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TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT



COST ESTIMATE – PHASE II

ALTERNATIVE 2: FSL=1255 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 2 – FSL 1255 M.A.S.L

August 2014

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PART IV – Alt 2: Calculation assumptions (Civil Works - Dam)

1 Introduction

This part has been adapted for the alternative 1255, 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

2.1 Stage 1

The main details necessary to calculate the quantities are given in the paragraph below.
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: $p = 0.6 * H = 75\text{m}$ (with H=125m 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: $e' = 5 m$

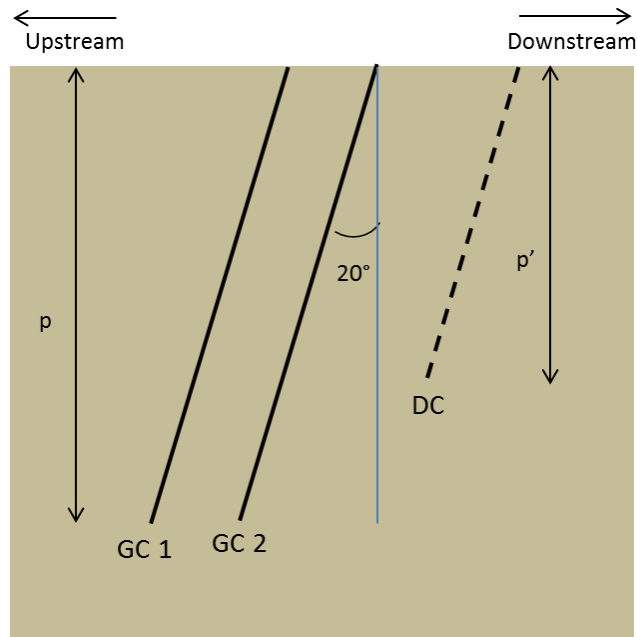


Figure 2-2: Grout and drainage curtains

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

- The quantities are detailed in the table below.

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	12,379
	b) Depth from 50 to 100 m	m	8,253
2	Rotary control holes, vertical, min. diameter 76 mm:		
	a) Depth from 0 to 50 m	m	389
	b) Depth from 50 to 100 m	m	259
3	Percussion drain holes, vertical, 100 mm min. diameter:		
	a) Depth from 0 to 50 m	m	8,913
	b) Depth from 50 to 100 m	m	5,942
B.I.8.02	<u>Water pressure tests:</u>		
1	Multiple steps	unit	205
B.I.8.03	<u>Grouting:</u>		
1	Cement pressure grouting (excluding materials), vertical holes:		
	a) Depth from 0 to 50 m	t	866
	b) Depth from 50 to 100 m	t	577
2	Portland cement ASTM Type I or II	t	722
3	Portland cement ASTM Type V (sulfate resistant)	t	722
4	Bentonite	t	14
5	Superplasticizer admixture	kg	2,165
B.I.8.04	Miscellaneous works	%	3%

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: $p = 0.6 * H = 180 \text{ m}$ (with $H = 300\text{m}$)
- 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 the table below.

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	29,019
	b) Depth from 50 to 100 m	m	29,019
	c) Depth from 100 to 150 m	m	24,873
2	Rotary control holes, vertical minimum diameter 76 mm:		
	a) Depth from 0 to 50 m	m	1,915
	b) Depth from 50 to 100 m	m	1,915
	c) Depth from 100 to 150 m	m	1,642
3	Percussion drain holes, vertical, 100 mm min. diameter:		
	a) Depth from 0 to 50 m	m	20,893
	b) Depth from 50 to 100 m	m	20,893
	c) Depth from 100 to 150 m	m	17,909
B.I.9.02	<u>Water pressure tests</u>		
1	Multiple steps	unit	513
B.I.9.03	<u>Grouting</u>		
1	Cement pressure grouting (excluding materials), vertical holes:		
	a) Depth from 0 to 50 m	t	2,031
	b) Depth from 50 to 100 m	t	2,031
	c) Depth from 100 to 150 m	t	1,741
2	Portland cement ASTM Type I or II	t	2,902
3	Portland cement ASTM Type V (sulfate resistant)	t	2,902
4	Bentonite	t	58
5	Superplasticizer admixture	kg	8,706
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:

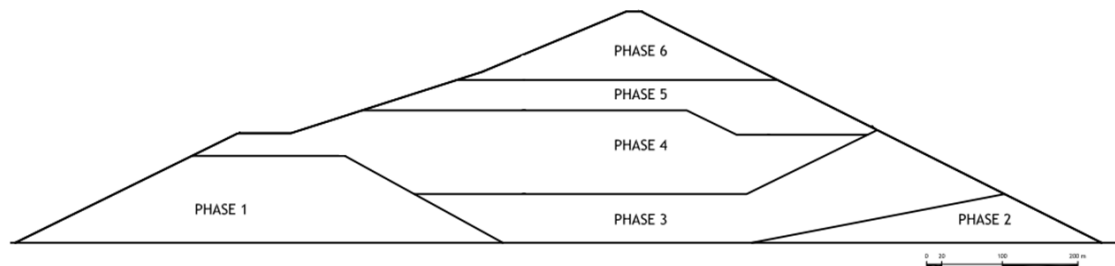


Figure 3-1: Construction phasing – Longitudinal section.

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	8,088,672	1,448,445		48,657	114,588	
2	1,863,636	671,729				
3	5,344,398	773,889	1,144,100	204,085	302,386	
4	11,785,869	1,872,821	2,342,599	352,044	629,156	
5	5,189,843	2,959,102	727,164	210,889	324,807	86,257
6	910,503	4,749,067	890,655	534,521	662,582	282,372
Note: The core is composed of 10% of Fine and 90% of loam by volume						

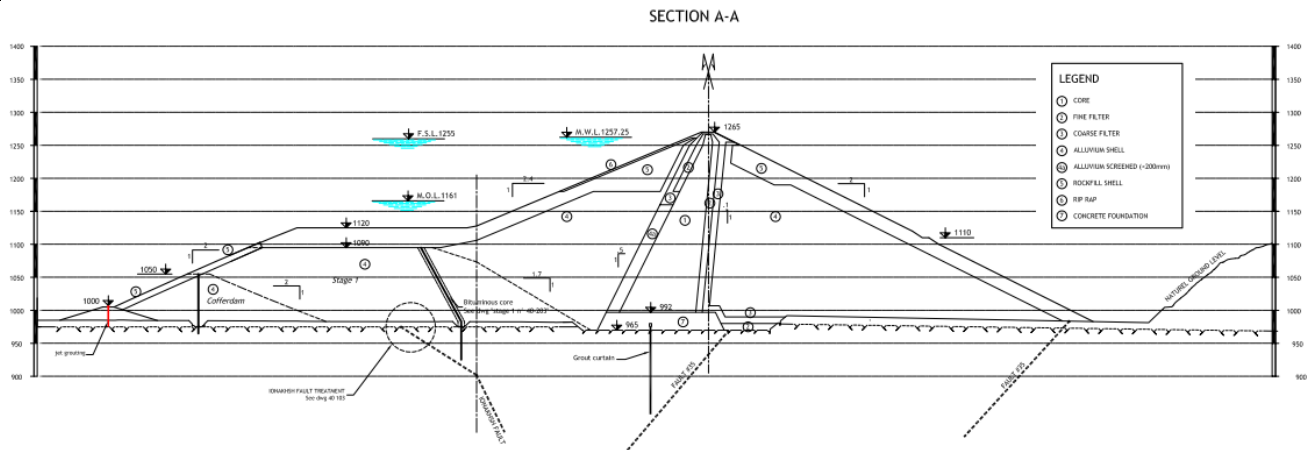


Figure 3-2: Materials definition - Section A-A.

3.2 Source of Fill Materials

The source of materials and quantities for each phases are given in the tables below.

The unit prices for each material are based on this transportation ways (cf. Cost Summary in report 2.4 Appendices).

Table 3-2: Source of material

Material		Phase 1	Phase 2	Phase 3		Phase 4	Phase 5		Phase 6
1	Alluvium shell	BA15	LG2	BA15	LG2	LG1	LG1	BA15	BA15
2	Rockfillfill shell	Q26	Q26	Q26		Q26	Q26		Q26
4	Core (Loam)			BA17		LL3	BA17	LL3	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	8,088,672	1,863,636	392,135	4,952,264	11,785,869	1,518,331	3,671,512	910,503
2	Rockfill shell	1,448,445	671,729	773,889		1,872,821	2,959,102		4,749,067
4	Core (Loam + Fine)			1,144,100		2,342,599	569,763	157,401	890,655
5	Fine Filter	48,657		204,085		352,044	210,889		534,521
6	Coarse Filter	114,588		302,386		629,156	324,807		662,582
7	Rip rap						86,257		282,372

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)	BA15	Int. Stock. 1	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	Dam
Alluvium shell (by conveyor)	BA15	LG1	>>>>>>>	Load. Stat. 1	Conveyor 1-3	>>>>>>>	Dam
Rockfillfill 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	LG2	>>>>>>>	>>>>>>>	Load. Stat. 2	Conveyor 2-3	>>>>>>>	Dam
Rockfillfill 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. 2	Conveyor 2-3	>>>>>>>	Dam
Alluvium shell (from BA15)	BA15	LG1	>>>>>>>	Load. Stat. 1	Conveyor 1-3	>>>>>>>	Dam
Rockfillfill shell	Q26	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	Dam
Core (Loam)	BA17	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	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
Rockfillfill 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 (from LG1)	LG1	>>>>>>>	>>>>>>>	Load. Stat. 1	Conveyor 1-3	>>>>>>>	Dam
Alluvium shell (from BA15)	BA15	LG1	>>>>>>>	Load. Stat. 1	Conveyor 1-3	>>>>>>>	Dam
Rockfillfill shell	Q26	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	Dam
Core (Loam) from BA17	BA17	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	Dam
Core (Loam) from LL3	LL3	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	>>>>>>>	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	BA15	LG1	>>>>>>>	Load. Stat. 1	Conveyor 1-3	Int. Stock. 2	Dam
Rockfillfill 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	13,298,866	
	Fine Filter		110,937
	Coarse Filter		261,260
2	Alluvium shell		19,270,000
3	Alluvium shell	921,516	10,579,836
	Fine filters		465,313
	Coarse filters		689,441
4	Alluvium shell	27,696,792	
	Fine filters		802,660
	Coarse filters		1,434,475
5	Alluvium shell	8,628,054	
	Fine filters		480,826
	Coarse filters		740,560
6	Alluvium shell	8,628,054	
	Fine filters		1,218,708
	Coarse filters		1,510,687

PART V – Alt. 2: 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 2: PRICE BILL OF QUANTITIES & COST SUMMARY (Civil Works)

DAM 1255

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		3 728 362		33 555 258		37 283 621
A.I.02	Camps, buildings and appurtenant facilities								
1	Construction	I.s.	1		7 456 724		42 254 770		49 711 494
2	Maintenance	I.s.	1		2 237 017		12 676 431		14 913 448
	TOTAL AMOUNT OF MOBILIZATION - DEMOBILIZATION - CAMPS				13 422 103		88 486 459		101 908 563
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	176 000	0.27	47 520	4.04	711 040	4.31	758 560
2	Maintenance of asphalt pavings	m ² /year	940 000	0.23	216 200	1.28	1 203 200	1.51	1 419 400
3	Maintenance of gravel surfacing pavings	m ² /year	7 800 000	0.20	1 560 000	1.31	10 218 000	1.51	11 778 000
A.II.5.02	Removal of landslides and rock falls from roadbed:								
1	Roads mainly excavated in rock formations	m ³	250 140	0.14	35 020	1.25	312 675	1.39	347 695
2	Roads mainly excavated in loose formations	m ³	300 000	0.14	42 000	1.25	375 000	1.39	417 000
A.II.5.03	Sundries								
1	Miscellaneous works	%	8%		152 059		1 025 593		1 177 652
	TOTAL AMOUNT OF ROADS MAINTENANCE - SITE ROADS				2 052 799		13 845 508		15 898 307
	TOTAL AMOUNT OF ROADS (CONSTRUCTION - IMPROVEMENT - MAINTENANCE)				9 869 500		58 140 150		68 009 650
	TOTAL AMOUNT OF GENERAL PROJECT COSTS				23 291 604		146 626 609		169 918 213
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		3 500 000
B.I.1.02	Cableway, operation and maintenance	I.s.	1		34 353		1 179 498		1 213 851
	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	662 318	2.34	1 549 824	14.84	9 828 799	17.18	11 378 623
2	Excavation on left bank for clay core foundation, unclassified	m3	523 212	2.23	1 166 763	13.38	7 000 577	15.61	8 167 339
B.I.2.02	Excavation in river bed:								
1	Excavation, alluvium	m3	522 789	0.31	162 065	3.62	1 892 496	3.93	2 054 561
2	Excavation, rock	m3	20 000	1.90	38 000	9.00	180 000	10.90	218 000
	Sundries								
B.I.2.03	Presplitting	m2	105 913	3.56	377 051	16.25	1 721 090	19.81	2 098 141
2	Care of water and miscellaneous works	%	3%		98 811		618 689		717 500
	Total No. B.I.2				3 392 514		21 241 651		24 634 165
B.I.3	Protection of Dam Core Excavation Surfaces								

DAM 1255

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))
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, thickness 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	50.42	17 869 100
2	Formworks, flat modular	m2	89 001	3.77	335 534	14.61	1 300 305	18.38	1 635 838
3	Formworks, flat non modular	m2	6 026	6.06	36 520	17.78	107 149	23.84	143 669
4	Portland cement ASTM Type I or II	t	79 741	5.16	411 464	252.60	20 142 608	257.76	20 554 072
B.I.5.02	Blanket grouting								
1	Percussion grout holes, 64 mm diameter	m	184 824	5.90	1 090 459	33.30	6 154 624	39.20	7 245 083
2	Cement pressure grouting (excluding materials)	t	18 482	42.60	787 329	124.85	2 307 464	167.45	3 094 792
3	Portland cement ASTM Type I or II	t	18 482	5.16	95 367	252.60	4 668 525	257.76	4 763 892
4	Bentonite	t	370	8.93	3 301	437.33	161 654	446.26	164 955
5	Superplasticizer admixture	kg	55 446	0.05	2 772	2.41	133 624	2.46	136 396
B.I.5.03	Sundries:								
1	Surface preparation	m2	21 390	1.50	32 085	6.00	128 340	7.50	160 425
2	Steel pipes for grouting connections	kg	6 510	0.50	3 255	4.00	26 040	4.50	29 295
3	PVC waterstops, width 300 mm	m	233	2.70	628	15.30	3 557	18.00	4 185
4	Care of water and miscellaneous works	%	3%		144 033		1 530 018		1 674 051
	Total No. B.I.5				4 945 134		52 530 621		57 475 755
B.I.6	Breakwater on Dam Crest								
B.I.6.01	Concrete	m3	1 980	8.20	16 236	37.90	75 042	46.10	91 278
B.I.6.02	Formworks, flat surfaces	m2	2 700	6.06	16 362	17.78	48 006	23.84	64 368
B.I.6.03	Reinforcing steel	t	99	242.54	24 011	1 308.26	129 518	1550.80	153 529
B.I.6.04	Portland cement ASTM Type I or II	t	713	5.16	3 678	252.60	180 053	257.76	183 731
B.I.6.05	Miscellaneous works	%	2%		1 206		8 652		9 858
	Total No. B.I.6				61 493		441 271		502 765
B.I.7	Grouting Galleries on Dam Abutments								
B.I.7.01	Excavation and supports:								
1	Excavation	m3	46 440	25.00	1 161 000	102.00	4 736 880	127.00	5 897 880
2	Rock bolts, 22 mm diameter	m	27 180	1.71	46 478	24.13	655 853	25.84	702 331
3	Welded wire fabric	kg	48 600	0.58	28 188	2.16	104 976	2.74	133 164
4	Shotcrete	m3	3 267	14.59	47 666	103.39	337 775	117.98	385 441
5	Portland cement ASTM Type I or II	t	817	5.16	4 214	252.60	206 311	257.76	210 525
6	Portland cement ASTM Type V (sulfate resistant)	t	817	6.06	4 950	296.70	242 330	302.76	247 279
B.I.7.02	Concrete works:								
1	Concrete, arch and sidewalls	m3	10 890	24.00	261 360	138.00	1 502 820	162.00	1 764 180
2	Concrete, invert	m3	3 060	18.00	55 080	84.00	257 040	102.00	312 120
B.I.7.03	Sundries:								
1	Portland cement ASTM Type I or II	t	2 511	5.16	12 957	252.60	634 279	257.76	647 235
2	Portland cement ASTM Type V (sulfate resistant)	t	2 511	6.06	15 217	296.70	745 014	302.76	760 230
3	Miscellaneous works	%	3%		49 113		282 698		331 812
	Total No. B.I.7				1 686 222		9 705 976		11 392 198
B.I.8	Grouting Curtains - Stage 1								
B.I.8.01	Drilling:								
1	Rotary grout holes, vertical, min. diameter 48 mm a) Depth from 0 to 50 m	m	12 379	11.00	136 173	62.50	773 712	73.50	909 885

DAM 1255

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))
	b) Depth from 50 to 100 m	m	8 253	12.76	105 307	72.50	598 337	85.26	703 645
2	Rotary control holes, vertical, min. diameter 76 mm:								
	a) Depth from 0 to 50 m	m	389	22.10	8 592	125.10	48 639	147.20	57 231
	b) Depth from 50 to 100 m	m	259	25.64	6 645	145.12	37 614	170.75	44 259
3	Percussion drain holes, vertical, 100 mm min. diameter:								
	a) Depth from 0 to 50 m	m	8 913	8.80	78 435	49.90	444 760	58.70	523 195
	b) Depth from 50 to 100 m	m	5 942	10.21	60 656	57.88	343 948	68.09	404 604
B.I.8.02	Water pressure tests:								
1	Multiple steps	unit	205	23.00	4 720	128.00	26 266	151.00	30 985
B.I.8.03	Grouting:								
1	Cement pressure grouting (excluding materials), vertical holes:								
	a) Depth from 0 to 50 m	t	866	53.42	46 270	160.28	138 828	213.70	185 098
	b) Depth from 50 to 100 m	t	577	61.47	35 495	184.42	106 491	245.89	141 987
2	Portland cement ASTM Type I or II	t	722	5.16	3 724	252.60	182 327	257.76	186 051
3	Portland cement ASTM Type V (sulfate resistant)	t	722	6.06	4 374	296.70	214 158	302.76	218 532
4	Bentonite	t	14	8.93	129	437.33	6 313	446.26	6 442
5	Superplasticizer admixture	kg	2 165	0.05	108	2.41	5 219	2.46	5 327
B.I.8.04	Miscellaneous works	%	3%		14 719		87 798		102 517
	Total No. B.I.8				505 348		3 014 410		3 519 758
B.I.9	Grouting Curtains - Stage 2								
B.I.9.01	Drilling								
1	Rotary grout holes, vertical, minimum diameter 48 mm								
	a) Depth from 0 to 50 m	m	29 019	11.00	319 206	62.50	1 813 669	73.50	2 132 874
	b) Depth from 50 to 100 m	m	29 019	12.76	370 279	72.50	2 103 856	85.26	2 474 134
	c) Depth from 100 to 150 m	m	24 873	15.18	377 686	86.28	2 145 944	101.46	2 523 630
2	Rotary control holes, vertical minimum diameter 76 mm:								
	a) Depth from 0 to 50 m	m	1 915	22.10	42 326	125.10	239 592	147.20	281 917
	b) Depth from 50 to 100 m	m	1 915	25.64	49 098	145.12	277 926	170.75	327 024
	c) Depth from 100 to 150 m	m	1 642	30.51	50 080	172.69	283 485	203.19	333 565
3	Percussion drain holes, vertical, 100 mm min. diameter:								
	a) Depth from 0 to 50 m	m	20 893	8.80	183 861	49.90	1 042 577	58.70	1 226 438
	b) Depth from 50 to 100 m	m	20 893	10.21	213 279	57.88	1 209 389	68.09	1 422 668
	c) Depth from 100 to 150 m	m	17 909	12.15	217 545	68.88	1 233 577	81.03	1 451 121
B.I.9.02	Water pressure tests								
1	Multiple steps	unit	513	23.00	11 799	128.00	65 664	151.00	77 463
B.I.9.03	Grouting								
1	Cement pressure grouting (excluding materials), vertical holes:								
	a) Depth from 0 to 50 m	t	2 031	53.42	108 519	160.28	325 598	213.70	434 118
	b) Depth from 50 to 100 m	t	2 031	61.47	124 872	184.42	374 637	245.89	499 510
	c) Depth from 100 to 150 m	t	1 741	70.70	123 105	212.10	369 315	282.80	492 420
2	Portland cement ASTM Type I or II	t	2 902	5.16	14 975	252.60	733 058	257.76	748 032
3	Portland cement ASTM Type V (sulfate resistant)	t	2 902	6.06	17 586	296.70	861 038	302.76	878 625
4	Bentonite	t	58	8.93	518	437.33	25 383	446.26	25 901
5	Superplasticizer admixture	kg	8 706	0.05	435	2.41	20 982	2.46	21 417
B.I.9.04	Miscellaneous works	%	3%		66 755		393 771		460 526
	Total No. B.I.9				2 291 925		13 519 459		15 811 384
	TOTAL AMOUNT OF DAM - COMMON WORKS OF PHASES FROM 1 TO 6				14 345 207		115 762 881		130 108 088
B.II	DAM - PHASE 1								
B.II.1	Pre-cofferdam:								
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	Impermeabilization diaphragm of pre-cofferdam:								
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

DAM 1255

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 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
B.II.3	5 Portland cement Type I ASTM	t	600	5.16	3 096	252.60	151 560	257.76	154 656
	lonakhsh fault treatment (grouting and hydraulic curtain):								
	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	Embankment								
	1 Alluvium shell (from BA15, by trucks)	m3	2 429 580	2.22	5 393 667	21.04	51 118 354	23.26	56 512 020
	2 Alluvium shell (from BA15, by conveyor)	m3	5 659 092	1.64	9 297 888	17.59	99 540 598	19.23	108 838 487
	3 Rockfill, shell zones (from Q26)	m3	1 448 445	1.56	2 259 573	11.36	16 454 330	12.92	18 713 903
	4 Filter, transition fine zone (from LG2)	m3	48 657	1.17	57 142	17.78	865 074	18.95	922 216
	5 Filter, transition coarse zone (from LG2)	m3	114 588	1.17	134 572	17.78	2 037 277	18.95	2 171 849
B.II.5	Bituminous inclined impermeabilization diaphragm								
	1 Excavation, alluvium	m3	3 096	0.35	1 084	3.70	11 455	4.05	12 539
	2 Excavation, rock	m3	6 192	1.83	11 331	8.93	55 295	10.76	66 626
	3 Rock surface preparation	m2	1 462	1.50	2 193	6.00	8 772	7.50	10 965
	4 Concrete plint for bituminous inclined core	m3	8 600	5.40	46 440	43.60	374 960	49.00	421 400
	5 Formworks	m2	3 010	6.06	18 241	17.78	53 518	23.84	71 758
	6 Portland cement ASTM Type I or II	t	2 236	5.16	11 538	252.60	564 814	257.76	576 351
	7 Bituminous inclined core	m3	20 385	58.00	1 182 356	332.00	6 767 966	390.00	7 950 322
B.II.6	Sundries								
	1 Dam instrumentation	l.s.	1		342 857		3 400 313		3 743 170
	2 Care of water and miscellaneous works	%	4.5%		1 004 515		9 404 895		10 409 410
	TOTAL AMOUNT OF DAM - PHASE 1				23 327 066		218 402 570		241 729 637
B.III	DAM PHASES FROM 2 TO 6								
B.III.1	Dam Phase 2								
	1 Alluvium shell (from LG2)	m3	1 863 636	0.85	1 575 705	10.22	19 053 818	11.07	20 629 523
	2 Rockfill, shell zones (from Q26)	m3	671 729	1.33	893 399	8.69	5 837 323	10.02	6 730 723
	3 Dam instrumentation	l.s.	1		49 382		497 823		547 205
	4 Miscellaneous works	%	2.5%		62 962		634 724		697 686
	Total No. B.III.1				2 581 448		26 023 688		28 605 137
B.III.2	Dam phase 3								
	1 Alluvium shell (from BA15)	m3	392 135	1.68	659 962	17.97	7 046 461	19.65	7 706 424
	2 Alluvium shell (from LG2)	m3	4 952 264	0.89	4 385 229	10.60	52 513 804	11.49	56 899 033
	3 Rockfill, shell zones (from Q26)	m3	773 889	1.39	1 075 705	9.38	7 259 077	10.77	8 334 783
	4 Core (loam from BA17)	m3	1 144 100	1.65	1 888 909	12.81	14 653 630	14.46	16 542 539
	5 Filter, transition fine zone (from LG2)	m3	204 085	1.40	286 617	19.62	4 003 980	21.02	4 290 596
	6 Filter, transition coarse zone (from LG2)	m3	302 386	1.40	424 671	19.62	5 932 578	21.02	6 357 249
	7 Dam instrumentation	l.s.	1		174 422		1 828 191		2 002 612
	8 Miscellaneous works	%	2.5%		222 388		2 330 943		2 553 331
	Total No. B.III.2				9 117 904		95 568 664		104 686 567
B.III.3	Dam phase 4								
	1 Alluvium shell (from LG1)	m3	11 785 869	1.36	16 064 139	15.17	178 785 738	16.53	194 849 877
	3 Rockfill, shell zones (from Q26)	m3	1 872 821	1.56	2 921 601	11.28	21 125 423	12.84	24 047 024
	4 Core (loam from LL3)	m3	2 342 599	1.85	4 322 096	14.61	34 227 717	16.46	38 549 812
	5 Filter, transition fine zone (from LG2)	m3	352 044	1.70	600 024	22.55	7 938 311	24.25	8 538 335
	6 Filter, transition coarse zone (from LG2)	m3	629 156	1.70	1 072 333	22.55	14 186 962	24.25	15 259 296
	7 Dam instrumentation	l.s.	1		499 604		5 125 283		5 624 887
	8 Miscellaneous works	%	2.5%		624 505		6 406 604		7 031 109
	Total No. B.III.3				26 104 302		267 796 038		293 900 339
B.III.4	Dam phase 5								
	1 Alluvium shell (from LG1)	m3	3 671 512	1.96	7 207 178	20.61	75 668 029	22.57	82 875 208
	2 Alluvium shell (from BA15)	m3	1 518 331	1.40	2 130 219	15.59	23 670 023	16.99	25 800 242
	3 Rockfill, shell zones (from Q26)	m3	2 959 102	1.62	4 793 745	11.98	35 450 039	13.60	40 243 784
	4 Core (loam from BA17)	m3	569 763	1.89	1 076 283	15.07	8 586 331	16.96	9 662 613
	4 Core (loam from LL3)	m3	157 401	1.89	297 330	15.07	2 372 030	16.96	2 669 360
	5 Filter, transition fine zone (from LG2)	m3	210 889	1.59	336 241	23.73	5 004 220	25.32	5 340 461

DAM 1255

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	Filter, transition coarse zone (from LG2)	m3	324 807	1.59	517 872	23.73	7 707 408	25.32	8 225 281
7	Rip-rap (from Q26)	m3	86 257	2.09	180 276	17.53	1 512 078	19.62	1 692 354
8	Dam instrumentation	l.s.	1		330 783		3 199 403		3 530 186
9	Miscellaneous works	%	2.5%		421 748		4 079 239		4 500 987
	Total No. B.III.4				17 291 675		167 248 800		184 540 475
B.III.5	Dam phase 6								
1	Alluvium shell (from BA15)	m3	910 503	2.13	1 942 102	23.81	21 678 617	25.94	23 620 719
2	Rockfill, shell zones (from Q26)	m3	4 749 067	1.66	7 883 451	12.41	58 935 921	14.07	66 819 372
3	Core (loam from LL3)	m3	890 655	1.93	1 719 854	15.38	13 696 489	17.31	15 416 343
4	Filter, transition fine zone (from LG2)	m3	534 521	1.92	1 028 632	24.63	13 164 825	26.55	14 193 457
5	Filter, transition coarse zone (from LG2)	m3	662 582	1.92	1 275 073	24.63	16 318 868	26.55	17 593 941
6	Rip-rap (from Q26)	m3	282 372	2.21	624 043	18.87	5 328 368	21.08	5 952 411
7	Dam instrumentation	l.s.	1		289 463		2 582 462		2 871 925
8	Miscellaneous works	%	2.5%		369 065		3 292 639		3 661 704
	Total No. B.III.5				15 131 685		134 998 188		150 129 873
	TOTAL AMOUNT OF DAM PHASES FROM 2 TO 6				70 227 013		691 635 378		761 862 391
	TOTAL AMOUNT OF DAM WORKS				107 899 287		1 025 800 829		1 133 700 115
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:								
1	Concrete, foundation and mat (culverts)	m ³	65 070.0	6.14	399 530	33.64	2 188 955	39.78	2 588 485
2	Concrete, above foundation (culverts)	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	Excavation and supports:								
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	m3/km	38 625.0	0.07	2 704	0.81	31 286	0.88	33 990
4	Overhauling in excess of 500 m, rock	m3/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	Concrete works:								
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

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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))
	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	m3/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	Excavation and supports:								
	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	Concrete works:								
	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	109 501	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
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 ²	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 ²	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 ²	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 ²	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								

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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 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
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

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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))
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
	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	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	4.8	42.60	204	124.85	599	167.45	804
C.I.1.2.7.04	Sundries:								
	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	Excavation and supports:								
	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	Concrete works:								
	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	1 684.99	634 567
C.I.1.2.8.03	Drilling and grouting:								
	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	Sundries:								
	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	Excavation and supports:								
	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	Concrete works:								
	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	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	4.6	42.60	196	124.85	574	167.45	770
C.I.1.2.9.04	Sundries:								
	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

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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))
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	Excavation and supports:								
	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	Concrete works:								
	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	Drilling and grouting:								
	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	Sundries:								
	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	Excavation and supports:								
	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	Concrete works:								
	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 ²		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	Sundries:								
	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	Excavation and supports:								
	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	Concrete works:								
	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 ²	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	Sundries:								
	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								
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

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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))
C.I.1.3.1.02	3 Rock bolts, 26.5 mm diameter	m	1 140.0	2.83	3 226	31.18	35 545	34.01	38 771
	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
C.I.1.3.1.03	3 Reinforcing steel	t	241.0	325.47	78 438	1 359.52	327 644	1 684.99	406 083
	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	7 378.2	32.00	236 103	128.00	944 412	160.00	1 180 515
	2 Rock bolts, 22 mm diameter	m		1.71		24.13		25.84	
	3 Rock bolts, 26.5 mm diameter	m	3 767.7	2.83	10 663	31.18	117 477	34.01	128 140
	4 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	5 Shotcrete	m ³	227.6	14.59	3 321	103.39	23 535	117.98	26 856
	6 Welded wire fabric	kg	5 690.8	0.58	3 301	2.16	12 292	2.74	15 593
	7 Steel ribs	kg	2 276.3	0.13	296	2.94	6 692	3.07	6 988
C.I.1.3.2.02	Concrete works:								
	1 Concrete, shaft	m ³	1 529.4	30.00	45 881	211.00	322 695	241.00	368 576
	6 Reinforcing steel	t	91.8	325.47	29 866	1 359.52	124 752	1 684.99	154 618
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	9.1	42.60	389	124.85	1 140	167.45	1 529
C.I.1.3.2.04	Sundries:								
	1 Portland cement ASTM type I or II	t	323	5.16	1 669	252.60	81 696	257.76	83 365
	2 Portland cement ASTM type V (sulfate resistant)	t	323	6.06	1 960	296.70	95 959	302.76	97 919
	3 Care of water and miscellaneous works	%	3%		10 003		51 920		61 923
	Total No. C.I.1.3.2				343 451		1 782 570		2 126 022
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
	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				1 594 878		9 087 618		10 682 497
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								
C.I.1.5.01	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

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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))
C.I.1.5.02	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
C.I.1.5.03	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
C.I.1.5.04	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				22 182 096		162 469 360		184 651 456
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	320 093.1	0.25	80 023	2.71	867 452	2.96	947 476
2	Excavation, rock	m ³	640 186.3	1.46	934 672	5.61	3 591 445	7.07	4 526 117
3	Overhauling in excess of 500 m, common material	m ³ /km	960 279.4	0.07	67 220	0.81	777 826	0.88	845 046
4	Overhauling in excess of 500 m, rock	m ³ /km	1 920 558.9	0.09	172 466	1.03	1 983 937	1.12	2 156 404
5	Rock bolts, 22 mm diameter	m	18 036.4	1.71	30 842	21.50	387 782	23.21	418 624
6	Rock bolts, 26.5 mm diameter	m	12 883.1	2.62	33 754	27.27	351 322	29.89	385 076
7	Rock bolts, 32 mm diameter	m	10 306.5	2.81	28 961	35.42	365 056	38.23	394 017
8	Grouted anchor bars, 22 mm diameter	m	28 342.8	1.44	40 814	10.97	310 921	12.41	351 735
9	Grouted anchor bars, 26 mm diameter	m	23 189.6	1.58	36 640	12.80	296 827	14.38	333 466
10	Grouted anchor bars, 32 mm diameter	m	41 035.4	1.63	66 888	15.71	644 667	17.34	711 554
11	Shotcrete	m ³	10 735.9	15.10	162 112	93.73	1 006 278	108.83	1 168 391
12	Welded wire fabric	kg	317 783.4	0.50	158 892	1.93	613 322	2.43	772 214
C.I.2.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	64 018.6	5.10	326 495	29.54	1 891 110	34.64	2 217 605
2	Concrete elevation	m ³	180 852.6	8.30	1 501 077	34.10	6 167 075	42.40	7 668 151
3	Reinforcing steel	t	12 243.6	242.54	2 969 554	1 308.26	16 017 764	1 550.80	18 987 317
4	Flat type Formworks	m ²	158 446.1	6.06	960 173	17.78	2 816 719	23.84	3 776 893
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	51 214.9	3.56	182 325	7.61	389 745	11.17	572 070
C.I.2.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	83 190.0	5.16	429 260	252.60	21 013 786	257.76	21 443 046
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		245 465		1 784 791		2 030 256
	Total No. C.I.2.1				8 427 632		61 277 826		69 705 458
C.I.2.2	UNDERGROUND WORKS - Headrace Tunnels Stretch up to Gates Chamber (Circular) - six tunnels from 140 to 104 m								
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

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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))
C.I.2.2.03	2 Reinforcing steel	t	1 155	325.47	375 918	1 359.52	1 570 246	1 684.99	1 946 163
	<u>Drilling and grouting:</u>								
	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	<u>Sundries:</u>								
	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	<u>Excavation and supports:</u>								
	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	<u>Concrete works:</u>								
	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	<u>Drilling and grouting:</u>								
	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
	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

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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	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	Sundries:								
	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	Excavation and supports:								
	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	Concrete works:								
	1 Concrete, backfill	m ³	6 350	17.00	107 950	115.00	730 250	132.00	838 200
	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	

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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		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.2.6				3 719 053		25 291 143		29 010 197
	TOTAL AMOUNT OF UPSTREAM WATERWAYS				18 861 613		127 386 671		146 248 284
	TOTAL AMOUNT OF POWER SYSTEM STRUCTURES				41 043 709		289 856 031		330 899 740
C.II	RIVER DIVERSION STRUCTURES								
C.II.1	DIVERSION TUNNELS 1- 2 (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
	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

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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))
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
	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	Concrete works:								
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	Drilling and grouting:								
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	Sundries:								
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 1- 2 (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	Excavation and supports:								
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	Concrete works:								
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 ²		2.98		4.57		7.55	

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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))
	7 Scaffolding for slab formworks, 50 KN/m ² max. load	m ³		3.56		7.61		11.17	
C.II.2.1.03	Sundries:								
	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	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	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 ²	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

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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))
	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
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
	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	

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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))
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
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	

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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))
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
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

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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 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
	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

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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	Care of water and miscellaneous works	%	3%						
	Total No. C.II.2.12				5 185		35 148		40 333
					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 MANAGMENT 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	m3/km	378 000.0	0.07	26 460	0.81	306 180	0.88	332 640
4	Overhauling in excess of 500 m, rock	m3/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	
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	Sundries:								
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	Excavation and supports:								
1	Excavation, common	m ³	235 247.5	0.25	58 812	2.71	637 521	2.96	696 333
2	Excavation, rock	m ³	470 495.0	1.46	686 923	5.61	2 639 477	7.07	3 326 400
3	Overhauling in excess of 500 m, common material	m3/km	1 176 237.5	0.07	82 337	0.81	952 752	0.88	1 035 089
4	Overhauling in excess of 500 m, rock	m3/km	2 352 475.0	0.09	211 252	1.03	2 430 107	1.12	2 641 359
5	Rock bolts, 22 mm diameter	m		1.71		21.50		23.21	
6	Rock bolts, 26.5 mm diameter	m	12 777.8	2.62	33 478	27.27	348 451	29.89	381 929
7	Rock bolts, 32 mm diameter	m	10 454.6	2.81	29 377	35.42	370 301	38.23	399 678
8	Grouted anchor bars, 22 mm diameter	m		1.44		10.97		12.41	
9	Grouted anchor bars, 26 mm diameter	m	15 207.4	1.58	24 028	12.80	194 655	14.38	218 683
10	Grouted anchor bars, 32 mm diameter	m	12 442.4	1.63	20 281	15.71	195 471	17.34	215 752
11	Shotcrete	m ³	2 037.2	15.10	30 761	93.73	190 942	108.83	221 703
12	Welded wire fabric	kg	60 299.6	0.50	30 150	1.93	116 378	2.43	146 528
C.III.1.2.02	Concrete works:								
1	Concrete, foundation and mat	m ³	106 787.4	5.10	544 616	29.54	3 154 500	34.64	3 699 116
2	Concrete elevation	m ³	10 866.5	8.30	90 192	34.10	370 548	42.40	460 740
3	Reinforcing steel	t	4 500.9	242.54	1 091 643	1 308.26	5 888 321	1 550.80	6 979 965
4	Flat type Formworks	m ²	11 601.8	6.06	70 306	17.78	206 248	23.84	276 554
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	Sundries:								
1	Portland cement, type I or II ASTM	t	38 566.0	5.16	199 000	252.60	9 741 763	257.76	9 940 763
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	20.0	722.33	14 447	3 244.14	64 883	3 966.47	79 329
4	Care of water and miscellaneous works	%	3%		96 528		825 069		921 598

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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 No. C.III.1.2				3 314 131		28 327 386		31 641 517
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
	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

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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))
C.III.1.5.02	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
	Concrete works:								
	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	Drilling and grouting:								
	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	Sundries:								
	1 Portland cement ASTM type I or II	t	2 395	5.16	12 360	252.60	605 089	257.76	617 450
	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	Excavation and supports:								
	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	Concrete works:								
	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	Drilling and grouting:								
	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	Sundries:								
	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	Excavation and supports:								
	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		1.58		15.28		16.86	
	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	Concrete works:								
	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

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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))
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>								
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 (75 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	2 804	32.00	89 743	128.00	358 971	160.00	448 714
3	Grouted anchor bars, 22 mm diameter	m	1 709	1.49	2 546	13.63	23 294	15.12	25 841
4	Grouted anchor bars, 26 mm diameter	m	855	1.58	1 350	15.28	13 057	16.86	14 407
5	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
6	Rock bolts, 22 mm diameter	m	1 068	1.71	1 827	24.13	25 775	25.84	27 601
7	Rock bolts, 26.5 mm diameter	m	641	2.83	1 814	31.18	19 983	34.01	21 797

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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 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	9 Shotcrete	m ³	418	14.59	6 102	103.39	43 239	117.98	49 341
	10 Welded wire fabric	kg	9 106	0.58	5 281	2.16	19 669	2.74	24 950
	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	784	30.00	23 521	211.00	165 429	241.00	188 950
	4 Reinforcing steel	t	113	325.47	36 620	1 359.52	152 964	1 684.99	189 583
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	1 728	8.99	15 538	27.90	48 221	36.89	63 759
	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	113	42.60	4 807	124.85	14 090	167.45	18 897
	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	527	5.16	2 720	252.60	133 168	257.76	135 888
	2 Portland cement ASTM type V (sulfate resistant)	t	527	6.06	3 195	296.70	156 417	302.76	159 612
	3 Care of water and miscellaneous works	%	3%		7 600		47 095		54 694
	Total No. C.III.1.9				260 929		1 616 914		1 877 843
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) - 973 m								
C.III.1.11.01	<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	24 525	8.02	196 688	33.87	830 650	41.89	1 027 337
	c) Rock Class III	m ³	6 403	8.77	56 151	37.35	239 138	46.12	295 289
	d) Rock Class IV	m ³	23 398	9.24	216 195	40.89	956 735	50.13	1 172 931

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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))
	e) Rock Class V	m ³	10 254	10.24	105 006	45.20	463 501	55.44	568 507
2	Grouted anchor bars, 22 mm diameter	m	9 117	1.49	13 585	13.63	124 269	15.12	137 854
3	Grouted anchor bars, 26 mm diameter	m	5 061	1.58	7 996	15.28	77 327	16.86	85 322
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	6 761	1.71	11 562	24.13	163 147	25.84	174 709
6	Rock bolts, 26.5 mm diameter	m	1 229	2.83	3 479	31.18	38 330	34.01	41 809
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 854	14.59	27 053	103.39	191 706	117.98	218 759
9	Welded wire fabric	kg	48 127	0.58	27 914	2.16	103 955	2.74	131 869
10	Steel ribs	kg	304 704	0.13	39 611	2.94	895 829	3.07	935 441
C.III.1.11.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	25 969	9.10	236 319	83.30	2 163 224	92.40	2 399 542
2	Concrete, invert	m ³	6 495	7.70	50 010	55.70	361 762	63.40	411 772
3	Reinforcing steel	t	1 735	325.47	564 811	1 359.52	2 359 269	1 684.99	2 924 080
C.III.1.11.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 813	4.04	7 325	18.36	33 291	22.40	40 616
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 225	8.99	46 969	27.90	145 765	36.89	192 734
3	Drain holes, 76 mm diameter	m	6 802	5.68	38 636	28.91	196 650	34.59	235 287
4	Contact & consolidation cement grouting, excluding materials	t	282	42.60	12 001	124.85	35 172	167.45	47 173
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	5 753	5.16	29 683	252.60	1 453 096	257.76	1 482 779
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%		51 776		376 183		427 959
	Total No. C.III.1.11				1 777 626		12 915 618		14 693 243
	TOTAL AMOUNT OF MIDDLE OUTLET LEVEL 1				19 135 593		143 148 850		162 284 443
C.III.3	HIGH LEVEL TUNNELS SPILLWAYS (THREE TUNNELS)								
C.III.3.1	SURFACE WORKS - Intake Structure								
C.III.3.1.01	Excavation and supports:								
1	Excavation, common	m ³	50 725.0	0.25	12 681	2.71	137 465	2.96	150 146
2	Excavation, rock	m ³	101 445.0	1.46	148 110	5.61	569 106	7.07	717 216
3	Overhauling in excess of 500 m, common material	m ³ /km	228 262.5	0.07	15 978	0.81	184 893	0.88	200 871
4	Overhauling in excess of 500 m, rock	m ³ /km	456 502.5	0.09	40 994	1.03	471 567	1.12	512 561
5	Rock bolts, 22 mm diameter	m	9 150.0	1.71	15 647	21.50	196 725	23.21	212 372
6	Rock bolts, 26.5 mm diameter	m	6 950.0	2.62	18 209	27.27	189 527	29.89	207 736
7	Rock bolts, 32 mm diameter	m		2.81		35.42		38.23	
8	Shotcrete	m ³	1 610.0	15.10	24 311	93.73	150 905	108.83	175 216
9	Welded wire fabric	kg	40 230.0	0.50	20 115	1.93	77 644	2.43	97 759
C.III.3.1.02	Concrete works:								
1	Concrete, foundation and mat	m ³	3 279.0	5.10	16 723	29.54	96 862	34.64	113 585
2	Concrete elevation	m ³	5 876.3	8.30	48 773	34.10	200 380	42.40	249 153
3	Reinforcing steel	t	528.0	242.54	128 061	1 308.26	690 761	1 550.80	818 822
4	Flat type Formworks	m ²	7 717.5	6.06	46 768	17.78	137 195	23.84	183 963
5	Curved type Formworks	m ²	1 410.0	10.67	15 049	26.77	37 741	37.44	52 790
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	3 654.2	5.16	18 856	252.60	923 046	257.76	941 901
2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
3	Care of water and miscellaneous works	%	3%		17 108		121 915		139 023
	Total No. C.III.3.1				587 382		4 185 731		4 773 113
C.III.3.2	SURFACE WORKS - Outlet Structures including chutes, stilling basins and flip bucket								
C.III.3.2.01	Excavation and supports:								
1	Excavation, common	m ³	876 700.0	0.25	219 175	2.71	2 375 857	2.96	2 595 032
2	Excavation, rock	m ³	2 045 600.0	1.46	2 986 576	5.61	11 475 816	7.07	14 462 392
3	Overhauling in excess of 500 m, common material	m ³ /km	3 506 800.0	0.07	245 476	0.81	2 840 508	0.88	3 085 984
4	Overhauling in excess of 500 m, rock	m ³ /km	8 182 400.0	0.09	734 780	1.03	8 452 419	1.12	9 187 199
5	Rock bolts, 22 mm diameter	m	27 000.0	1.71	46 170	21.50	580 500	23.21	626 670
6	Rock bolts, 26.5 mm diameter	m	33 500.0	2.62	87 770	27.27	913 545	29.89	1 001 315
7	Rock bolts, 32 mm diameter	m	28 500.0	2.81	80 085	35.42	1 009 470	38.23	1 089 555
8	Grouted anchor bars, 22 mm diameter	m		1.44		10.97		12.41	
9	Grouted anchor bars, 26 mm diameter	m	47 700.0	1.58	75 366	12.80	610 560	14.38	685 926

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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))
10	Grouted anchor bars, 32 mm diameter	m	62 500.0	1.63	101 875	15.71	981 875	17.34	1 083 750
11	Shotcrete	m ³	17 300.0	15.10	261 230	93.73	1 621 529	108.83	1 882 759
12	Welded wire fabric	kg	400 220.0	0.50	200 110	1.93	772 425	2.43	972 535
C.III.3.2.02	Concrete works:								
1	Concrete, foundation and mat	m ³	237 150.0	5.10	1 209 465	29.54	7 005 411	34.64	8 214 876
2	Concrete elevation	m ³	84 825.0	8.30	704 048	34.10	2 892 533	42.40	3 596 580
3	Reinforcing steel	t	17 210.0	242.54	4 174 113	1 308.26	22 515 155	1 550.80	26 689 268
4	Flat type Formworks	m ²	57 960.0	6.06	351 234	17.78	1 030 363	23.84	1 381 597
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	Sundries:								
1	Portland cement, type I or II ASTM	t	110 817.0	5.16	571 816	252.60	27 992 374	257.76	28 564 190
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	1 950.0	332.13	647 654	1 491.67	2 908 757	1 823.80	3 556 410
4	Tendons, 70 t capacity, PHA 7K7 15 mm L=30	ea	2 695.0	576.06	1 552 482	2 416.47	6 512 387	2 992.53	8 064 868
5	Tendons, 70 t capacity, PHA 7K7 15 mm L=40	ea	2 000.0	779.33	1 558 660	3 187.14	6 374 280	3 966.47	7 932 940
6	Care of water and miscellaneous works	%	5%		790 404		5 443 288		6 233 692
	Total No. C.III.3.2				16 598 487		114 309 051		130 907 538
C.III.3.3	SURFACE WORKS - Plunge Pool and Right Bank Slope Protection								
C.III.3.3.01	Excavation and supports:								
1	Excavation, common	m ³	58 360.5	0.25	14 590	2.71	158 157	2.96	172 747
2	Excavation, rock	m ³	47 749.5	1.46	69 714	5.61	267 875	7.07	337 589
3	Excavation, common, under water	m ³	19 453.5	1.00	19 454	10.84	210 876	11.84	230 329
4	Excavation, rock, under water	m ³	15 916.5	3.29	52 286	12.62	200 906	15.91	253 192
5	Excavation, trench for cut-off	m ³	27 561.8	0.50	13 781	4.80	132 296	5.30	146 077
6	Overhauling in excess of 500 m, common material	m ³ /km	210 751.5	0.07	14 753	0.81	170 709	0.88	185 461
7	Overhauling in excess of 500 m, rock	m ³ /km	127 332.0	0.09	11 434	1.03	131 534	1.12	142 968
C.III.3.3.02	Concrete works:								
1	Concrete, cut-off	m ³	32 085.8	5.10	163 637	29.54	947 813	34.64	1 111 450
2	Reinforcing steel	t	1 443.9	242.54	350 194	1 308.26	1 888 943	1 550.80	2 239 136
C.III.3.3.03	Sundries:								
1	Tendons, 70 t capacity, PHA 7K7 15 mm L=15	ea	300.0	289.79	86 937	1 325.48	397 644	1 615.27	484 581
2	Portland cement ASTM type I or II	t	10 267	5.16	52 980	252.60	2 593 555	257.76	2 646 535
3	Portland cement ASTM type V (sulfate resistant)	t		6.06		296.70		302.76	
4	Care of water and miscellaneous works	%	10%		84 976		710 031		795 007
	Total No. C.III.3.3				934 735		7 810 339		8 745 074
C.III.3.4	UNDERGROUND WORKS - Tunnel Pressure Stretch (Horseshoe) - 1270 m (three tunnels)								
C.III.3.4.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m ³		4.97		26.97		31.94	
b)	Rock Class II	m ³	44 770	5.59	250 448	29.93	1 339 945	35.52	1 590 394
c)	Rock Class III	m ³	15 430	6.20	95 697	33.10	510 783	39.31	606 481
d)	Rock Class IV	m ³	74 100	6.72	497 717	35.83	2 654 979	42.55	3 152 696
e)	Rock Class V	m ³	25 100	7.34	184 312	40.42	1 014 661	47.77	1 198 974
2	Grouted anchor bars, 22 mm diameter	m	24 050	1.49	35 835	13.63	327 802	15.12	363 636
3	Grouted anchor bars, 26 mm diameter	m	15 080	1.58	23 826	15.28	230 422	16.86	254 249
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	8 600	1.71	14 706	24.13	207 518	25.84	222 224
6	Rock bolts, 26.5 mm diameter	m	6 000	2.83	16 980	31.18	187 080	34.01	204 060
7	Rock bolts, 32 mm diameter	m	2 480	3.02	7 490	39.12	97 018	42.14	104 507
8	Shotcrete	m ³	4 000	14.59	58 360	103.39	413 560	117.98	471 920
9	Welded wire fabric	kg	87 260	0.58	50 611	2.16	188 482	2.74	239 092
10	Steel ribs	kg	650 300	0.13	84 539	2.94	1 911 882	3.07	1 996 421
C.III.3.4.02	Concrete works:								
1	Concrete, arch	m ³	20 890	8.90	185 921	75.20	1 570 928	84.10	1 756 849
2	Concrete, sidewalls	m ³	16 710	11.40	190 494	54.70	914 037	66.10	1 104 531
3	Concrete, invert	m ³	12 540	6.00	75 240	43.00	539 220	49.00	614 460
4	Reinforcing steel	t	2 795	325.47	909 689	1 359.52	3 799 858	1 684.99	4 709 547
C.III.3.4.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	4 160	4.04	16 806	18.36	76 378	22.40	93 184
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	16 560	8.99	148 874	27.90	462 024	36.89	610 898
3	Drain holes, 76 mm diameter	m		5.68		28.91		34.59	
4	Contact & consolidation cement grouting, excluding materials	t	775	42.60	33 015	124.85	96 759	167.45	129 774
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:								

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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	9 310	5.16	48 039	252.60	2 351 681	257.76	2 399 720
	2 Portland cement ASTM type V (sulfate resistant)	t	9 310	6.06	56 418	296.70	2 762 247	302.76	2 818 665
	3 Care of water and miscellaneous works	%	3%		89 551		649 718		739 268
	Total No. C.III.3.4				3 074 568		22 306 982		25 381 550
C.III.3.5	UNDERGROUND WORKS - Tunnel Free-flow Stretch (D-shaped) - 2465 m (three tunnels)								
C.III.3.5.01	<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	112 798	5.54	625 150	29.57	3 334 992	35.11	3 960 142
	c) Rock Class III	m ³	154 686	6.14	949 350	32.70	5 058 120	38.84	6 007 470
	d) Rock Class IV	m ³	80 775	6.63	535 654	35.38	2 858 163	42.02	3 393 817
	e) Rock Class V	m ³	40 984	7.35	301 210	40.26	1 650 007	47.61	1 951 217
	2 Grouted anchor bars, 22 mm diameter	m	38 260	1.49	57 008	13.63	521 487	15.12	578 495
	3 Grouted anchor bars, 26 mm diameter	m	23 240	1.58	36 720	15.28	355 114	16.86	391 834
	4 Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
	5 Rock bolts, 22 mm diameter	m	19 533	1.71	33 401	24.13	471 324	25.84	504 725
	6 Rock bolts, 26.5 mm diameter	m	14 652	2.83	41 465	31.18	456 850	34.01	498 315
	7 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	8 Shotcrete	m ³	8 429	14.59	122 985	103.39	871 514	117.98	994 499
	9 Welded wire fabric	kg	203 419	0.58	117 983	2.16	439 384	2.74	557 367
	10 Steel ribs	kg	982 267	0.13	127 695	2.94	2 887 864	3.07	3 015 559
C.III.3.5.02	<u>Concrete works:</u>								
	1 Concrete, arch	m ³	46 168	8.90	410 893	75.20	3 471 816	84.10	3 882 710
	2 Concrete, sidewalls	m ³	25 984	11.40	296 217	54.70	1 421 323	66.10	1 717 541
	3 Concrete, invert	m ³	43 320	6.00	259 919	43.00	1 862 755	49.00	2 122 674
	4 Reinforcing steel	t	6 014	325.47	1 957 340	1 359.52	8 176 001	1 684.99	10 133 341
C.III.3.5.03	<u>Drilling and grouting:</u>								
	1 Percussion contact grout holes, 40-48 mm diameter	m	8 067	4.04	32 589	18.36	148 102	22.40	180 691
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	15 109	8.99	135 832	27.90	421 549	36.89	557 381
	3 Drain holes, 76 mm diameter	m	29 269	5.68	166 249	28.91	846 174	34.59	1 012 423
	4 Contact & consolidation cement grouting, excluding materials	t	830	42.60	35 359	124.85	103 627	167.45	138 986
	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	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	20 787	5.16	107 261	252.60	5 250 816	257.76	5 358 077
	2 Portland cement ASTM type V (sulfate resistant)	t	20 787	6.06	125 970	296.70	6 167 526	302.76	6 293 496
	3 Care of water and miscellaneous works	%	10%		647 625		4 677 451		5 325 076
	Total No. C.III.3.5				7 123 874		51 451 961		58 575 835
C.III.3.6	UNDERGROUND WORKS - Upstream Maintenance Gates Chambers (70 m each)								
C.III.3.6.01	<u>Excavation and supports:</u>								
	1 Rock Excavation	m ³	48 420	9.20	445 464	41.70	2 019 114	50.90	2 464 578
	2 Grouted anchor bars, 22 mm diameter	m	3 000	1.49	4 470	13.63	40 890	15.12	45 360
	3 Grouted anchor bars, 26 mm diameter	m	1 980	1.58	3 128	15.28	30 254	16.86	33 383
	4 Grouted anchor bars, 32 mm diameter	m	4 500	1.62	7 290	17.76	79 920	19.38	87 210
	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	3 900	2.83	11 037	31.18	121 602	34.01	132 639
	7 Rock bolts, 32 mm diameter	m	1 500	3.02	4 530	39.12	58 680	42.14	63 210
	8 Shotcrete	m ³	291	14.59	4 246	103.39	30 086	117.98	34 332
	9 Welded wire fabric	kg	7 260	0.58	4 211	2.16	15 682	2.74	19 892
	10 Steel ribs	kg		0.13		2.94		3.07	
C.III.3.6.02	<u>Concrete works:</u>								
	1 Concrete	m ³	23 400	16.00	374 400	150.00	3 510 000	166.00	3 884 400
	2 Reinforcing steel	t	1 170	325.47	380 800	1 359.52	1 590 638	1 684.99	1 971 438
C.III.3.6.03	<u>Drilling and grouting:</u>								
	1 Percussion contact grout holes, 40-48 mm diameter	m	1 215	4.04	4 909	18.36	22 307	22.40	27 216
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 340	8.99	21 037	27.90	65 286	36.89	86 323
	3 Drain holes, 76 mm diameter	m	420	5.68	2 386	28.91	12 142	34.59	14 528
	4 Contact & consolidation cement grouting, excluding materials	t	75	42.60	3 195	124.85	9 364	167.45	12 559
	5 Cement grouting between concrete and steel lining	m ²	4 050	2.85	11 543	8.55	34 628	11.40	46 170
	6 Bentonite	t		8.93		437.33		446.26	
C.III.3.6.04	<u>Sundries:</u>								
	1 Portland cement ASTM type I or II	t	3 847	5.16	19 850	252.60	971 746	257.76	991 596
	2 Portland cement ASTM type V (sulfate resistant)	t	3 847	6.06	23 313	296.70	1 141 397	302.76	1 164 710
	3 Steel lining	kg	795 000	0.77	612 150	5.23	4 157 850	6.00	4 770 000
	4 Care of water and miscellaneous works	%	3%		58 216		418 433		476 649
	Total No. C.III.3.6				1 998 738		14 366 216		16 364 953

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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))
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	119 115	9.20	1 095 858	41.70	4 967 096	50.90	6 062 954
	2 Grouted anchor bars, 22 mm diameter	m	3 375	1.49	5 029	13.63	46 001	15.12	51 030
	3 Grouted anchor bars, 26 mm diameter	m	2 625	1.58	4 148	15.28	40 110	16.86	44 258
	4 Grouted anchor bars, 32 mm diameter	m	8 250	1.62	13 365	17.76	146 520	19.38	159 885
	5 Rock bolts, 22 mm diameter	m	4 500	1.71	7 695	24.13	108 585	25.84	116 280
	6 Rock bolts, 26.5 mm diameter	m	6 225	2.83	17 617	31.18	194 096	34.01	211 712
	7 Rock bolts, 32 mm diameter	m	5 625	3.02	16 988	39.12	220 050	42.14	237 038
	8 Shotcrete	m ³	735	14.59	10 724	103.39	75 992	117.98	86 715
	9 Welded wire fabric	kg	18 300	0.58	10 614	2.16	39 528	2.74	50 142
	10 Steel ribs	kg		0.13		2.94		3.07	
C.III.3.7.02	Concrete works:								
	1 Concrete	m ³	73 350	16.00	1 173 600	150.00	11 002 500	166.00	12 176 100
	2 Reinforcing steel	t	4 050	325.47	1 318 154	1 359.52	5 506 056	1 684.99	6 824 210
C.III.3.7.03	Drilling and grouting:								
	1 Percussion contact grout holes, 40-48 mm diameter	m	3 060	4.04	12 362	18.36	56 182	22.40	68 544
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	5 850	8.99	52 592	27.90	163 215	36.89	215 807
	3 Drain holes, 76 mm diameter	m	675	5.68	3 834	28.91	19 514	34.59	23 348
	4 Contact & consolidation cement grouting, excluding materials	t	195	42.60	8 307	124.85	24 346	167.45	32 653
	5 Cement grouting between concrete and steel lining	m ²	5 085	2.85	14 492	8.55	43 477	11.40	57 969
	6 Bentonite	t		8.93		437.33		446.26	
C.III.3.7.04	Sundries:								
	1 Portland cement ASTM type I or II	t	11 999	5.16	61 914	252.60	3 030 916	257.76	3 092 830
	2 Portland cement ASTM type V (sulfate resistant)	t	11 999	6.06	72 713	296.70	3 560 066	302.76	3 632 779
	3 Steel lining	kg	999 000	0.77	769 230	5.23	5 224 770	6.00	5 994 000
	4 Care of water and miscellaneous works	%	3%		140 077		1 034 071		1 174 148
	Total No. C.III.3.7				4 809 311		35 503 089		40 312 400
C.III.3.8	UNDERGROUND WORKS - Drainage and Grouting Tunnels of Gates Chambers (D-shaped) - 2 tunnels each 270 m long								
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	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.3.8.02	Concrete works:								
	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.3.8.03	Drilling and grouting:								
	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	5 710	8.99	51 333	27.90	159 309	36.89	210 642
	3 Drain holes, 76 mm diameter	m	5 770	5.68	32 774	28.91	166 811	34.59	199 584
	4 Contact & consolidation cement grouting, excluding materials	t	297	42.60	12 652	124.85	37 080	167.45	49 733
	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	1 282	5.16	6 616	252.60	323 878	257.76	330 494
	2 Portland cement ASTM type V (sulfate resistant)	t	1 282	6.06	7 770	296.70	380 422	302.76	388 192
	3 Care of water and miscellaneous works	%	3%		12 711		86 780		99 490
	Total No. C.III.3.8				436 395		2 979 439		3 415 834
C.III.3.9	UNDERGROUND WORKS - Access Tunnels to Gates Chambers (D-shaped) - 820 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	18 081	8.02	145 010	33.87	612 403	41.89	757 413
	c) Rock Class III	m ³	8 091	8.77	70 955	37.35	302 186	46.12	373 142

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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))
	d) Rock Class IV	m ³	19 721	9.24	182 222	40.89	806 392	50.13	988 614
	e) Rock Class V	m ³	8 637	10.24	88 446	45.20	390 407	55.44	478 854
2	Grouted anchor bars, 22 mm diameter	m	9 293	1.49	13 847	13.63	126 668	15.12	140 515
3	Grouted anchor bars, 26 mm diameter	m	4 373	1.58	6 910	15.28	66 825	16.86	73 734
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	4 237	1.71	7 245	24.13	102 231	25.84	109 475
6	Rock bolts, 26.5 mm diameter	m	1 093	2.83	3 094	31.18	34 090	34.01	37 184
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	1 640	14.59	23 928	103.39	169 560	117.98	193 487
9	Welded wire fabric	kg	41 000	0.58	23 780	2.16	88 560	2.74	112 340
10	Steel ribs	kg	256 933	0.13	33 401	2.94	755 384	3.07	788 785
C.III.3.9.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	21 949	9.10	199 733	83.30	1 828 324	92.40	2 028 057
2	Concrete, invert	m ³	5 467	7.70	42 093	55.70	304 493	63.40	346 587
3	Reinforcing steel	t	1 477	325.47	480 839	1 359.52	2 008 510	1 684.99	2 489 348
C.III.3.9.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 531	4.04	6 184	18.36	28 103	22.40	34 287
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 401	8.99	39 562	27.90	122 779	36.89	162 341
3	Drain holes, 76 mm diameter	m	5 740	5.68	32 603	28.91	165 943	34.59	198 547
4	Contact & consolidation cement grouting, excluding materials	t	238	42.60	10 130	124.85	29 689	167.45	39 820
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.3.9.04	Sundries:								
1	Portland cement ASTM type I or II	t	4 874	5.16	25 152	252.60	1 231 262	257.76	1 256 413
2	Portland cement ASTM type V (sulfate resistant)	t	4 874	6.06	29 539	296.70	1 446 221	302.76	1 475 759
3	Care of water and miscellaneous works	%	3%		43 940		318 601		362 541
	Total No. C.III.3.9				1 508 612		10 938 631		12 447 243
C.III.3.10	UNDERGROUND WORKS - Ventilation Tunnel (205 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	1 702	8.02	13 653	33.87	57 660	41.89	71 313
c)	Rock Class III	m ³	700	8.77	6 136	37.35	26 132	46.12	32 268
d)	Rock Class IV	m ³	3 239	9.24	29 933	40.89	132 462	50.13	162 395
e)	Rock Class V	m ³	1 486	10.24	15 217	45.20	67 169	55.44	82 386
2	Grouted anchor bars, 22 mm diameter	m	1 311	1.49	1 954	13.63	17 872	15.12	19 826
3	Grouted anchor bars, 26 mm diameter	m	656	1.58	1 036	15.28	10 018	16.86	11 054
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	820	1.71	1 401	24.13	19 775	25.84	21 177
6	Rock bolts, 26.5 mm diameter	m	492	2.83	1 392	31.18	15 332	34.01	16 723
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	313	14.59	4 574	103.39	32 413	117.98	36 987
9	Welded wire fabric	kg	7 308	0.58	4 239	2.16	15 785	2.74	20 024
10	Steel ribs	kg	61 174	0.13	7 953	2.94	179 850	3.07	187 803
C.III.3.10.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	1 612	9.10	14 669	83.30	134 275	92.40	148 944
2	Concrete, invert	m ³	627	7.70	4 828	55.70	34 925	63.40	39 753
3	Reinforcing steel	t	127	325.47	41 190	1 359.52	172 054	1 684.99	213 243
C.III.3.10.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	280	4.04	1 132	18.36	5 146	22.40	6 278
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1 027	8.99	9 232	27.90	28 651	36.89	37 883
3	Drain holes, 76 mm diameter	m	1 030	5.68	5 853	28.91	29 790	34.59	35 643
4	Contact & consolidation cement grouting, excluding materials	t	78	42.60	3 308	124.85	9 694	167.45	13 001
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	512	5.16	2 644	252.60	129 426	257.76	132 069
2	Portland cement ASTM type V (sulfate resistant)	t	512	6.06	3 105	296.70	152 021	302.76	155 126
3	Care of water and miscellaneous works	%	3%		5 203		38 113		43 317
	Total No. C.III.3.10				178 650		1 308 563		1 487 214
	TOTAL AMOUNT OF HIGH LEVEL TUNNELS SPILLWAYS (THREE TUNNELS)				37 250 753		265 160 001		302 410 754
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	m3	2 670 327	0.23	600 824	2.44	6 512 928	2.66	7 113 752

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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 Excavation, rock	m3	6 230 764	1.31	8 164 793	5.05	31 470 340	6.36	39 635 133
	3 Overhauling in excess of 500 m, common material	m3/km	13 351 636.1	0.07	934 615	0.81	10 814 825	0.88	11 749 440
	4 Overhauling in excess of 500 m, rock	m3/km	31 153 817.6	0.09	2 797 613	1.03	32 181 894	1.12	34 979 506
	5 Rock bolts, 25 mm diameter	m	195 948	2.62	513 383	27.27	5 343 491	29.89	5 856 874
	6 Rock bolts, 32 mm diameter	m	170 690	2.81	479 638	35.42	6 045 826	38.23	6 525 463
	7 Grouted anchor bars, 25 mm diameter	m	391 895	1.58	619 194	12.80	5 016 259	14.38	5 635 453
	8 Grouted anchor bars, 32 mm diameter	m	341 379	1.63	556 448	15.71	5 363 067	17.34	5 919 515
	9 Shotcrete	m3	30 361	15.10	458 448	93.73	2 845 718	108.83	3 304 167
	10 Welded wire fabric	kg	1 030 249.6	0.50	515 125	1.93	1 988 382	2.43	2 503 506
C.III.4.1.02	Concrete works:								
	1 Concrete, foundation and mat	m3	138 338	5.10	705 524	29.54	4 086 505	34.64	4 792 028
	2 Concrete elevation	m3	21 306	8.30	176 840	34.10	726 535	42.40	903 374
	3 Reinforcing steel (50 kg/m3)	t	6 386	242.54	1 548 802	1 308.26	8 354 234	1 550.80	9 903 037
	4 Flat type Formworks	m2	53 215	6.06	322 477	17.78	946 005	23.84	1 268 482
	5 Curved type Formworks	m2		10.67		26.77		37.44	
	6 Scaffolding for slab formworks, 20 KN/m2 max. load	m3		2.98		4.57		7.55	
	7 Scaffolding for slab formworks, 50 KN/m2 max. load	m3		3.56		7.61		11.17	
	8 Overhauling in excess of 1000 m from batching plant	m3/km	159 644	0.11	17 561	0.86	137 294	0.97	154 855
C.III.4.1.03	Sundries:								
	1 Portland cement, type I or II ASTM	t	35 594.7	5.16	183 669	252.60	8 991 226	257.76	9 174 895
	2 Portland cement, type V ASTM (sulfate resistant)	t	29 153.7	6.06	176 672	296.70	8 649 910	302.76	8 826 581
	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%		564 107		4 188 153		4 752 261
	Total No. C.III.4.1				19 367 684		143 793 265		163 160 949
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	36 385	8.02	291 810	33.87	1 232 371	41.89	1 524 181
	c) Rock Class III	m3	72 771	8.77	638 198	37.35	2 717 983	46.12	3 356 181
	d) Rock Class IV	m3	36 385	9.24	336 200	40.89	1 487 795	50.13	1 823 996
	e) Rock Class V	m3		10.24		45.20		55.44	
	2 Grouted anchor bars, 22 mm diameter	m	14 829	1.49	22 096	13.63	202 122	15.12	224 217
	3 Grouted anchor bars, 26 mm diameter	m	7 944	1.58	12 551	15.28	121 379	16.86	133 930
	4 Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
	5 Rock bolts, 22 mm diameter	m	7 414	1.71	12 678	24.13	178 897	25.84	191 574
	6 Rock bolts, 26.5 mm diameter	m	5 574	2.83	15 775	31.18	173 804	34.01	189 580
	7 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	8 Shotcrete	m3	3 154	14.59	46 015	103.39	326 080	117.98	372 095
	9 Welded wire fabric	kg	76 104	0.58	44 140	2.16	164 384	2.74	208 524
	10 Steel ribs	kg	367 026	0.13	47 713	2.94	1 079 056	3.07	1 126 770
C.III.4.2.02	Concrete works:								
	1 Concrete, arch	m3	19 502	8.90	173 571	75.20	1 466 580	84.10	1 640 152
	2 Concrete, sidewalls	m3	24 593	11.40	280 361	54.70	1 345 243	66.10	1 625 604
	3 Concrete, invert	m3	27 605	6.00	165 627	43.00	1 186 994	49.00	1 352 621
	4 Reinforcing steel (50kg/m3)	t	3 585	325.47	1 166 810	1 359.52	4 873 879	1 684.99	6 040 689
C.III.4.2.03	Drilling and grouting:								
	1 Percussion contact grout holes, 40-48 mm diameter	m	3 056	4.04	12 348	18.36	56 115	22.40	68 463
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 768	8.99	42 868	37.90	180 725	46.89	223 593
	3 Drain holes, 76 mm diameter	m	7 524	5.68	42 739	28.91	217 533	34.59	260 272
	4 Contact & consolidation cement grouting, excluding materials	t	220	42.80	9 362	124.85	27 438	167.45	36 800
	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	13 509	5.16	69 708	252.60	3 412 440	257.76	3 482 147
	2 Portland cement ASTM type V (sulfate resistant)	t	11 074	6.06	67 107	296.70	3 285 582	302.76	3 352 689
	3 Care of water and miscellaneous works	%	3%		104 930		712 092		817 022
	Total No. C.III.4.2				3 602 609		24 448 489		28 051 098
C.III.4.3	Amount to be deducted (Outlet similar with MLO1)								
					1 657 065		14 163 693		15 820 758
	TOTAL AMOUNT OF SURFACE SPILLWAY				21 313 227		154 078 061		175 391 288

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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 AMOUNT OF FLOOD MANAGMENT STRUCTURES				77 699 573		562 386 912		640 086 485
C.IV	TRANSPORTATION TUNNELS								
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:								
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	m3/km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
4	Overhauling in excess of 500 m, rock	m3/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.1.1				74 486		515 665		590 151
C.IV.1.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 235 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	6 192.9	5.92	36 666	29.97	185 613	35.89	222 279
c)	Rock Class III	m ³	5 252.9	6.67	35 038	33.91	178 128	40.58	213 167
d)	Rock Class IV	m ³	5 455.7	7.15	39 005	36.60	199 673	43.75	238 678
e)	Rock Class V	m ³	4 534.1	8.01	36 322	42.58	193 082	50.60	229 404
2	Grouted anchor bars, 22 mm diameter	m	1 843	1.49	2 746	13.63	25 122	15.12	27 868
3	Grouted anchor bars, 26 mm diameter	m	1 567	1.58	2 475	15.28	23 939	16.86	26 414
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 060	1.71	1 812	24.13	25 573	25.84	27 385
6	Rock bolts, 26.5 mm diameter	m	783	2.83	2 217	31.18	24 424	34.01	26 641
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	544	14.59	7 933	103.39	56 216	117.98	64 149
9	Welded wire fabric	kg	13 519	0.58	7 841	2.16	29 202	2.74	37 043
10	Steel ribs	kg	114 155	0.13	14 840	2.94	335 615	3.07	350 455
C.IV.1.2.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	8 455	9.10	76 944	83.30	704 334	92.40	781 278
2	Concrete, invert	m ³	2 115	7.70	16 286	55.70	117 806	63.40	134 091
3	Reinforcing steel	t	576	325.47	187 464	1 359.52	783 057	1 684.99	970 521
C.IV.1.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	710	4.04	2 867	18.36	13 028	22.40	15 895
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1 382	8.99	12 427	27.90	38 568	36.89	50 995
3	Drain holes, 76 mm diameter	m	2 087	5.68	11 856	28.91	60 345	34.59	72 202
4	Contact & consolidation cement grouting, excluding materials	t	75	42.60	3 180	124.85	9 320	167.45	12 500
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	1 851	5.16	9 551	252.60	467 544	257.76	477 094
2	Portland cement ASTM type V (sulfate resistant)	t	1 851	6.06	11 217	296.70	549 169	302.76	560 386
3	Care of water and miscellaneous works	%	3%		15 561		120 593		136 153
	Total No. C.IV.1.2				534 248		4 140 350		4 674 598
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-10				608 734		4 656 015		5 264 750

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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))
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	Excavation and supports:								
	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	m3/km	8 925.0	0.07	625	0.81	7 229	0.88	7 854
	4 Overhauling in excess of 500 m, rock	m3/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	Concrete works:								
	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	Sundries:								
	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) - 716 m								
C.IV.2.2.01	Excavation and supports:								
	1 Excavation								
	a) Rock Class I	m ³		5.14		25.65		30.79	
	b) Rock Class II	m ³	22 036.4	5.92	130 469	29.97	660 469	35.89	790 938
	c) Rock Class III	m ³	12 801.4	6.67	85 388	33.91	434 096	40.58	519 484
	d) Rock Class IV	m ³	19 929.4	7.15	142 483	36.60	729 397	43.75	871 880
	e) Rock Class V	m ³	10 361.5	8.01	83 003	42.58	441 237	50.60	524 240
	2 Grouted anchor bars, 22 mm diameter	m	6 011	1.49	8 956	13.63	81 927	15.12	90 883
	3 Grouted anchor bars, 26 mm diameter	m	5 153	1.58	8 142	15.28	78 744	16.86	86 886
	4 Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
	5 Rock bolts, 22 mm diameter	m	3 430	1.71	5 864	24.13	82 754	25.84	88 618
	6 Rock bolts, 26.5 mm diameter	m	2 572	2.83	7 279	31.18	80 199	34.01	87 478
	7 Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
	8 Shotcrete	m ³	1 596	14.59	23 288	103.39	165 029	117.98	188 317
	9 Welded wire fabric	kg	41 245	0.58	23 922	2.16	89 090	2.74	113 012
	10 Steel ribs	kg	260 861	0.13	33 912	2.94	766 932	3.07	800 844
C.IV.2.2.02	Concrete works:								
	1 Concrete, arch and sidewalls	m ³	25 657	9.10	233 483	83.30	2 137 264	92.40	2 370 746
	2 Concrete, invert	m ³	6 412	7.70	49 373	55.70	357 153	63.40	406 526
	3 Reinforcing steel	t	1 710	325.47	556 616	1 359.52	2 325 039	1 684.99	2 881 655
C.IV.2.2.03	Drilling and grouting:								
	1 Percussion contact grout holes, 40-48 mm diameter	m	2 189	4.04	8 844	18.36	40 191	22.40	49 035
	2 Rotary consolidation grout holes, 40-48 mm min. diameter	m	4 123	8.99	37 063	27.90	115 023	36.89	152 086
	3 Drain holes, 76 mm diameter	m	6 357	5.68	36 110	28.91	183 791	34.59	219 901
	4 Contact & consolidation cement grouting, excluding materials	t	223	42.60	9 520	124.85	27 900	167.45	37 419
	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	Sundries:								
	1 Portland cement ASTM type I or II	t	5 602	5.16	28 906	252.60	1 415 063	257.76	1 443 970
	2 Portland cement ASTM type V (sulfate resistant)	t	5 602	6.06	33 948	296.70	1 662 111	302.76	1 696 059
	3 Care of water and miscellaneous works	%	3%		46 397		356 202		402 599
	Total No. C.IV.2.2				1 592 967		12 229 610		13 822 576
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-18				1 630 210		12 487 442		14 117 652
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								

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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))
C.IV.3.1.01	Excavation and supports:								
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	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.3.1.03	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.3.1				74 486		515 665		590 151
C.IV.3.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 2105 m								
C.IV.3.2.01	Excavation and supports:								
1	Excavation								
a)	Rock Class I	m ³		5.14		25.65		30.79	
b)	Rock Class II	m ³	55 535	5.92	328 802	29.97	1 664 487	35.89	1 993 289
c)	Rock Class III	m ³	47 035	6.67	313 732	33.91	1 594 956	40.58	1 908 687
d)	Rock Class IV	m ³	68 361	7.15	488 738	36.60	2 501 935	43.75	2 990 672
e)	Rock Class V	m ³	20 302	8.01	162 637	42.58	864 561	50.60	1 027 198
2	Grouted anchor bars, 22 mm diameter	m	19 509	1.49	29 068	13.63	265 903	15.12	294 971
3	Grouted anchor bars, 26 mm diameter	m	16 725	1.58	26 425	15.28	255 558	16.86	281 983
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	11 158	1.71	19 080	24.13	269 234	25.84	288 314
6	Rock bolts, 26.5 mm diameter	m	8 339	2.83	23 601	31.18	260 025	34.01	283 626
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	4 843	14.59	70 654	103.39	500 682	117.98	571 336
9	Welded wire fabric	kg	123 539	0.58	71 653	2.16	266 845	2.74	338 498
10	Steel ribs	kg	511 262	0.13	66 464	2.94	1 503 110	3.07	1 569 574
C.IV.3.2.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	75 113	9.10	683 527	83.30	6 256 900	92.40	6 940 427
2	Concrete, invert	m ³	18 784	7.70	144 637	55.70	1 046 267	63.40	1 190 903
3	Reinforcing steel	t	5 004	325.47	1 628 551	1 359.52	6 802 615	1 684.99	8 431 165
C.IV.3.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	6 361	4.04	25 698	18.36	116 788	22.40	142 487
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	11 848	8.99	106 512	27.90	330 554	36.89	437 066
3	Drain holes, 76 mm diameter	m	18 680	5.68	106 105	28.91	540 051	34.59	646 156
4	Contact & consolidation cement grouting, excluding materials	t	644	42.60	27 441	124.85	80 423	167.45	107 863
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.IV.3.2.04	Sundries:								
1	Portland cement ASTM type I or II	t	16 435	5.16	84 805	252.60	4 151 522	257.76	4 236 327
2	Portland cement ASTM type V (sulfate resistant)	t	16 435	6.06	99 597	296.70	4 876 312	302.76	4 975 909
3	Care of water and miscellaneous works	%	3%		135 232		1 024 462		1 159 694
	Total No. C.IV.3.2				4 642 957		35 173 187		39 816 144
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-39				4 717 444		35 688 852		40 406 295
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	Excavation and supports:								
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

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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 Overhauling in excess of 500 m, common material	m3/km	8 925.0	0.07	625	0.81	7 229	0.88	7 854
	4 Overhauling in excess of 500 m, rock	m3/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	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	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	Sundries:								
	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)								
.01	Excavation and supports:								
	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
.02	Concrete works:								
	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
.03	Drilling and grouting:								
	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
.04	Sundries:								
	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
C.IV.5	TRANSPORTATION TUNNEL T-10A (Construction Tunnel)								
C.IV.5.1	SURFACE WORKS - Upstream and downstream portals								
C.IV.5.1.01	Excavation and supports:								
	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	m3/km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
	4 Overhauling in excess of 500 m, rock	m3/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	Concrete works:								
	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	Sundries:								
	1 Portland cement, type I or II ASTM	t	192.7	5.16	994	252.60	48 663	257.76	49 657

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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, 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	Excavation and supports:								
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	Concrete works:								
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	Drilling and grouting:								
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	Sundries:								
1	Portland cement ASTM type I or II	t	1 207	5.16	6 231	252.60	305 007	257.76	311 238
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 and downstream portals								
C.IV.6.1.01	Excavation and supports:								
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	Concrete works:								
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 ²		2.98		4.57		7.55	
7	Scaffolding for slab formworks, 50 KN/m ² max. load	m ²		3.56		7.61		11.17	
C.IV.6.1.03	Sundries:								
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

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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))
C.IV.6.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 450 m								
C.IV.6.2.01	Excavation and supports:								
1	Excavation								
	a) Rock Class I	m ³		5.14		25.65		30.79	
	b) Rock Class II	m ³	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	Concrete works:								
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	Drilling and grouting:								
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
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	Excavation and supports:								
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	m3/km	17 850.0	0.07	1 250	0.81	14 459	0.88	15 708
4	Overhauling in excess of 500 m, rock	m3/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	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.7.1.03	Sundries:								
1	Portland cement, type I or II ASTM	t	276.9	5.16	1 429	252.60	69 942	257.76	71 371
2	Portland cement, type V ASTM (sulfate resistant)	t	230.0	6.06	1 394	296.70	68 241	302.76	69 635
3	Care of water and miscellaneous works	%	3%		2 176		15 324		17 499
	Total No. C.IV.7.1				74 700		526 112		600 812
C.IV.7.2	UNDERGROUND WORKS - Tunnel Stretch (D-shaped) - 338 m								
C.IV.7.2.01	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 (2)	Amount (1 x 2)	Price (3)	Amount (1 x 3)	Price (2+3)	Amount (1 x (2+3))
1	Excavation								
	a) Rock Class I	m ³		5.14		25.65		30.79	
	b) Rock Class II	m ³	7 429.4	5.92	43 987	29.97	222 672	35.89	266 659
	c) Rock Class III	m ³	6 035.0	6.67	40 255	33.91	204 649	40.58	244 904
	d) Rock Class IV	m ³	9 401.1	7.15	67 212	36.60	344 072	43.75	411 284
	e) Rock Class V	m ³	8 148.4	8.01	65 275	42.58	346 993	50.60	412 268
2	Grouted anchor bars, 22 mm diameter	m	2 723	1.49	4 058	13.63	37 120	15.12	41 178
3	Grouted anchor bars, 26 mm diameter	m	2 331	1.58	3 683	15.28	35 621	16.86	39 304
4	Grouted anchor bars, 32 mm diameter	m		1.62		17.76		19.38	
5	Rock bolts, 22 mm diameter	m	1 558	1.71	2 664	24.13	37 589	25.84	40 253
6	Rock bolts, 26.5 mm diameter	m	1 166	2.83	3 299	31.18	36 344	34.01	39 642
7	Rock bolts, 32 mm diameter	m		3.02		39.12		42.14	
8	Shotcrete	m ³	828	14.59	12 079	103.39	85 598	117.98	97 677
9	Welded wire fabric	kg	19 445	0.58	11 278	2.16	42 001	2.74	53 279
10	Steel ribs	kg	205 071	0.13	26 659	2.94	602 909	3.07	629 568
C.IV.7.2.02	Concrete works:								
1	Concrete, arch and sidewalls	m ³	12 353	9.10	112 415	83.30	1 029 029	92.40	1 141 443
2	Concrete, invert	m ³	3 094	7.70	23 822	55.70	172 323	63.40	196 145
3	Reinforcing steel	t	871	325.47	283 642	1 359.52	1 184 800	1 684.99	1 468 442
C.IV.7.2.03	Drilling and grouting:								
1	Percussion contact grout holes, 40-48 mm diameter	m	1 024	4.04	4 137	18.36	18 801	22.40	22 937
2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2 440	8.99	21 937	27.90	68 080	36.89	90 017
3	Drain holes, 76 mm diameter	m	2 996	5.68	17 016	28.91	86 606	34.59	103 622
4	Contact & consolidation cement grouting, excluding materials	t	125	42.60	5 337	124.85	15 641	167.45	20 977
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	2 720	5.16	14 038	252.60	687 185	257.76	701 222
2	Portland cement ASTM type V (sulfate resistant)	t	2 720	6.06	16 486	296.70	807 156	302.76	823 642
3	Care of water and miscellaneous works	%	3%		23 378		181 956		205 334
	Total No. C.IV.7.2				802 656		6 247 143		7 049 799
	TOTAL AMOUNT OF TRANSPORTATION TUNNEL T-50A				877 355		6 773 255		7 650 610
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

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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))
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								
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	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.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

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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 No. C.IV.10.2				931 968		6 057 408		6 989 376
	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							
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
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

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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))
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:								
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	

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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	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	
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:								

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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 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	<u>Drilling and grouting:</u>								
	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	<u>Sundries:</u>								
	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	<u>Excavation and supports:</u>								
	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	<u>Drilling and grouting:</u>								
	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	<u>Sundries:</u>								
	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	<u>Excavation and supports:</u>								
	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	<u>Drilling and grouting:</u>								
	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	<u>Sundries:</u>								
	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
	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	<u>Excavation and supports:</u>								
	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	<u>Concrete works:</u>								
	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	<u>Sundries:</u>								
	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	<u>Excavation and supports:</u>								
	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	<u>Concrete works:</u>								
	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	<u>Sundries:</u>								
	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	<u>Excavation and supports:</u>								
	1 Expansion bolts	unit	1 960	1.20	2 352	11.80	23 128	13.00	25 479

DAM 1255

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 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				15 197 687		115 113 747		130 311 434
	TOTAL AMOUNT OF UNDERGROUND WORKS				155 910 489		1 127 954 449		1 283 864 938
	GRAND TOTAL OF CIVIL WORKS				287 101 379		2 300 381 887		2 587 483 266

PART VII – Alt 2: PRICE BILL OF QUANTITIES & COST SUMMARY (Permanent equipment)

ITEM	E&M COSTS - 2400 MW INSTALLED CAPACITY - 6 UNITS - FSL 1255 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	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	65 195	39 117 000	10 561 590	1 173 510	27 381 900		
	Total N°1.1 ----->>							17 602 650	1 955 850	39 117 000	58 675 500	
	Total N°1 ----->>>							17 602 650	1 955 850	39 117 000		58 675 500
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	88 013	52 807 950	22 883 445	2 542 605	27 381 900		
	Total N°2.1 ----->>							29 924 505	3 324 945	39 117 000	72 366 450	
	Total N°2 ----->>>							29 924 505	3 324 945	39 117 000		72 366 450
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	
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° ----->>>							363 046 643	43 247 291	152 396 016	427 648 000			
2	MISCELLANEA													
	Miscellanea on EM equipment	%		5.0%				18 152 332	2 162 365	7 619 801	27 934 498			
TOTAL AMOUNT OF E&M EQUIPMENT											381 198 975	45 409 656	160 015 817	586 624 448

ROGUN HYDROELECTRIC POWER PLANT
 COST ESTIMATE PHASE II E&M_1290-1255_2800MW

ITEM	E&M COSTS - 2800 MW INSTALLED CAPACITY - 6 UNITS - FSL 1255 & 1290 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	64 025	38 415 000	10 372 050	1 152 450	26 890 500		
	Total N°1.1 ----->>							17 286 750	1 920 750	38 415 000	57 622 500	
	Total N°1 ----->>>							17 286 750	1 920 750	38 415 000		57 622 500
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	86 434	51 860 250	22 472 775	2 496 975	26 890 500		
	Total N°2.1 ----->>							29 387 475	3 265 275	38 415 000	71 067 750	
	Total N°2 ----->>>							29 387 475	3 265 275	38 415 000		71 067 750
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		

ITEM	E&M COSTS - 2800 MW INSTALLED CAPACITY - 6 UNITS - FSL 1255 & 1290 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		
3.1.2	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	8 091 325		30 943 846
	TOTAL AMOUNT OF E&M EQUIPMENT							428 760 984	51 141 962	169 917 817		649 820 763

ROGUN HYDROELECTRIC POWER PLANT
 COST ESTIMATE PHASE II E&M_1290-1255_3200MW

ITEM	E&M COSTS - 3200 MW INSTALLED CAPACITY - 6 UNITS - FSL 1255 & 1290 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	533.3	600.0	32 500	19 500 000	7 020 000	780 000	11 700 000		
1.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 6, based on existing final capacity	MW	1	533.3	600.0	65 000	39 000 000	10 530 000	1 170 000	27 300 000		
	Total N°1.1 ----->>							17 550 000	1 950 000	39 000 000	58 500 000	
	Total N°1 ----->>>							17 550 000	1 950 000	39 000 000		58 500 000
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	533.3	600.0	32 500	19 500 000	7 020 000	780 000	11 700 000		
2.1.2	Generator and Excitation Equipment											
	Generator and Excitation Equipment - unit 5, based on existing final capacity	MW	1	533.3	600.0	87 750	52 650 000	22 815 000	2 535 000	27 300 000		
	Total N°2.1 ----->>							29 835 000	3 315 000	39 000 000	72 150 000	
	Total N°2 ----->>>							29 835 000	3 315 000	39 000 000		72 150 000
3	FOUR NEW UNITS											
3.1	NEW UNITS - UNIT											
3.1.1	Hydraulic Turbine and Governor											
	Units 4, 3, 2, 1	MW	4	533.3	2 133.3	62 530	133 397 333	96 046 080	10 671 787	26 679 467		

ITEM	E&M COSTS - 3200 MW INSTALLED CAPACITY - 6 UNITS - FSL 1255 & 1290 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		
3.1.2	Generator and Excitation Equipment											
	Units 4, 3, 2, 1	MW	4	533.3	2 133.3	62 530	133 397 333	89 376 213	10 671 787	33 349 333		
	Total N°3.1 ----->>>							185 422 293	21 343 573	60 028 800	266 794 667	
3.2	UNITS - BOP											
3.2.1	Automation											
	Units 6, 5, 4, 3, 2, 1	MW	1	3200.0	3 200.0	12 499	39 996 800	30 797 536	3 199 744	5 999 520		
3.2.2	BOP Mechanical (including PH Cranes)											
	Units 6, 5, 4, 3, 2, 1	MW	1	3200.0	3 200.0	14 998	47 993 600	36 955 072	3 839 488	7 199 040		
3.2.3	BOP Electrical											
	Units 6, 5, 4, 3, 2, 1	MW	1	3200.0	3 200.0	18 748	59 993 600	46 195 072	4 799 488	8 999 040		
3.2.4	HV Transformers											
	Units 6, 5, 4, 3, 2, 1	MW	1	3200.0	3 200.0	24 997	79 990 400	63 992 320	11 198 656	4 799 424		
3.2.4	Switchward and Links											
	Units 6, 5, 4, 3, 2, 1	MW	1	3200.0	3 200.0	16 248	51 993 600	40 035 072	4 159 488	7 799 040		
	Total N°3.2 ----->>>							217 975 072	27 196 864	34 796 064	279 968 000	
	Total N°3 ----->>>							403 397 365	48 540 437	94 824 864		546 762 667
4	MISCELLANEA											
	Miscellanea on EM equipment	%		5.0%				22 539 118	2 690 272	8 641 243		33 870 633
	TOTAL AMOUNT OF E&M EQUIPMENT							473 321 484	56 495 709	181 466 107		711 283 300

ROGUN HYDROELECTRIC POWER PLANT
COST ESTIMATE PHASE II EXISTING HSS

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 - 2400-3200 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: 115 m head	t	2	88.7	177.4	11 050	1 960 270	1 509 408	156 822	294 041		
1.3.3	Emergency Gates											

ROGUN HYDROELECTRIC POWER PLANT
COST ESTIMATE PHASE II HSS 1255

ITEM	HSS COSTS - 2400-3200 MW INSTALLED CAPACITY 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
	emergency gates 3.5 x 5.15 m (WxH) - design pressure: 115 m head	t	3	73.9	221.7	11 050	2 449 785	1 886 334	195 983	367 468		

ITEM	HSS COSTS - 2400-3200 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		
1.3.4 Sector Gates												
	sector gates 3.5 x 4.65 m (WxH) - design pressure: 115 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 HIGH LEVEL SPILLWAY TUNNEL 2 (HLST2)												
1.4.1 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		
1.4.2 Maintenance Gates												
	maintenance gates 3.5 x 6.7 m (WxH) - design pressure: 115 m head	t	2	88.7	177.4	11 050	1 960 270	1 509 408	156 822	294 041		
1.4.3 Emergency Gates												
	emergency gates 3.5 x 5.15 m (WxH) - design pressure: 115 m head	t	3	73.9	221.7	11 050	2 449 785	1 886 334	195 983	367 468		
1.4.4 Sector Gates												
	sector gates 3.5 x 4.65 m (WxH) - design pressure: 115 m head	t	3	89.8	269.4	11 050	2 976 870	2 292 190	238 150	446 531		
	Total N°1.4 ----->>							6 538 782	679 354	1 273 789	8 491 925	
1.5 HIGH LEVEL SPILLWAY TUNNEL 3 (HLST3)												
1.5.1 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		
1.5.2 Maintenance Gates												
	maintenance gates 3.5 x 6.7 m (WxH) - design pressure: 115 m head	t	2	88.7	177.4	11 050	1 960 270	1 509 408	156 822	294 041		
1.5.3 Emergency Gates												
	emergency gates 3.5 x 5.15 m (WxH) - design pressure: 115 m head	t	3	73.9	221.7	11 050	2 449 785	1 886 334	195 983	367 468		
1.5.4 Sector Gates												
	sector gates 3.5 x 4.65 m (WxH) - design pressure: 115 m head	t	3	89.8	269.4	11 050	2 976 870	2 292 190	238 150	446 531		
	Total N°1.5 ----->>							6 538 782	679 354	1 273 789	8 491 925	
1.6 SURFACE SPILLWAY												

ITEM	HSS COSTS - 2400-3200 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		
1.6.1	Gantry Crane											
	Gantry crane	n°	1	70	70.0	14 300	1 001 000	770 770	80 080	150 150		
1.6.2	Stoplogs											
	maintenance gates 8.0 x 13.1 m (WxH) - design pressure: 13.1 m head	t	4	82.3	329.0	6 500	2 138 500	1 710 800	171 080	256 620		
1.6.3	Sector Gates											
	sector gates 8.0 x 13.1 m (WxH) - design pressure: 13.1 m head	t	4	87.6	350.3	11 050	3 871 036	2 980 698	309 683	580 655		
	Total N°1.6 ----->>							5 462 268	560 843	987 425	7 010 536	
1.7	PERMANENT POWER INTAKES											
1.7.1	External Removable trash racks											
	External Removable wide mesh trash racks (2 racks, each rack 6.5 x 8.25 m)	t	36	5.5	198.0	5 200	1 029 600	823 680	82 368	123 552		
1.7.2	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	6	199.2	1 195.2	6 500	7 768 800	5 981 976	621 504	1 165 320		
1.7.3	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	36	59.1	2 127.6	4 000	8 510 400	6 553 008	680 832	1 276 560		

ITEM	HSS COSTS - 2400-3200 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		
1.7.4	Power Intakes Removable trash racks											
	Removable trash racks (2 racks for each intake, each rack 7 x 45 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		
1.7.5	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		
1.7.6	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		
1.7.7	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		
1.7.8	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		
1.7.9	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°1.7 ----->>							49 940 872	5 234 056	10 738 272	65 913 200	
1.8	PENSTOCKS											
1.8.1	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		
1.8.2	Maintenance crane											
	Maintenance crane	t	1	45	45.0	14 300	643 500	495 495	51 480	96 525		
	Total N°1.8 ----->>							40 362 075	4 481 100	29 627 325	74 470 500	
	Total N°1 ----->>							151 104 384	15 955 413	51 327 114		218 386 911
2	MISCELLANEA											
	Miscellanea on HSS equipment	%		4.0%				6 044 175	638 217	2 053 085		8 735 476

ROGUN HYDROELECTRIC POWER PLANT
 COST ESTIMATE PHASE II HSS 1255

ITEM	HSS COSTS - 2400-3200 MW INSTALLED CAPACITY 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
	TOTAL AMOUNT OF HSS EQUIPMENT							157 148 559	16 593 629	53 380 199		227 122 387

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>				<i>6 300 000</i>							
	<i>miscellanea</i>	%	3%		<i>189 000</i>							
	<i>spare parts</i>	%	2%		<i>126 000</i>							
	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>				<i>6 300 000</i>							
	<i>miscellanea</i>	%	3%		<i>189 000</i>							
	<i>spare parts</i>	%	2%		<i>126 000</i>							
	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