%				15 888 099	1 889 451	5 763 306		23 540 855
	TOTAL AMOUNT OF E&M EQUIPMENT							333 650 069	39 678 461	121 029 426		494 357 955

ITEM	E&M COSTS - 2400 MW INSTALLED CAPACITY - 6 UNITS - FSL 1220 Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal	Subtotal
								Manufact.	Transport	Installation	II level	I level
1	REUTILIZATION OF UNIT 6											
1.1	REUTILIZATION OF UNIT 6 - UNIT											
1.1.1	Hydraulic Turbine and Governor											
	Hydraulic Turbines and Governors - unit 6, based on existing final capacity	MW	1	400.0	600.0	32 598	19 558 500	7 041 060	782 340	11 735 100		
1.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 6, based on existing final capacity	MW	1	400.0	600.0	42 377	25 426 050	10 561 590	1 173 510	13 690 950		
	Total N°1.1 ----->>							17 602 650	1 955 850	25 426 050	44 984 550	
	Total N°1 ----->>>							17 602 650	1 955 850	25 426 050		44 984 550
2	REUTILIZATION OF UNIT 5											
2.1	REUTILIZATION OF UNIT 5 - UNIT											
2.1.1	Hydraulic Turbine and Governor											
	Hydraulic Turbines and Governors - unit 5, based on existing final capacity	MW	1	400.0	600.0	32 598	19 558 500	7 041 060	782 340	11 735 100		
2.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 5, based on existing final capacity	MW	1	400.0	600.0	65 195	39 117 000	22 883 445	2 542 605	13 690 950		
	Total N°2.1 ----->>							29 924 505	3 324 945	25 426 050	58 675 500	
	Total N°2 ----->>>							29 924 505	3 324 945	25 426 050		58 675 500
3	FOUR NEW UNITS											
3.1	NEW UNITS 4, 3, 2, 1 - UNIT											
3.1.1	Hydraulic Turbine and Governor											
	Units 4, 3, 2, 1	MW	4	400.0	1 600.0	65 195	104 312 000	75 104 640	8 344 960	20 862 400		
3.1.2	Generator and Excitation Equipment											
	Units 4, 3, 2, 1	MW	4	400.0	1 600.0	65 195	104 312 000	69 889 040	8 344 960	26 078 000		
	Total N°3.1 ----->>							144 993 680	16 689 920	46 940 400	208 624 000	

ITEM	E&M COSTS - 2400 MW INSTALLED CAPACITY - 6 UNITS - FSL 1220 Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
3.2	NEW UNITS 6, 5, 4, 3, 2, 1 - BOP											
3.2.1	Automation											
	Units 6, 5, 4, 3, 2, 1	MW	1	2400.0	2 400.0	13 037	31 288 800	24 092 376	2 503 104	4 693 320		
3.2.2	BOP Mechanical (including PH Cranes)											
	Units 6, 5, 4, 3, 2, 1	MW	1	2400.0	2 400.0	15 645	37 548 000	28 911 960	3 003 840	5 632 200		
3.2.3	BOP Electrical											
	Units 6, 5, 4, 3, 2, 1	MW	1	2400.0	2 400.0	19 556	46 934 400	36 139 488	3 754 752	7 040 160		
3.2.4	HV Transformers											
	Units 6, 5, 4, 3, 2, 1	MW	1	2400.0	2 400.0	26 074	62 577 600	50 062 080	8 760 864	3 754 656		
3.2.4	Switchward and Links											
	Units 6, 5, 4, 3, 2, 1	MW	1	2400.0	2 400.0	16 948	40 675 200	31 319 904	3 254 016	6 101 280		
	Total N°3.2 ----->>>							170 525 808	21 276 576	27 221 616	219 024 000	
	Total N°3 ----->>>>							363 046 643	43 247 291	125 014 116		427 648 000
2	MISCELLANEA											
	Miscellanea on EM equipment	%		5.0%				18 152 332	2 162 365	6 250 706		26 565 403
	TOTAL AMOUNT OF E&M EQUIPMENT							381 198 975	45 409 656	131 264 822		557 873 453

ITEM	E&M COSTS - 2800 MW INSTALLED CAPACITY - 6 UNITS - FSL 1220 Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
1	REUTILIZATION OF UNIT 6											
1.1	REUTILIZATION OF UNIT 6 - UNIT											
1.1.1	Hydraulic Turbine and Governor											
	Hydraulic Turbines and Governors - unit 6, based on existing final capacity	MW	1	466.7	600.0	32 013	19 207 500	6 914 700	768 300	11 524 500		
1.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 6, based on existing final capacity	MW	1	466.7	600.0	41 616	24 969 750	10 372 050	1 152 450	13 445 250		
	Total N°1.1 ----->>							17 286 750	1 920 750	24 969 750	44 177 250	
	Total N°1 ----->>>							17 286 750	1 920 750	24 969 750		44 177 250
2	REUTILIZATION OF UNIT 5											
2.1	REUTILIZATION OF UNIT 5 - UNIT											
2.1.1	Hydraulic Turbine and Governor											
	Hydraulic Turbines and Governors - unit 5, based on existing final capacity	MW	1	466.7	600.0	32 013	19 207 500	6 914 700	768 300	11 524 500		
2.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 5, based on existing final capacity	MW	1	466.7	600.0	64 025	38 415 000	22 472 775	2 496 975	13 445 250		
	Total N°2.1 ----->>							29 387 475	3 265 275	24 969 750	57 622 500	
	Total N°2 ----->>>							29 387 475	3 265 275	24 969 750		57 622 500
3	FOUR NEW UNITS											
3.1	NEW UNITS - UNIT											
3.1.1	Hydraulic Turbine and Governor											
	Units 4, 3, 2, 1	MW	4	466.7	1 866.7	64 025	119 513 333	86 049 600	9 561 067	23 902 667		
3.1.2	Generator and Excitation Equipment											
	Units 4, 3, 2, 1	MW	4	466.7	1 866.7	64 025	119 513 333	80 073 933	9 561 067	29 878 333		
	Total N°3.1 ----->>							166 123 533	19 122 133	53 781 000	239 026 667	
3.2	UNITS - BOP											

3.2.1	Automation											
	Units 6, 5, 4, 3, 2, 1	MW	1	2800.0	2 800.0	12 814	35 879 200	27 626 984	2 870 336	5 381 880		
3.2.2	BOP Mechanical (including PH Cranes)											
	Units 6, 5, 4, 3, 2, 1	MW	1	2800.0	2 800.0	15 377	43 055 600	33 152 812	3 444 448	6 458 340		
3.2.3	BOP Electrical											
	Units 6, 5, 4, 3, 2, 1	MW	1	2800.0	2 800.0	19 221	53 818 800	41 440 476	4 305 504	8 072 820		
3.2.4	HV Transformers											
	Units 6, 5, 4, 3, 2, 1	MW	1	2800.0	2 800.0	25 629	71 761 200	57 408 960	10 046 568	4 305 672		
3.2.4	Switchward and Links											
	Units 6, 5, 4, 3, 2, 1	MW	1	2800.0	2 800.0	16 659	46 645 200	35 916 804	3 731 616	6 996 780		
	Total N°3.2 ----->>							195 546 036	24 398 472	31 215 492	251 160 000	
	Total N°3 ----->>>							361 669 569	43 520 605	84 996 492	490 186 667	
4	MISCELLANEA											
	Miscellanea on EM equipment	%		5.0%				20 417 190	2 435 332	6 746 800	29 599 321	
	TOTAL AMOUNT OF E&M EQUIPMENT							428 760 984	51 141 962	141 682 792	621 585 738	

ITEM	EXISTING HSS EQUIPMENT COST OF REMAINING WORKS TO COMPLETION Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)					
						Supply & Transport		Installation		Subtotal	Subtotal
						Unit Price	Cost	Unit Price	Cost	II level	I level
1	EXISTING HSS EQUIPMENT										
1.1	DIVERSION TUNNELS REPAIR GATE CHAMBER										
1.1.1	Gates										
	Sliding gates with embedded parts and gates	t	6								
1.1.2	Auxiliary items										
	Auxiliary items	t	1								
1.1.3	Cranes										
	cranes	t	2								
	Total N°1.1 ----->>										
1.2	DIVERSION TUNNELS: EMERGENCY/ REPAIR GATE AND MAIN GATE CHAMBER										
1.2.1	Radial gates										
	Radial gates with embedded parts and drive	t	6								
1.2.2	Slide gates										
	Slide gates with embedded parts and drive	t	6								
1.2.3	Cranes										
	cranes	t	2								
1.2.4	Auxiliary items										
	Auxiliary items	t	1								
	Total N°1.2 ----->>										-

ITEM	EXISTING HSS EQUIPMENT COST OF REMAINING WORKS TO COMPLETION Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)					
						Supply & Transport		Installation		Subtotal	Subtotal
						Unit Price	Cost	Unit Price	Cost	II level	I level
1.3	POWER OUTLET / DRAFT TUBE										
1.3.1	Slide gates										
	Slide gate at power outlet with embedded parts	t	2	90	180.0			4 550	819 000		
1.3.2	Sectional gates										
	Sectional gate at draft tube with embedded parts	t	6	82.0	492.0			4 550	2 238 600		
1.3.3	Cranes										
	cranes	t	1	118.0	118.0			3 900	460 200		
1.3.4	Auxiliary items										
	Auxiliary items	t	1	45.0	45.0			4 550	204 750		
	Total N°1.3 ----->>									3 722 550	
1.4	TEMPORARY POWER INTAKE										
1.4.1	Trash Racks										
	Trash Racks and embedded parts	t	1	426	426.0			1 950	830 700		
	Total N°1.4 ----->>									830 700	

ITEM	EXISTING HSS EQUIPMENT COST OF REMAINING WORKS TO COMPLETION Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)					
						Supply & Transport		Installation		Subtotal	Subtotal
						Unit Price	Cost	Unit Price	Cost	II level	I level
1.5	GATE CHAMBER OF TEMPORARY WATERWAYS										
1.5.1	Slide gates										
	Slide gates with embedded parts - supplied and transported	t	2	217	434.0						
	Slide gates with embedded parts - installed	t	2	164	328.0			4 550	1 492 400		
1.5.2	Slide gates										
	Slide gates with embedded parts	t	2	205.0	410.0			4 550	1 865 500		
1.5.3	Cranes										
	cranes - supplied and transported	t	1	85.0	85.0						
	cranes - installed	t	1	50.0	50.0			3 900	195 000		
1.5.4	Steel Lining										
	Steel Lining	t	2								
1.5.5	Auxiliary items										
	Auxiliary items	t	1								
	Total N°1.5 ----->>									3 552 900	
1.6	PENSTOCK										
1.6.1	Steel Lining										
	Steel Lining - supplied and transported	t	1	2100	2 100.0						
	Steel Lining - installed	t	1	600	600.0			3 250	1 950 000		
	Total N°1.6 ----->>									1 950 000	
	Total N°1 ----->>										10 056 150
	TOTAL AMOUNT OF EXISTING HSS EQUIPMENT										10 056 150

ITEM	HSS COSTS - 2000-2800 MW INSTALLED CAPACITY Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
1	HSS EQUIPMENT											
1.1	DIVERSION TUNNEL 3RD LEVEL (DT3)											
1.1.1	EOT Cranes											
	Eot crane - span 10÷14 m - max load 80 ton	n°	2	100	200.0	14 300	2 860 000	2 288 000	228 800	343 200		
1.1.2	Emergency Gates											
	emergency gates 4.3 x 7.1 m (WxH) - design pressure: 150 m head	t	8	152.8	1 222.4	11 050	13 507 520	10 806 016	1 080 602	1 620 902		
1.1.3	Sector Gates											
	sector gates 4.3 x 5.2 m (WxH) - design pressure: 150 m head	t	4	138.6	554.4	11 050	6 126 120	4 900 896	490 090	735 134		
	Total N°1.1 ----->>							17 994 912	1 799 491	2 699 237	22 493 640	
1.2	MIDDLE LEVEL OUTLET N.1 (MLO1)											
1.2.1	EOT Cranes											
	Eot crane - span 10÷14 m - max load 130 ton	n°	2	140	280.0	14 300	4 004 000	3 083 080	320 320	600 600		
1.2.2	Maintenance Gates											
	maintenance gates 6.0 x 10.0 m (WxH) - design pressure: 150 m head	t	2	308.6	617.2	11 050	6 820 060	5 251 446	545 605	1 023 009		
1.2.3	Emergency Gates											
	emergency gates 3.9 x 7.75 m (WxH) - design pressure: 150 m head	t	4	141.7	566.8	11 050	6 263 140	4 822 618	501 051	939 471		
1.2.4	Sector Gates											
	sector gates 3.9 x 5.95 m (WxH) - design pressure: 150 m head	t	4	134.3	537.2	11 050	5 936 060	4 570 766	474 885	890 409		
	Total N°1.2 ----->>							17 727 910	1 841 861	3 453 489	23 023 260	
1.3	HIGH LEVEL SPILLWAY TUNNEL 1 (HLST1)											
1.3.1	EOT Cranes											
	Eot crane - span 10÷13 m - max load 40 ton	n°	2	50	100.0	11 050	1 105 000	850 850	88 400	165 750		
1.3.2	Maintenance Gates											
	maintenance gates 3.5 x 6.7 m (WxH) - design pressure: 85 m head	t	2	88.7	177.4	11 050	1 960 270	1 509 408	156 822	294 041		

ITEM	HSS COSTS - 2000-2800 MW INSTALLED CAPACITY Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
1.3.3	Emergency Gates											
	emergency gates 3.5 x 5.15 m (WxH) - design pressure: 85 m head	t	3	73.9	221.7	11 050	2 449 785	1 886 334	195 983	367 468		
1.3.4	Sector Gates											
	sector gates 3.5 x 4.65 m (WxH) - design pressure: 85 m head	t	3	89.8	269.4	11 050	2 976 870	2 292 190	238 150	446 531		
	Total N°1.3 ----->>							6 538 782	679 354	1 273 789	8 491 925	
1.4	SURFACE SPILLWAY											
1.6.1	Gantry Crane											
	Gantry crane	n°	2	70	140.0	14 300	2 002 000	1 541 540	160 160	300 300		
1.6.2	Stoplogs											
	maintenance gates 8.0 x 14.0 m (WxH) - design pressure: 14.0 m head	t	8	90.3	722.4	6 500	4 695 600	3 756 480	375 648	563 472		
1.6.3	Sector Gates											
	sector gates 8.0 x 14.0 m (WxH) - design pressure: 14.0 m head	t	8	95.9	767.1	11 050	8 476 234	6 526 700	678 099	1 271 435		
	Total N°1.4 ----->>							11 824 720	1 213 907	2 135 207	15 173 834	

ITEM	HSS COSTS - 2000-2800 MW INSTALLED CAPACITY Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
1.5	PERMANENT POWER INTAKES											
1.5.1	External Removable trash racks											
	External Removable wide mesh trash racks (2 racks, each rack 6.5 x 8.25 m)	t	24	5.5	132.0	5 200	686 400	549 120	54 912	82 368		
1.5.2	Intakes stoplogs											
	Stoplogs for multi-level intakes. Two stoplogs for each external intake are foreseen, 6.5 x 8.25 m; four couples of elements are provided.	t	4	199.2	796.8	6 500	5 179 200	3 987 984	414 336	776 880		
1.5.3	Intakes steel movable closure elements											
	Steel closures for multi-level intakes. Two elements for each external intake are foreseen, 6.5 x 8.25 m; four couples of elements for each power intake are provided.	t	24	59.1	1 418.4	4 000	5 673 600	4 368 672	453 888	851 040		
1.5.4	Power Intakes Removable trash racks											
	Removable trash racks (2 racks for each intake, each rack 7 x 4.5 m) maximum water velocity on gross area 0.43 m/s, 3 m design differential pressure	t	12	135	1 620.0	5 200	8 424 000	6 739 200	673 920	1 010 880		
1.5.5	Steel lining											
	Steel lining for transition downstream stoplogs	t	6	50	300.0	6 500	1 950 000	1 053 000	117 000	780 000		
1.5.6	Intake slide gate											
	Servomotor operated intake slide gate 6.3 x 8 m, 105 m design pressure	t	6	430	2 580.0	11 050	28 509 000	21 951 930	2 280 720	4 276 350		
1.5.7	Stoplogs											
	Stoplogs: single element 6.3 x 8 m; two elements are provided for the 6 intakes; 105 m design pressure	t	2	120	240.0	6 500	1 560 000	1 201 200	124 800	234 000		
1.5.8	Aeration pipe & accessories											
	Aeration pipe 1.2 m diameter, linings, supporting beams	t	6	166	996.0	6 500	6 474 000	4 337 580	517 920	1 618 500		
1.5.9	Gantry crane											
	Upper Gantry crane 2 x 70 t to lift stoplogs and servomotor, 11.5 span	t	1	118	118.0	14 300	1 687 400	1 299 298	134 992	253 110		
	Total N°1.5 ----->>							45 487 984	4 772 488	9 883 128	60 143 600	
1.6	PENSTOCKS											
1.6.1	Penstocks											
	Permanent penstocks for all six units	t	6	1893	11 358.0	6 500	73 827 000	39 866 580	4 429 620	29 530 800		

ROGUN HYDROELECTRIC POWER PLANT
COST ESTIMATE PHASE II HSS 1220

ITEM	HSS COSTS - 2000-2800 MW INSTALLED CAPACITY Description of Works	Unit	n°	unit qty	Quantity	Total (US\$ equivalent)						
						Unit Price	Total Cost	Breakdown of Total Cost			Subtotal II level	Subtotal I level
								Manufact.	Transport	Installation		
1.6.2	Maintenance crane											
	Maintenance crane	t	1	45	45.0	14 300	643 500	495 495	51 480	96 525		
	Total N°1.6 ----->>							40 362 075	4 481 100	29 627 325	74 470 500	
	Total N°1 ----->>							139 936 384	14 788 201	49 072 175		203 796 759
2	MISCELLANEA											
	Miscellanea on HSS equipment	%		4.0%				5 597 455	591 528	1 962 887		8 151 870
	TOTAL AMOUNT OF HSS EQUIPMENT							145 533 839	15 379 729	51 035 062		211 948 629

ITEM	TL/SS COSTS - 2400-2000 MW INSTALLED CAPACITY Description of Works	Unit	Quantity	Total (US\$ equivalent)								
				Unit Price	Cost	Breakdown of Total Cost			Subtotal III level	Subtotal II level	Subtotal I level	
						Manufact.	Transport	Installation				
1	TRANSMISSION LINE AND SUBSTATION BAY REINFORCEMENTS											
1.1	Line L-Obi-Rogun HPP/3 OBIGARM - ROGUN HPP											
	Line_500 kV 3xAC-400 - single circuit	km	8.0	400 000	3 200 000	2 064 000	256 000	880 000.00				
	500 kV bays at substations	n°	2.0	1 550 000	3 100 000	2 154 500	248 000	697 500.00				
	<i>Subtotal</i>				6 300 000							
	<i>miscellanea</i>	%	3%		189 000							
	<i>spare parts</i>	%	2%		126 000							
	Total N°1.1 ----->>					4 429 425	529 200	1 656 375	6 615 000			
1.2	Line L-Obi-Rogun HPP/2 OBIGARM - ROGUN HPP											
	Line_500 kV 3xAC-400 - single circuit	km	8.0	400 000	3 200 000	2 064 000	256 000	880 000.00				
	500 kV bays at substations	n°	2.0	1 550 000	3 100 000	2 154 500	248 000	697 500.00				
	<i>Subtotal</i>				6 300 000							
	<i>miscellanea</i>	%	3%		189 000							
	<i>spare parts</i>	%	2%		126 000							
	Total N°1.2 ----->>					4 429 425	529 200	1 656 375	6 615 000			
	Total N° 1 ----->>					8 858 850	1 058 400	3 312 750				13 230 000
	TOTAL AMOUNT OF TL/SS REINFORCEMENTS AND RELEVANT WORKS					8 858 850	1 058 400	3 312 750				13 230 000

ROGUN HYDROELECTRIC POWER PLANT
 COST ESTIMATE PHASE II TL&SS 3200-2800 MW

ITEM	TL/SS COSTS - 3200-2800 MW INSTALLED CAPACITY Description of Works	Unit	Quantity	Total (US\$ equivalent)								
				Unit Price	Cost	Breakdown of Total Cost			Subtotal III level	Subtotal II level	Subtotal I level	
						Manufact.	Transport	Installation				
1	TRANSMISSION LINE AND SUBSTATION BAY REINFORCEMENTS											
1.1	Line L-Obi-Rogun HPP/3 OBIGARM - ROGUN HPP											
	Line_500 kV 3xAC-400 - single circuit	km	8.0	400 000	3 200 000	2 064 000	256 000	880 000.00				
	500 kV bays at substations	n°	2.0	1 550 000	3 100 000	2 154 500	248 000	697 500.00				
	<i>Subtotal</i>				6 300 000							
	<i>miscellanea</i>	%	3%		189 000							
	<i>spare parts</i>	%	2%		126 000							
	Total N°1.1 ----->>					4 429 425	529 200	1 656 375	6 615 000			
1.2	Line L-Obi-Rogun HPP/2 OBIGARM - ROGUN HPP											
	Line_500 kV 3xAC-400 - single circuit	km	8.0	400 000	3 200 000	2 064 000	256 000	880 000.00				
	500 kV bays at substations	n°	2.0	1 550 000	3 100 000	2 154 500	248 000	697 500.00				
	<i>Subtotal</i>				6 300 000							
	<i>miscellanea</i>	%	3%		189 000							
	<i>spare parts</i>	%	2%		126 000							
	Total N°1.2 ----->>					4 429 425	529 200	1 656 375	6 615 000			
1.3	Line L-Obi-Rogun HPP/1 OBIGARM - ROGUN HPP											
	Line_500 kV 3xAC-400 - single circuit	km	8.0	400 000	3 200 000	2 064 000	256 000	880 000.00				
	500 kV bays at substations	n°	2.0	1 550 000	3 100 000	2 154 500	248 000	697 500.00				
	<i>Subtotal</i>				6 300 000							
	<i>miscellanea</i>	%	3%		189 000							
	<i>spare parts</i>	%	2%		126 000							
	Total N°1.3 ----->>					4 429 425	529 200	1 656 375	6 615 000			
	Total N° 1 ----->>					13 288 275	1 587 600	4 969 125				19 845 000
	TOTAL AMOUNT OF TL/SS REINFORCEMENTS AND RELEVANT WORKS					13 288 275	1 587 600	4 969 125				19 845 000