OSHPC BARKI TOJIK

TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

PHASE I
ASSESSMENT OF EXISTING ROGUN HPP WORKS

Cost Estimate
Volume 1 – Methodology, Rates and Priced BoQ

RP 39

September 2013

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Ingénieurs Conseils

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ELECTROCONSULT

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Energy + Water Economics

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Foreword

Rogun Hydroelectric Power Plant is located on the Vakhsh River in southern Tajikistan, approximately 110 km from Dushanbe and upstream of the existing hydroelectric plant of Nurek.

The plant has a four-decade history. It was firstly proposed in 1959 and a technical scheme was developed by 1965. Construction begun in 1980 as per a design prepared by Hydroproject Tashkent, but the project came to a halt for the first time in 1991 when the Soviet Union dissolved. The main works carried out before this occurrence include most of the construction facilities, such as roads, road-tunnels, bridges over the Vakhsh River and permanent works for the installation of the planned first two units. Parts of the works constructed were destroyed or suffered remarkable damages during a flood that happen in 1993.

Rogun project is one of the planned hydroelectric power plants of the Vakhsh cascade; according to the original scheme it would be equipped with six generating units with a total installed capacity of about 3,600 MW and a reservoir total storage volume of 13.3 km^3, at FSL of 1,290 ma.s.l. When finished, in the above configuration the dam of this project would be the world's tallest, with a height of 335 meters. According to the general planning, two main stages are envisaged during the power-plant construction.

The first stage includes the construction of a dam up to 140 m high approximately and the installation of two units arranged for operating at low head during the first impounding, allowing the plant early generation.

The second stage includes the heightening of the dam up to the crest and the installations of 4 additional units, as well as the modification of the first two units for operating at the high head corresponding to the final configuration of the Project.

"Phase I" consists of the engineering services relevant to the assessment of the existing works of Rogun Hydroelectric Power Plant, as established in the services/tasks that the Consultant has to perform for the Government of Tajikistan and Barki Tojik in accordance with the ToR of the Contract for the TEAS of the Project.

This volume deals with the cost estimate of the existing works, both civil and electromechanical, related to Rogun HPP.

The cost estimate of the existing works has been carried out during the time spanning from June to December 2012 on the ground of basic costs (labour, materials and construction equipment) which have been investigated in Tajikistan and in other countries during the early stage of the study.

The unit price analyses and the cost summaries have been elaborated in United States of America Dollars (US$), with break down into local and foreign currency. In

order to simplify the calculations for obtaining the unit prices, the local component has been converted into US$ equivalent.

The details related to the cost estimate methodology are given in the ten parts composing this Volume.

It is highlighted that, following the comments of the Client in respect to the cost estimate, the same has been updated and the tables showing the comparison between the detailed BoQ prepared by the TEAS Consultant and the Client have been incorporated into the document at hands.

PART – I

INTRODUCTION

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COST SUMMARY

1 METHODOLOGY

1.1 Structure of the Cost Estimate

The cost estimate is composed of two volumes.
Volume 1 is entitled “Methodology, Rates and Priced BoQ”.
Volume 2 is entitled “Civil Works - Analyses of Unit Prices”.

Volume 1 is composed of eight parts as follows:

Part	Description
Part I	Introduction and Cost Summary
Part II	Civil works - Basic costs of labour and materials
Part III	Civil works - Construction equipment rates
Part IV	Civil works - Construction methods
Part V	Civil works - Price list
Part VI	Civil works - Priced bill of quantities
Part VII	Permanent equipment - Priced bill of quantities
Part VIII	TEAS Consultant-Client BoQ Comparison (Civil Works)
Part IX	TEAS Consultant-Client BoQ Comparison (Permanent Equipment)
Part X	Annexes: • Annex 1 – General plan view (Dwg. 30004 B) • Annex 2 – Underground Works Layout

1.2 Civil Works

1.2.1 Contract Conditions

The cost estimate has been elaborated assuming that the contracts for the civil works construction were based on standard FIDIC Conditions, which take the following key provisions into account:

Amount of performance security: 10% of the Contract Price;

Advance payment: 15% of the Contract Price;

Retention money: 10% of interim payment certificates;

Release of retention money: against bank guarantee;

Limit of liquidated damages:10% of Final Contract Price;

Price escalation: specific provisions for price adjustment covering local labour, diesel fuel, wood, cement and reinforcing steel;

Defect liability period: 365 days from the final acceptance of the Permanent Works.

1.2.2 Construction Time schedule

The construction time schedule of Rogun civil works have been divided into two main packages, as follows:

Lot 1 Contract which covers the road works located upstream of the dam site including the main suspended bridge over the Vakhsh River;

Lot 2 Contract which covers all the remaining works.

Forty one (41) months is the total time estimated for the execution of the works of Lot 1. After a time of six months, deemed necessary for the mobilization and the construction facilities, the works proceed with the construction of the roads on the right bank and the suspended bridge. The roads on the left bank are constructed after the completion of such bridge.

Ninety six (96) months, i.e. eight years is the total time estimated for the execution of the works of Lot 2. After a time of four months, deemed necessary for the mobilization, the construction of camps, temporary buildings, power station, power lines and the service roads proceeds for about one year. According to the construction time schedule, the permanent works can start about nine months after the Notice to Proceed. The main works which are on the critical path include the powerhouse and the diversion tunnels whose construction time is of approx. seven years. Due to the fact that a lot of tunnels, adits, galleries and caverns are executed simultaneously, and that therefore some transportation tunnels and access adits can be subject to a congested traffic which slows down the construction activities, the above mentioned seven years have been extended to eight years.

1.2.3 Work Organization and Worker's Supervision

The unit price analyses have been elaborated considering that:

The works of Lot 1 are organized with a ten-hours shift a day, 24 working days per month and 10.5 months per year.

The works of Lot 2 are organized with three-eight-hours shifts a day, 24 working days per month and 11 months per year.

The worker's supervision is organized on two levels as normally foreseen when international contractors are involved in similar projects, i.e. a local foremen who manages squads composed from eight to ten workers and an expatriate general foremen who manages several squad foremen.

1.2.4 Project Costs

The project costs related to the civil works are detailed in the priced Bill of Quantities included in Part VI of this volume and summarized in the table at the end of this chapter.

1.2.5 *Costs not Included in the Estimate*

The cost estimate does not include the following costs:

a) Land acquisition and rights of way (both permanent and temporary);

b) Environment mitigation, if any;

c) Resettlement, if any;

d) Construction of social infrastructures;

e) Engineering and supervision;

f) Contract administration;

g) Interests during construction;

h) Taxes, duties and levies in Tajikistan, except for the Contractor's Income Tax.

1.2.6 *Rates of Exchange*

The local basic costs, mainly concerning labor and few materials, have been converted to US$ with a rate of exchange of 1.00 US$ = 4.764 Somoni.

The basic costs of imported materials, imported construction equipment and expatriate personnel which were quoted in Euro currency, have been converted to US$ with a rate of exchange of 1.00 € = 1.30 US$.

1.2.7 *Assumptions*

The costs have been estimated assuming that the works are carried out nowadays, by international contractors having experience in similar hydropower projects, with the possible participation of local subcontractor(s) for the execution of part of the construction activities such as the construction of camps, roads and other temporary facilities.

1.2.8 *Analyses of Unit prices*

The detailed analyses for establishing the unit prices have been concentrated on those items which represent the major portion of the total cost and have been elaborated on the ground of the investigated basic costs and productions that have been studied in detail according to the specific characteristics of each works to be carried out.

Works which are very similar to those analyzed have been quoted with prices established by analogy. Minor works impossible to established by analogy, 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.

1.2.9 *Estimating Methodology*

The price analyses carried out take the following main components into account:

Basic wages of labor;

Basic costs of materials delivered to the Site;

Owning and operating costs of the construction equipment;

Site construction contingencies;

Overheads and profit.

The basic wages of labor and the basic costs of materials are included in Part II of this volume.

The owning and operating costs of construction equipment are included in Part III of this volume.

The Site construction contingencies, overheads and profit are commented in the paragraph herein below.

A flow chart related to the cost estimate methodology is given in the annexed Figure 1. The physical contingencies shown on this figure have not been considered for the Phase I Cost Estimate because it only includes works already built.

1.2.10 Site Construction Contingencies

Site construction contingencies have been considered in the detailed analyses on a percentage basis and added to the total of the direct costs.

These contingencies include minor costs not included in the detailed analyses that are caused by recurring and unexpected events that can affect the production rates.

Such events mainly include: equipment breakdown during operation, unexpected work interruptions, equipment refueling, displacement from site to site of the resources, unexpected unfavourable weather conditions, on-spot construction equipment maintenance, etc.

1.2.11 General Construction Costs

The general construction costs related to mobilization and demobilization of construction equipment and construction facilities as well as those related to construction and maintenance of camps have been included in the lump sums of the priced BoQ.

1.2.12 Overheads and Profit

The overheads consist of costs that the Contractor incurs both at the job-site and at his headquarter for staff salaries, vehicles for personnel and general services, office expenses, bonds, insurance, camp running costs including maintenance of camps, tests, rents, travels, legal fees, medical and hospital care and other expenses that are not included in the direct costs.

The amount of overheads depends on a lot of variables which are strictly connected to the specific organization and to the country of origin of the contractor.

The overheads for Rogun Hydroelectric Power Plant have been established on the ground of data recorded during the construction of similar projects all over the world that have been awarded according to competitive bid procedures.

The percentages of the main overhead components and of the Contractor's risks and profit considered are listed in the following table.

N°	Description	%
1	Site running costs, personnel	8.6%
2	mobility	3.7%
3	construction facilities	2.8%
4	other	2.0%
5	Travels	3.7%
6	Head office and liason office	2.8%
7	Bonds, guarantees and insurances	4.5%
8	Financial costs	4.7%
9	General investigations and tests	0.3%
10	Defects repair	0.6%
11	Miscellaneous (income tax, consultancies, licenses, permits, vehicle taxes etc.)	6.0%
12	Contractor's risks	3.0%
13	Contractor's profit	9.0%
Total ----------→>		51.7%
Rounded Total ----------→>		52.0%

The above percentage of indirect costs has been added to all direct costs analyzed excluding the supply of reinforcing steel, cement, bentonite and concrete admixtures because less indirect costs are born by contractors for these materials.

The percentage of 52% for indirect costs has been applied to the sum of the direct costs in local and foreign currency and then subdivided 10% in local currency and 90% in foreign currency.

2 PERMANENT EQUIPMENT

The evaluation of the existing Rogun HPP equipment cost started with the verification of the status of the supplied components existing at site, part of which have been already erected and even tested.

Basically all the components which are part of the power generating equipment are still stored at site or in other locations in Tajikistan, and have not been incorporated into the project yet.

As mentioned in the relevant section of the main report, they need some rehabilitation works, but there are also parts missing that shall be supplied.

The detailed inventory of the existing E&M component is shown in paragraph 3.5 of the main report.

While evaluating the cost of the existing Units, the particular aspects of their design have been taken into account.

The first two generating units will have different features while operating firstly under provisional conditions and successively under their final configuration.

Such units, in their provisional arrangement, were designed about 25 years, manufactured in 1988, supplied and stored at site about 20 years ago. In their original configuration the provisional units have a provisional runner and a rotational speed lower than the final one, then, with an higher head range, the runner is changed to the final one, and at the end, when the minimum normal head is reached, the unit is modified to its final configuration increasing the rotational speed.

One unit out of the two available in their provisional arrangement is almost complete, while the generator of the second unit is missing.

The existing parts of generator exciters and voltage regulators are of old design and shall be replaced with new ones, as well as all the control system of the existing turbine governor.

Besides, rotor and stator core of the existing generator are directly cooled with distillate water. For safety reasons the existing generator shall be modified at least implementing generator stator windings directly cooled with distillate water and providing also conventional air-water coolers.

The existing components and their utilization in view of their cost estimate are listed in the following table:

Main Items of the Generating Units	Available	
	Unit 1	Unit 2
Spiral case and stay ring (both available for three units plus some additional part of stay ring)	Yes	Yes
Draft tube cone (available for all the six units)	Yes	Yes
Draft tube elbow (not clear if available for three or six units)	Yes	Yes
Head cover	Yes	Yes
Bottom cover	Yes	Yes
Runner of preliminary arrangement	Yes	Yes
Runner of final arrangement	No	No
Guide vanes and servomotors	Yes	Yes
Ring gate and servomotors	Yes	Yes
Turbine Shaft	Yes	Yes

Turbine guide bearing	Yes	Yes
Turbine shaft seal	Yes	Yes
Cone supporting thrust bearing	Yes	Yes
Governor	Part	No
Stator	92-93%	No
Rotor	Part	No
Excitation system and voltage regulator (to be replaced with new ones)	Part	Part
Generator shaft	Yes	No
Generator guide bearing and upper bracket	Yes	No
Generator lower bracket	Yes	No
Generator thrust bearing (pads and other elements also for first unit are missing)	Yes	No
Main transformer	No	No
Cooling systems	Part	Part
Other minor auxiliaries	Part	Part

As far as the hydromechanical equipment is concerned, the available parts are those listed here below:

Description of the Equipment	Total amount	Portion installed	to be installed
	tons	tons	tons
Diversion tunnels repair gate chamber			
Sliding gates with embedded parts and drive	882	882	
Auxiliary items	830	830	
Cranes	413	413	
Diversion tunnels: emergency/ repair gate and main gate chamber			
Radial gates with embedded parts and drive	1,847	1,847	
Slide gates with embedded parts and drive	840	840	
Cranes	212	212	
Auxiliaries	104	104	
Lining in diversion tunnels			
Steel lining	5,460	5,460	
Power Outlet/draft tube			

Slide gate at power outlet with embedded parts	180	0	180
Sectional gate at draft tube with embedded parts	492	0	492
Cranes	118	0	118
Auxiliaries	45	0	45
Temporary Power Intake			
Trash racks and embedded parts	426	0	426
Gate Chamber of Temporary Waterways			
Slide gate with embedded parts	434	106	328
Slide gate with embedded parts	410	0	410
Cranes	85	35	50
Steel linings	570	570	
Auxiliaries	215	215	
Steel Lining			
Steel Lining	2,100	1,500	600
Salt Protection System			
Left Bank Lining	1,800	1,450	350
Right Bank Lining	1,800	0	18

As for the unit prices to be adopted for the basic components, they have been derived from the most recent supplies of units of the same type of Rogun HPP and comparable characteristics, for power plants constructed or under construction of the consultant data base.

Since there are components which were not erected yet, the prices have been split into supply/transport and erection, so to apply to any equipment the portions which correspond to the actual situation.

The cost of the E&M equipment is referred to the cost per kW evaluating separately turbine, generator and BOP costs and, as above said, evaluating separately transport and erection costs where appropriate. A calculation of costs based on cost per kW installed, is a procedure justified for E&M which are composed of three components having a cost of the same order of magnitude: turbines, generators and BOP.

The cost of hydro-mechanical equipment is based on the unit cost/kg depending on the typology of the equipment.

The simplified BoQ and relevant units prices are contained in Part VII.

3 COST SUMMARY

3.1 Civil works

The costs of the civil works are as follows:

N°	Work Section	Local Currency (US$ Equiv.)	Foreign Currency (US$)	Total Amount (US$ Equiv.)
1	General construction costs	37,038,693	220,835,507	257,874,201
2	Borrow areas and quarries for dam construction	16,859,240	171,839,934	188,699,174
3	Surface works of underground works	5,358,692	42,119,791	47,478,483
4	Transportation tunnels	9,045,693	62,383,433	71,429,125
5	Access adits	4,322,139	28,397,306	32,719,446
6	Diversion tunnels and related gate chambers	18,324,972	127,457,651	145,782,623
7	Stage 1 power tunnel and appurtenants	1,125,553	7,578,691	8,704,244
8	Powerhouse and appurtenants	6,074,998	37,007,825	43,082,823
9	Grouting galleries	6,967,293	47,659,375	54,626,668
10	Drainage galleries	2,365,903	14,162,304	16,528,207
11	Miscellaneous underground works	997,008	6,083,075	7,080,083
12	Remaining tunnels, adits and galleries	2,451,244	15,965,432	18,416,676
13	Maintenance of main transportation tunnels during the construction of the other underground works	1,792,500	11,705,300	13,497,800
14	Salt Wedge Top Protection	1,043,802	5,760,141	6,803,942
	GRAND TOTAL	**113,767,731**	**798,955,766**	**912,723,496**

3.2 Permanent Equipment

The costs of the permanent equipment existing at site are given in the following table:

ITEM	Description of Works	Total Amount (US$ Equiv.)
1	ELECTROMECHANICAL EQUIPMENT TOTAL COST	89,648,442
2	HYDROMECHANICAL EQUIPMENT TOTAL COST	90,748,450
	TOTAL AMOUNT OF EXISTING E&M AND HSS EQUIPMENT	180,396,892

3.3 Civil Works and Permanent Equipment

The total costs of civil works and permanent equipment are given in the following table:

ITEM	SUMMARY OF EXISTING ROGUN HPP WORKS COSTS	Total Amount (US$ Equiv.)
1	CIVIL WORKS TOTAL COST	912,723,496
2	PLANT EQUIPMENT TOTAL COST	180,396,892
	TOTAL AMOUNT OF PROJECT EXISTING WORKS	1,093,120,388

It is ought to underline that the above estimates represent the cost of the existing works as if they were constructed today, i.e. based on current prices level.

The estimate relevant to the costs for remedial works that would be required to bring the works to the safety and serviceability conditions required by the project according to the internationally recognized design criteria and standards is included in Phase II Cost Estimate Report.

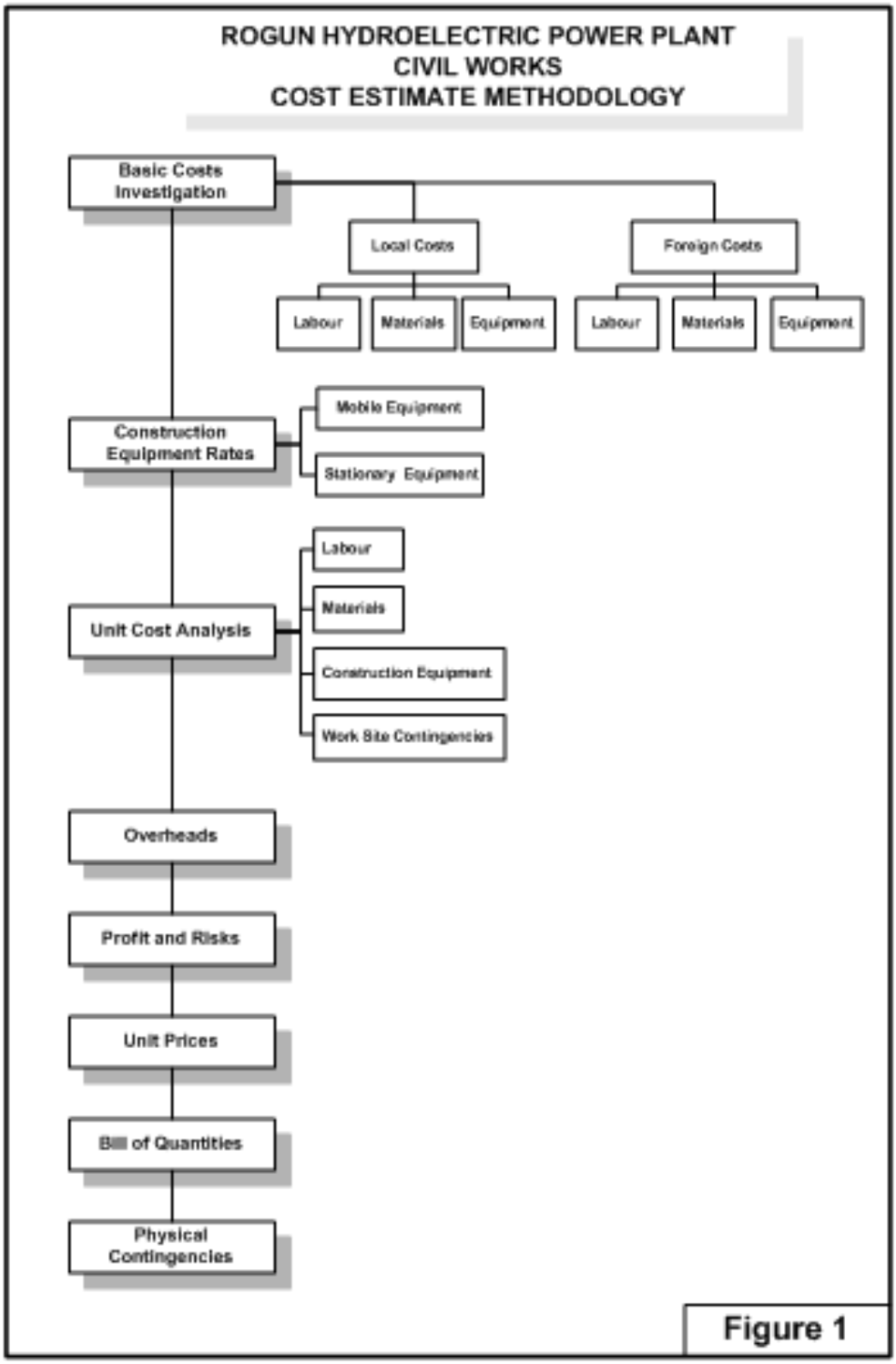
ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS
COST ESTIMATE METHODOLOGY
Basic Costs Investigation
Local Costs
Foreign Costs
Labour
Materials
Equipment
Labour
Materials
Equipment
Construction Equipment Rates
Mobile Equipment
Stationary Equipment
Unit Cost Analysis
Labour
Materials
Construction Equipment
Work Site Contingencies
Overheads
Profit and Risks
Unit Prices
Bill of Quantities
Physical Contingencies

Figure 1

PART – II

BASIC COSTS

LABOUR AND MATERIALS

1 BASIC COSTS

1.1 General

The Part II of this volume includes the labor wages for the surface and underground works and the costs of local and imported materials.

1.2 Labor Wages

The local labor wages are those investigated in Tajikistan during the month of June 2012 and are the average in force in the Country for the construction of civil works.

The expatriate labor wages are those that currently international contractors who work abroad for large civil works projects can assume for preparing a tender for Rogun power plant.

The wages include all the retributions according to the lows in force and the additional burdens such as overtime, night shift differential, site allowance, bonuses and extra compensations.

The cost estimate has been performed assuming that the labor necessary for the construction activities will be mainly local. However foreign personnel, such as general foremen and specialists, has been taken into account for the execution of the works.

The times considered for the workers in the analyses are in general a little more than that established for the construction equipment involved in each specific activity, in order to take into account the time losses that normally occur during the execution of the works.

1.3 Materials

The construction materials have been considered procured mainly from foreign countries, because not available at all or not available in sufficient quantity in the Country.

The main imported materials include: Portland cement, gasoline, diesel oil, lubricants, part of the explosives, woods, steel items including the steel bars for concrete reinforcement and welded wire fabric, rock bolts, tendons, drilling tools (shanks, rods, couplings, rock bits, integral drill steels, breaker tools and other similar consumable goods), panel type steel formworks, telescopic type formworks for tunnels, climbing type formworks, steel scaffoldings, water stops and concrete admixtures.

The local materials include only part of the explosives.

The prices of the imported materials have been obtained from the prevailing quotations in force at the time of the investigation in US$. The quotation in Euros have been converted to US$ with the prevailing rate of exchange at the time of the

investigation, i.e. 1 Euro = 1.30 US$. No custom duties and taxes have been added to the cost of imported materials.

The cost of loading, ocean freight, inland transportation to the Site, insurance premium and storage have been added to the ex-factory cost of each item in order to establish the on Site cost.

The burden for losses during transport and handling of some good has been considered in percentage of the supply plus transport cost and included in the material price list.

1.4 Tables of Labor and Materials

The labor wages for the surface and the underground works have been listed in Table BC 1 which follows.

The costs of materials have been listed in the Tables BC 2 and BC 3 which follow for local and imported materials respectively.

BASIC COSTS - LABOUR WAGES

Item	Description	Wage			Hourly Wage in US$ Equivalent
		Currency	Daily Wage	Hourly Wage	
1	**LOCAL LABOUR**				
1.1	**Surface Works**				
1.1.1	Foreman	Somoni	232.86	29.11	6.11
1.1.2	Heavy equipment operator	do	205.42	25.68	5.39
1.1.3	Specialist (welder, rigger, powder o. etc)	do	130.34	16.29	3.42
1.1.4	Skilled	do	105.57	13.20	2.77
1.1.5	Semiskilled	do	83.85	10.48	2.20
1.1.6	Unskilled	do	62.50	7.81	1.64
1.2	**Underground Works**				
1.2.1	Foreman	Somoni	251.54	31.44	6.60
1.2.2	Heavy equipment operator	do	221.81	27.73	5.82
1.2.3	Specialist (welder, rigger, powder o. etc)	do	140.63	17.58	3.69
1.2.4	Skilled	do	113.95	14.24	2.99
1.2.5	Semiskilled	do	90.71	11.34	2.38
1.2.6	Unskilled	do	67.46	8.43	1.77
2	**EXPATRIATE LABOUR**				
2.1	**Surface Works**				
2.1.1	Foreman	US$	350.00	43.75	----
2.1.2	Specialist	do	330.00	41.25	----
2.1.3	Skilled	do	290.00	36.25	----
2.2	**Underground Works**				
2.2.1	Foreman	US$	378.00	47.25	----
2.2.2	Specialist	do	363.00	45.38	----
2.2.3	Skilled	do	319.00	39.88	----

Item	Description	Unit	Source	(Somoni)				Cost in US$ Equivalent
				Basic Cost	Trans-port	T. & H. Losses	Total Cost	
	LOCAL MATERIALS							
1	**Explosives**							
1.01	Explosive, amonite type	kg	CIF Site	11.00	0.00	0.00	0.00	2.31
1.02	Explosive, gramonite type	kg	ditto	9.81	0.00	0.00	0.00	2.06
1.03	Explosive, ammonium nitrate	kg	ditto	3.53	0.00	0.00	0.00	0.74
	Steel items							
1.04	Steel tyloop for formworks	ea.	CIF Site	17.87	0.00	0.00	0.00	3.75

ROGUN HYDROELECTRIC POWER PLANT **TABLE BC 3**

CIVIL WORKS COST ESTIMATE - PHASE I - VOLUME 1

BASIC COSTS - IMPORTED MATERIALS

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS						
1	**Expansion anchor rock bolts 22.0 mm dia.**						
1.01	Rock bolt, 22 mm dia., length 3.0 m	ea	Europe	34.10	2.59	0.00	36.69
1.02	Rock bolt, 22 mm dia., length 3.5 m	ea	Ditto	36.58	3.02	0.00	39.60
1.03	Rock bolt, 22 mm dia., length 4.0 m	ea	Ditto	39.06	3.46	0.00	42.52
1.04	Rock bolt, 22 mm dia., length 4.5 m	ea	Ditto	41.54	3.89	0.00	45.43
1.05	Rock bolt, 22 mm dia., length 5.0 m	ea	Ditto	44.02	4.32	0.00	48.34
1.06	Rock bolt, 22 mm dia., length 5.5 m	ea	Ditto	46.50	4.75	0.00	51.25
1.07	Rock bolt, 22 mm dia., length 6.0 m	ea	Ditto	48.98	5.18	0.00	54.16
2	**Expansion anchor rock bolts 26.5 mm dia.**						
2.01	Rock bolt, 26.5 mm dia., length 3.0 m	ea	Europe	49.58	3.65	0.00	53.23
2.02	Rock bolt, 26.5 mm dia., length 3.5 m	ea	Ditto	53.28	4.27	0.00	57.55
2.03	Rock bolt, 26.5 mm dia., length 4.0 m	ea	Ditto	56.98	4.86	0.00	61.84
2.04	Rock bolt, 26.5 mm dia., length 4.5 m	ea	Ditto	60.68	5.48	0.00	66.16
2.05	Rock bolt, 26.5 mm dia., length 5.0 m	ea	Ditto	64.38	6.08	0.00	70.46
2.06	Rock bolt, 26.5 mm dia., length 5.5 m	ea	Ditto	68.08	6.70	0.00	74.78
2.07	Rock bolt, 26.5 mm dia., length 6.0 m	ea	Ditto	71.78	7.29	0.00	79.07
3	**Resin anchor rock bolts 32 mm dia.**						
3.01	Rock bolt, 32.0 mm dia., length 3.0 m	ea	Europe	68.84	5.35	0.00	74.19
3.02	Rock bolt, 32.0 mm dia., length 3.5 m	ea	Ditto	74.24	6.24	0.00	80.48
3.03	Rock bolt, 32.0 mm dia., length 4.0 m	ea	Ditto	79.64	7.13	0.00	86.77
3.04	Rock bolt, 32.0 mm dia., length 4.5 m	ea	Ditto	85.04	8.02	0.00	93.06
3.05	Rock bolt, 32.0 mm dia., length 5.0 m	ea	Ditto	90.44	8.91	0.00	99.35
3.06	Rock bolt, 32.0 mm dia., length 5.5 m	ea	Ditto	95.84	9.80	0.00	105.64
3.07	Rock bolt, 32.0 mm dia., length 6.0 m	ea	Ditto	101.24	10.69	0.00	111.93
3.08	Rock bolt, 32.0 mm dia., length 6.5 m	ea	Ditto	126.80	11.58	0.00	138.38
3.09	Rock bolt, 32.0 mm dia., length 7.0 m	ea	Ditto	132.20	12.47	0.00	144.67
	Note: "T&H" Losses = Transport & handling losses						

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.)						
3.10	Rock bolt, 32.0 mm dia., length 7.5 m	ea	Europe	137.60	13.37	0.00	150.97
3.11	Rock bolt, 32.0 mm dia., length 8.0 m	ea	Ditto	143.00	14.26	0.00	157.26
3.12	Rock bolt, 32.0 mm dia., length 8.5 m	ea	Ditto	148.40	15.15	0.00	163.55
3.13	Rock bolt, 32.0 mm dia., length 9.0 m	ea	Ditto	153.80	16.04	0.00	169.84
4	**Permanent tendons, 50 t capacity**						
4.01	Tendon, capacity 50 t, length 10 m	ea	Europe	257.90	12.15	0.00	270.05
4.02	Tendon, capacity 50 t, length 15 m	ea	Ditto	321.70	18.23	0.00	339.93
4.03	Tendon, capacity 50 t, length 20 m	ea	Ditto	385.60	24.30	0.00	409.90
4.04	Tendon, capacity 50 t, length 25 m	ea	Ditto	449.40	30.38	0.00	479.78
4.05	Tendon, capacity 50 t, length 30 m	ea	Ditto	513.20	36.45	0.00	549.65
5	**Permanent tendons, 70 t capacity**						
5.01	Tendon, capacity 70 t, length 10 m	ea	Europe	307.00	15.93	0.00	322.93
5.02	Tendon, capacity 70 t, length 15 m	ea	Ditto	383.00	23.90	0.00	406.90
5.03	Tendon, capacity 70 t, length 20 m	ea	Ditto	459.00	31.86	0.00	490.86
5.04	Tendon, capacity 70 t, length 25 m	ea	Ditto	535.00	39.83	0.00	574.83
5.05	Tendon, capacity 70 t, length 30 m	ea	Ditto	611.00	47.79	0.00	658.79
6	**Integral drill steels and breaker point**						
6.01	Integral drill steel, 22 mm size, length 800 mm	ea	Sweden	131.00	1.65	0.00	132.65
6.02	Integral drill steel, 22 mm size, length 1600 mm	ea	Ditto	151.00	2.97	0.00	153.97
6.03	Integral drill steel, 22 mm size, length 2400 mm	ea	Ditto	170.00	4.35	0.00	174.35
6.04	Integral drill steel, 22 mm size, length 3200 mm	ea	Ditto	197.00	5.78	0.00	202.78
6.05	Integral drill steel, 22 mm size, length 4000 mm	ea	Ditto	230.00	6.93	0.00	236.93
6.06	Integral drill steel, 22 mm size, length 4800 mm	ea	Ditto	278.00	8.31	0.00	286.31
6.07	Hand held breaker moil point, length 440 mm	ea	Ditto	30.50	1.87	0.00	32.37
7	**Truck drill steels**						
7.01	Track drill rod R32, length 3660 mm	ea	Sweden	471.80	11.44	0.00	483.24
7.02	Shank adaptor for ditto	ea	Ditto	275.40	1.71	0.00	277.11

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.)						
7.03	Coupling for ditto	ea	Sweden	53.60	0.55	0.00	54.15
7.04	Track drill rod T38, lenght 3660 mm	ea	Ditto	522.00	16.94	0.00	538.94
7.05	Shank adapter for ditto	ea	Ditto	282.30	2.37	0.00	284.67
7.06	Coupling for ditto	ea	Ditto	76.30	0.94	0.00	77.24
7.07	Track drill rod T45, lenght 3660 mm	ea	Ditto	701.65	22.77	0.00	724.42
7.08	Shank adapter for ditto	ea	Ditto	294.70	3.36	0.00	298.06
7.09	Coupling for ditto	ea	Ditto	114.80	1.76	0.00	116.56
8	**Tunnelling jumbo drill steels**						
8.01	Tunnel jumbo rod R 32, length 3090 mm	ea	Sweden	449.10	10.89	0.00	459.99
8.02	Tunnel jumbo rod R 32, length 4310 mm	ea	Ditto	623.70	15.13	0.00	638.83
8.03	Tunnel jumbo rod R 32, length 5530 mm	ea	Ditto	789.30	19.14	0.00	808.44
8.04	Shank adapter for ditto	ea	Ditto	300.50	1.87	0.00	302.37
8.05	Coupling for ditto	ea	Ditto	76.00	1.05	0.00	77.05
9	**Percussion drill bits**						
9.01	Button type rock bit, 35 mm dia.	ea	Sweden	79.30	0.28	0.00	79.58
9.02	Button type rock bit, 45 mm dia.	ea	Ditto	136.80	0.44	0.00	137.24
9.03	Button type rock bit, 48 mm dia.	ea	Ditto	150.00	0.50	0.00	150.50
9.04	Button type rock bit, 51 mm dia.	ea	Ditto	163.80	0.55	0.00	164.35
9.05	Button type rock bit, 64 mm dia.	ea	Ditto	291.10	0.88	0.00	291.98
9.06	Button type rock bit, 76 mm dia.	ea	Ditto	393.00	1.21	0.00	394.21
9.07	Button type rock bit, 89 mm dia.	ea	Ditto	466.30	1.76	0.00	468.06
9.08	Button type rock bit, 102 mm dia.	ea	Ditto	584.70	2.15	0.00	586.85
9.09	Reamer rock bit, 102 mm dia.	ea	Ditto	416.00	1.16	0.00	417.16
10	**Rods, barrels & bits for rotary drilling**						
10.01	Drill rod for rotary drilling, 42 x 1500 mm	ea	Sweden	90.00	3.96	0.00	93.96
10.02	Drill rod for rotary drilling, 50 x 1500 mm	ea	Ditto	124.00	6.35	0.00	130.35
10.03	Drill rod for rotary drilling, 60 x 1500 mm	ea	Ditto	167.00	9.68	0.00	176.68

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.D)						
	Rods, barrels & bits for rotary drilling (cont.)						
10.04	Drill rod for rotary drilling, 42 x 3000 mm	ea	Sweden	165.00	7.21	0.00	172.21
10.05	Drill rod for rotary drilling, 50 x 3000 mm	ea	Ditto	225.00	11.55	0.00	236.55
10.06	Drill rod for rotary drilling, 60 x 3000 mm	ea	Ditto	302.00	17.60	0.00	319.60
10.07	Simple core barrel, 56 mm dia., length 1500 mm	ea	Ditto	574.00	8.25	0.00	582.25
10.08	Simple core barrel, 56 mm dia., length 3000 mm	ea	Ditto	696.00	16.50	0.00	712.50
10.09	Doble core barrel, 56 mm dia., length 1500 mm	ea	Ditto	869.00	13.75	0.00	882.75
10.10	Double core barrel, 56 mm dia., length 3000 mm	ea	Ditto	1,054.00	28.05	0.00	1082.05
10.11	Diamond core bit, 76/56 mm diameter	ea	Ditto	766.00	0.83	0.00	766.83
10.12	Diamond impregnated type plug bit, 36 mm diameter	ea	Ditto	507.00	0.28	0.00	507.28
10.13	Diamond impregnated type plug bit, 46 mm diameter	ea	Ditto	610.00	0.72	0.00	610.72
10.14	Diamond impregnated type plug bit, 56 mm diameter	ea	Ditto	793.00	1.05	0.00	794.05
10.15	Diamond impregnated type plug bit, 66 mm diameter	ea	Ditto	1,071.00	1.38	0.00	1072.38
10.16	Diamond impregnated type plug bit, 76 mm diameter	ea	Ditto	1,390.00	1.65	0.00	1391.65
11	**Pakers**						
11.01	Top type mecanically expanded packer, Ø 43.5 mm	ea	Sweden	514.00	2.75	0.00	516.75
11.02	Single type inflatable paker, 30-55 mm dia., L 500	ea	Ditto	956.00	2.20	0.00	958.20
11.03	Single type inflatable paker, 42-98 mm dia., L 500	ea	Ditto	1,019.00	3.30	0.00	1022.30
11.04	Double type inflatable paker, 42-98 mm dia., L 500x2	ea	Ditto	1,332.00	5.50	0.00	1337.50
12	**Waterstops**						
12.01	PVC waterstop, width 220 mm	m	Europe	6.50	0.56	0.00	7.06
12.02	PVC waterstop, width 2500 mm	m	Ditto	7.20	0.66	0.00	7.86
12.03	PVC waterstop, width 320 mm	m	Ditto	7.82	0.86	0.00	8.68
13	**Cement and bentonite**						
13.01	Portland cement ASTM type I or II, bulk	t	CIF Site	0.00	0.00	0.00	206.20
13.02	Portland cement ASTM type I or II, bagged	t	Ditto	0.00	0.00	0.00	216.10
13.03	Portland cement ASTM type V (sulfate resistant), bulk	t	Ditto	0.00	0.00	0.00	242.20

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.D)						
	Cement and bentonite (cont.)						
13.04	Silica fume	t	CIF Site	0.00	0.00	0.00	468.00
13.05	Bentonite	t	Ditto	0.00	0.00	0.00	357.00
14	**Concrete admixtures & form break bond**						
14.01	Water-reducing admixture	kg	Turkey	1.16	0.26	0.02	1.44
14.02	Superplasticizer admixture	kg	Ditto	1.68	0.26	0.03	1.97
14.03	Air entraining	kg	Ditto	1.59	0.26	0.03	1.88
14.04	Shotcrete quick set admixture	kg	Ditto	0.52	0.26	0.01	0.79
14.05	Formworks break-bond emulsion	kg	Ditto	2.91	0.26	0.06	3.23
15	**Wooden items**						
15.01	Lumber for formworks, planks sawn	m^3	CIF Site	0.00	0.00	0.00	350.00
15.02	Lumber for formworks, planks planed	m^3	Ditto	0.00	0.00	0.00	420.00
15.03	Lumber for formworks, square sawn	m^3	Ditto	0.00	0.00	0.00	310.00
15.04	Plywood for formworks, 12 mm thick	m^2	Ditto	0.00	0.00	0.00	11.45
15.05	Plywood for formworks, 25 mm thick	m^2	Ditto	0.00	0.00	0.00	20.27
16	**Fuels and lubricants**						
16.01	Diesel oil	Lit	Russia	0.60	0.37	0.02	0.99
16.02	Gasoline (petrol)	Lit	Ditto	0.65	0.37	0.02	1.04
16.03	Lubricant for diesel engine	kg	Ditto	4.20	0.40	0.00	4.60
16.04	Lubricant for gasoline engine	kg	Ditto	4.60	0.40	0.00	5.00
16.05	Lubricant for transmissions and gears	kg	Ditto	3.70	0.40	0.00	4.10
16.06	Hydraulic oil	kg	Ditto	3.60	0.40	0.00	4.00
16.07	Grease, litium type	kg	Ditto	4.40	0.40	0.00	4.80
17	**Explosives and related materials**						
17.01	Explosive, emulsion type	kg	CIF Site	2.28	0.00	0.00	2.28
17.02	Electric detonators, 3.0 m leading wires	ea	Ditto	1.98	0.00	0.00	1.98
17.03	Plain detonator	m	Ditto	0.78	0.00	0.00	0.78

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.D)						
	Explosives and related materials (cont.)						
17.04	Detonating fuse (cord)	m	CIF Site	0.82	0.00	0.00	0.82
17.05	Slow burning fuse	m	Ditto	0.51	0.00	0.00	0.51
17.06	Copper type firing cable	m	Ditto	0.56	0.00	0.00	0.56
17.07	Copper type shotfiring wire	m	Ditto	0.13	0.00	0.00	0.13
18	**Steel items**						
18.01	Reinforcing steel Ø 10-20 mm, plain	kg	Russia	0.42	0.41	0.00	0.83
18.02	Reinforcing steel Ø 16-32 mm, deformed	kg	Ditto	0.43	0.41	0.00	0.84
18.03	Welded wire fabric	kg	Ditto	0.46	0.41	0.00	0.87
18.04	Reinforcing steel, prestress type	kg	Ditto	1.19	0.41	0.00	1.60
18.05	Steel plates, from 10 to 25 mm thickness	kg	Ditto	0.43	0.41	0.00	0.84
18.06	Steel beams, H shape 150 to 300 mm	kg	Ditto	0.60	0.41	0.00	1.01
18.07	Steel conventional shapes (L, T, Z, Π and similar)	kg	Ditto	0.65	0.41	0.00	1.06
18.08	Black steel pipes, from 25 mm to 76 mm dia.	kg	Ditto	1.20	0.41	0.00	1.61
18.09	Black steel pipes, from 76 mm to 200 mm dia.	kg	Ditto	1.00	0.41	0.00	1.41
18.10	Galvanized steel pipes, from 25 mm to 50 mm dia.	kg	Ditto	1.56	0.41	0.00	1.97
18.11	Galvanized steel pipes, from 50 mm to 100 mm dia.	kg	Ditto	1.50	0.41	0.00	1.91
18.12	Black wire (0.8-1.5 mm dia)	kg	Ditto	0.75	0.41	0.00	1.16
18.13	Nails for wooden forworks	kg	Ditto	0.70	0.41	0.00	1.11
19	**Galvanized steel scaffoldings**						
19.01	Steel scaffolding, pipe	m	Europe	8.91	1.34	0.00	10.25
19.02	Steel scaffolding, joint (average of 3 types)	ea	Ditto	10.08	0.50	0.00	10.58
19.03	Steel scaffolding, connection	ea	Ditto	4.19	0.23	0.00	4.42
19.04	Steel scaffolding, base	ea	Ditto	4.59	0.36	0.00	4.95
19.05	Fast assembly wall type scaffolding	m2	Ditto	47.50	2.88	0.00	50.38
	(steel component only)						

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.D)						
20	**Wall type steel formworks**						
20.01	Single panel type steel formwork with anchoring truss	m^2	Europe	754.40	66.24	0.00	820.64
20.02	Anchor bolt for ditto	ea.	Ditto	53.25	5.40	0.00	58.65
20.03	Multipanels type steel formworks with clamps	m^2	Ditto	222.75	16.20	0.00	238.95
21	**Steel formworks for underground concrete**						
21.01	Full round formwork, 3.75 m diameter	m^2	Europe	589.00	55.80	0.00	644.80
21.02	Traveller on rail for Ø 3.75 m form shifting	unit	Ditto	40,000.00	3,600.00	0.00	43,600.00
21.03	Full round formwork, 8.00 m diameter	m^2	Ditto	665.00	64.80	0.00	729.80
21.04	Traveller on rail for Ø 8.00 m form shifting	unit	Ditto	54,960.00	5,040.00	0.00	60,000.00
21.05	Arch and sidewalls formwork, 3-4 m span	m^2	Ditto	418.00	39.60	0.00	457.60
21.06	Arch and sidewalls formwork, 4-6 m span	m^2	Ditto	456.00	43.20	0.00	499.20
21.07	Arch and sidewalls formwork, 6-8 m span	m^2	Ditto	532.00	50.40	0.00	582.40
21.08	Arch and sidewalls formwork, 8-10 m span	m^2	Ditto	627.00	59.40	0.00	686.40
21.09	Arch and sidewalls formwork, 10-12 m span	m^2	Ditto	722.00	68.40	0.00	790.40
21.10	Arch formwork, 11-13 m span	m^2	Ditto	738.00	64.80	0.00	802.80
21.11	Arch formwork, 13.14 m span	m^2	Ditto	861.00	75.60	0.00	936.60
21.12	Arch formwork, 19.00 m span with shifting trolley	m^2	Ditto	1,081.00	82.80	0.00	1,163.80
21.13	Arch formwork, 20.50 m span with shifting trolley	m^2	Ditto	1,222.00	93.60	0.00	1,315.60
21.14	Arch formwork, 24.00 m span with shifting trolley	m^2	Ditto	1,410.00	108.00	0.00	1,518.00
21.15	Side closure of tunnel formworks	m^2	Ditto	380.00	36.00	0.00	416.00
21.16	Formwork for tunnel side curbs, type 1	m^2	Ditto	410.00	36.00	0.00	446.00
21.17	Formwork for tunnel side curbs, type 2	m^2		492.00	43.20	0.00	535.20
22	**Rubber hoses, 12 bar pressure**						
22.01	Rubber hoses 19 mm (3/4") diameter with fittings	m	Europe	10.64	0.59	0.00	11.23
22.02	Rubber hoses 25 mm (1") diameter with fittings	m	Ditto	14.30	0.86	0.00	15.16
22.03	Rubber hoses 37 mm (1-1/2") diameter with fittings	m	Ditto	19.40	1.27	0.00	20.67
22.04	Rubber hoses 50 mm (2") diameter with fittings	m	Ditto	24.70	1.98	0.00	26.68

Item	Description	Unit	Source	Cost (US$)			
				Basic Cost	Transport Cost	T&H Losses	Total Cost
	IMPORTED MATERIALS (CONT.D)						
23	**Miscellaneous**						
23.01	Steel rib supports	kg	Europe	1.60	0.55	0.00	2.15
23.02	Ribbed galvanized steel sheet, 3/10 mm thickness	m2	Ditto	3.25	0.33	0.00	3.58
23.03	Ribbed galvanized steel sheet, 5/10 mm thickness	m2	Europe	4.29	1.38	0.00	5.67
23.04	Galvanized gabions, 8x10 cm mesh, Ø 2.7 mm wire	kg	Ditto	4.19	0.77	0.00	4.96

PART – III

CONSTRUCTION EQUIPMENT

RATES

1 CONSTRUCTION EQUIPMENT RATES

1.1 Estimate of the Rates

The rates of the main construction equipment have been established by means of a computerized analysis.

The program takes several basic data of each unit into account such as: delivered price to the customer including attachments, residual value at replacement, net value to be recovered through work, estimated ownership period, estimated usage time, repairs carried out at the Site workshop, mechanical availability, condition of roads, abrasion degree of the soil and other specific data which can affect the cost of each equipment.

The rates include the owning and the operating costs.
The owning costs include: depreciation, interest cost, insurance, installation and dismantling.
The operating costs include: repairs, fuel, lubricants, electric power, specific wear items and other minor items such as filters, batteries, grease, tires and other minor costs.

The depreciation has been calculated according to the straight - line method for the economic life of the different machines, leaving a residual amount (i.e. resale salvage value) for some units according to the total life established for the depreciation.

Interest and insurance, applied against owner's average capital cost, have been calculated with an annual rate equal to 6.5% and 1.5% respectively.

The rates of equipment have been divided into two groups, i.e. rates for mobile units and rates for stationary/dedicated units. The first group includes the units that in general can be used in several sections of works; the second group includes the units that in general are dedicated to specific works for several months.

The owning cost of the mobile units has been tabulated separately and utilized in the price analyses for taking the cost of the reserve units that the contractor has to keep at the Site in order to perform the construction activities according to the time schedule in force.

The rates of stationary/dedicated units have been separated into owning costs (per month) and operating costs (per hour). In the owning rates have been also included the cost for the basic spare parts that the contractor have to keep on Site in order to assure an uninterrupted service of the units.

The rate of some units has been calculated both for average working conditions and severe working conditions.

1.2 Table of Rates

The construction equipment rates are listed in Table CE 1 which follows.

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
		(1)	(2)			
A	**MOBILE EQUIPMENT**					
1	**Bulldozers**					
1.01	Bulldozer with universal type blade, 72 kW	Op.	A	0.63	48.81	49.44
		s.b.	----	0.00	20.84	20.84
1.02	Bulldozer with universal type blade, 153 kW	Op.	A	0.96	79.55	80.51
		s.b.	----	0.00	30.76	30.76
1.03	Bulldozer with universal type blade, 179 kW	Op.	A	1.29	97.19	98.48
		s.b.	----	0.00	36.66	36.66
1.04	Bulldozer with universal type blade, 231 kW	Op.	A	1.64	121.99	123.63
		s.b.	----	0.00	45.46	45.46
1.05	Bulldozer with universal type blade, 306 kW	Op.	A	2.29	161.65	163.94
		s.b.	----	0.00	58.03	58.03
1.06	Bulldozer with universal b. & parall. type ripper, 179 kW	Op.	S	1.98	131.75	133.73
		s.b.	----	0.00	47.53	47.53
1.07	Bulldozer with universal b. & single-shank ripper, 231 kW	Op.	S	3.19	171.52	174.71
		s.b.	----	0.00	59.83	59.83
1.08	Bulldozer with universal b. & single-shank ripper, 306 kW	Op.	S	2.90	303.48	306.38
		s.b.	----	0.00	69.83	69.83
2	**Wheel loaders**					
2.01	Wheel loader, 72 kW, 1.30 m3 heaped bucket	Op.	A	0.35	31.09	31.44
		s.b.	----	0.00	13.33	13.33
2.02	Wheel loader, 115 kW, 2.10 - 2.40 m3 heaped bucket	Op.	A	0.49	44.61	45.10
		s.b.	----	0.00	18.74	18.74
2.03	Wheel loader, 157 kW, 2.95-3.30 m3 heaped bucket	Op.	A	0.60	54.76	55.36
		s.b.	----	0.00	21.07	21.07
2.04	Wheel loader, 157 kW, 3.10 m3 heaped rock bucket	Op.	S	0.75	70.52	71.27
		s.b.	----	0.00	26.87	26.87
2.05	Wheel loader, 199 kW, 3.70 - 4.30 m3 heaped bucket	Op.	A	0.83	73.62	74.45
		s.b.	----	0.00	28.96	28.96
2.06	Wheel loader, 199 kW, 4.0 m3 heaped rock bucket	Op.	S	0.83	73.62	74.45
		s.b.	----	0.00	28.96	28.96
2.07	Wheel loader, 275 kW, 5.20 - 5.80 m3 heaped bucket	Op.	A	1.03	97.91	98.94
		s.b.	----	0.00	35.81	35.81
2.08	Wheel loader, 275 kW, 5.50 m3 heaped rock bucket	Op.	S	1.35	135.08	136.43
		s.b.	----	0.00	44.63	44.63
2.09	Wheel loader, 373 kW, 6.40 - 7.30 m3 heaped bucket	Op.	A	1.56	142.03	143.59
		s.b.	----	0.00	53.94	53.94
3	**Track type hydraulic excavators (backhoes)**					
3.01	Hydraulic backhoe, 41 kW, 0.37 m3 g. p. heaped bucket	Op.	A	0.27	23.93	24.20
		s.b.	----	0.00	12.03	12.03
3.02	Hydraulic backhoe, 130 kW, 1.80 m3 g. p.heaped bucket	Op.	A	0.58	56.52	57.10
		s.b.	----	0.00	23.56	23.56
3.03	Hydraulic backhoe, 161 kW, 2.35 m3 g. p.heaped bucketd	Op.	A	0.63	66.88	67.51
		s.b.	----	0.00	25.76	25.76
3.04	Hydraulic backhoe, 200 kW, 2.60 m3 g. p. heaped bucketd	Op.	A	0.67	81.94	82.61
		s.b.	----	0.00	27.32	27.32
3.05	Hydraulic backhoe, 239 kW, 3.50 m3 g. p. heaped bucket	Op.	A	0.95	99.42	100.37
		s.b.	----	0.00	38.33	38.33
3.06	Hydraulic backhoe, 354 kW, 5.10 m3 g. p. heaped bucket	Op.	A	1.44	149.70	151.14
		s.b.	----	0.00	58.35	58.35
3.07	Hydraulic backhoe used for y.vibrators, 41 kW, 8.5 t oper. weigtl	Op.	A	0.23	15.23	15.46
		s.b.	----		10.36	10.36
(1)	*Op.=operating unit, s.b=stand-by unit, s.p.=spare parts available at Site store*	*(2)*	*Operating condition: A= Average, S= Severe*			

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
	MOBILE EQUIPMENT (CONT.)					
	Track type hydraulic excavators (front shovels)					
3.08	Hydraulic front shovel, 301 kW, 4.10 m3 heaped bucket	Op.	A	1.37	123.22	124.59
		s.b.	----	0.00	53.08	53.08
3.09	Hydraulic front shovel, 390 kW, 5.70 m3 heaped bucket	Op.	A	1.80	163.89	165.69
		s.b.	----	0.00	72.58	72.58
4	**Trucks, tippers and water tanks**					
4.01	Flat bed truck, 10 t pay load with 7.0 t/m capacity crane	Op.	A	0.32	29.23	29.55
		s.b.	----	0.00	12.36	12.36
4.02	Flat bed truck, 15 t pay load	Op.	A	0.35	43.67	44.02
		s.b.	----	0.00	13.61	13.61
4.03	Tractor and semi-trailer, 25 t pay load	Op.	A	0.50	57.86	58.36
		s.b.	----	0.00	19.01	19.01
4.04	Rear tipper with semi-rock type body, 24.0 t pay load	Op.	A	0.44	55.14	55.58
		s.b.	----	0.00	16.94	16.94
4.05	Truck mounted water tank, 24 000 liters capacity	Op.	A	0.42	47.56	47.98
		s.b.	----	0.00	16.67	16.67
4.06	Heavy duty trailer water tank, 38000 liters capacity	Op.	A	1.79	75.58	77.37
		s.b.	----	0.00	19.36	19.36
5	**Off-highway dumpers**					
5.01	Rear dump truck, 36.60 ton pay load., 25.10 m3 heaped	Op.	A	1.32	98.59	99.91
		s.b.	----	0.00	33.74	33.74
5.02	Rear dump truck, 46.20 ton pay load., 31.30 m3 heaped	Op.	A	1.61	116.24	117.85
		s.b.	----	0.00	39.01	39.01
5.03	Rear dump truck, 55.60 ton pay load., 35.60 m3 heaped	Op.	A	1.86	133.53	135.39
		s.b.	----	0.00	41.34	41.34
5.04	4WD reversible steering dumper, 10 t pay load	Op.	A	0.20	21.98	22.18
		s.b.	----	0.00	9.08	9.08
5.05	Self loading 4WD reversible steering mini-dumper, 2.5 t pay loac	Op.	A	0.06	7.75	7.81
		s.b.	----	0.00	5.08	5.08
6	**Motorgraders**					
6.01	Motorgrader with ripper, 103 kW, 3.66 m blade width	Op.	A	0.79	66.33	67.12
		s.b.	----	0.00	32.25	32.25
6.02	Motorgrader with ripper, 136 kW, 3.66 m blade width	Op.	A	0.90	78.21	79.11
		s.b.	----	0.00	36.56	36.56
6.03	Motorgrader with ripper, 193 kW, 4.29 m blade width	Op.	A	0.94	89.25	90.19
		s.b.	----	0.00	37.24	37.24
7	**Rollers and compactors**					
7.01	Smooth single drum vibrating roller, 22.1 kg/cm s. linear load	Op.	A	0.19	25.10	25.29
		s.b.	----	0.00	7.29	7.29
7.02	Smooth single drum vibrating roller, 38.0 kg/cm s. linear load	Op.	A	0.23	31.18	31.41
		s.b.	----	0.00	8.92	8.92
7.03	Smooth single drum vibrating roller, 50.0 kg/cm s. linear load	Op.	A	0.27	43.87	44.14
		s.b.	----	0.00	9.89	9.89
7.04	Pad-foot single drum vibrating roller, 38 kg/cm s. linear load	Op.	A	0.23	31.08	31.31
		s.b.	----	0.00	8.85	8.85
7.05	Pad-foot single drum vibrating roller, 44.0 kg/cm s. linear load	Op.	A	0.28	43.95	44.23
		s.b.	----	0.00	10.46	10.46
7.06	Tyred roller, 27 t operating weight with ballast, width 2.30 m	Op.	A	0.50	48.14	48.64
		s.b.	----	0.00	17.49	17.49
7.07	Vibrating plate compactor, 7.5 kW, 490 kg operating weigth	Op.	A	0.07	5.39	5.46
		s.b.	----	0.00	2.85	2.85

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
	MOBILE EQUIPMENT (CONT.)					
	Rollers and compactors (cont.d)					
7.08	Vibrating rammer (tamper), 70 kg operating weight	Op.	A	0.03	2.61	2.64
		s.b.	----	0.00	1.13	1.13
8	**Rock drill rigs and breakers**					
8.01	Diesel powered tyred rock drill, 61 kW, holes 38-64 mm dia.	Op.	A	0.54	46.87	47.41
		s.b.	----	0.00	26.85	26.85
8.02	Diesel powered crawler rock drill, 116 kW, holes 64-89 mm dia.	Op.	A	0.68	66.30	66.98
		s.b.	----	0.00	34.44	34.44
8.03	Diesel powered crawler rock drill, 149 kW, holes 76-102 mm dia	Op.	A	0.73	77.76	78.49
		s.b.	----	0.00	38.96	38.96
8.04	Diesel powered crawler rock drill, 194 kW, holes 89-115. mm di	Op.	A	0.77	84.86	85.63
		s.b.	----	0.00	38.83	38.83
8.05	Air powered crawler rock drill, holes 51-76 mm diameter	Op.	A	0.39	24.56	24.95
		s.b.	----	0.00	16.40	16.40
8.06	Electro-hydraulic rock drill, 52 kW, holes 38-64 mm dia.	Op.	A	0.49	36.48	36.97
		s.b.	----	0.00	18.26	18.26
8.07	Air powered wagon-drill with 3029 mm feed, hole dia. 38/64 mm	Op.	A	0.22	15.05	15.27
		s.b.	----	0.00	10.05	10.05
8.08	Hand-held rock drill, medium weight type	Op.	A	0.04	2.03	2.07
		s.b.	----	0.00	1.21	1.21
8.09	Hand-held rock drill, heavy weight type	Op.	A	0.05	2.71	2.76
		s.b.	----	0.00	1.60	1.60
8.10	Hand-held paving breaker, medium weigth type	Op.	A	0.03	1.98	2.01
		s.b.	----	0.00	1.07	1.07
8.11	Hand-held paving breaker, heavy weigth type	Op.	A	0.04	2.61	2.65
		s.b.	----	0.00	1.41	1.41
9	**Diesel powered air compressors**					
9.01	Motorcompressor, 5.0 m3/min capacity, 7.5 bar pressure	Op.	A	0.08	11.32	11.40
		s.b.	----	0.00	2.99	2.99
9.02	Motorcompressor, 10.0 m3/min capacity, 7.5 bar pressure	Op.	A	0.15	24.64	24.79
		s.b.	----	0.00	5.46	5.46
9.03	Motorcompressor, 15.0 m3/min capacity, 7.5 bar pressure	Op.	A	0.20	40.08	40.28
		s.b.	----	0.00	7.50	7.50
9.04	Motorcompressor, 20.0 m3/min capacity, 7.5 bar pressure	Op.	A	0.25	57.86	58.11
		s.b.	----	0.00	9.26	9.26
9.05	Motorcompressor, 25.0 m3/min capacity, 7.5 bar pressure	Op.	A	0.29	77.99	78.28
		s.b.	----	0.00	10.73	10.73
9.06	Motorcompressor, 30.0 m3/min capacity, 7.5 bar pressure	Op.	A	0.33	99.41	99.74
		s.b.	----	0.00	11.98	11.98
10	**Truck mixers and concrete tippers**					
10.01	Truckmixer (4WD-reversible steering), 5.0 m3 nominal capacity	Op.	A	0.28	25.38	25.66
		s.b.	----		10.68	10.68
10.02	Truckmixer, 6.0 m^3 nominal capacity	Op.	A	0.27	32.54	32.81
		s.b.	----		11.20	11.20
10.03	Truckmixer, 8.0 m^3 nominal capacity	Op.	A	0.33	41.72	42.05
		s.b.	----		13.62	13.62
10.04	Truckmixer, 10.0 m^3 nominal capacity	Op.	A	0.40	47.95	48.35
		s.b.	----		14.53	14.53
10.05	Truckmixer, 12.0 m^3 nominal capacity	Op.	A	0.46	52.69	53.15
		s.b.	----		16.74	16.74

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
	MOBILE EQUIPMENT (CONT.D)					
	Concrete tippers (cont.d)					
10.06	Truck with concrete body, 10.5 m^3 struck (8.70 m3 actual)	Op.	A	0.38	39.07	39.45
		s.b.	----	0.00	14.45	14.45
10.07	Truck with c. body & agitator, 12 m^3 struck (9.00 m3 actual)	Op.	A	0.45	52.53	52.98
		s.b.	----	0.00	14.67	14.67
11	**Towed concrete pumps**					
11.01	Diesel powered concrete pump w. pipes, 28 m3/h max cap.	Op.	A	0.28	21.17	21.45
		s.b.	----	0.00	11.10	11.10
11.02	Diesel powered concrete pump w. pipes, 54 m3/h max cap.	Op.	A	0.35	29.66	30.01
		s.b.	----	0.00	13.76	13.76
11.03	Diesel powered concrete pump w. pipes, 71 m3/h max cap.	Op.	A	0.35	37.44	37.79
		s.b.	----	0.00	14.10	14.10
11.04	Electric powered concrete pump w. pipes, 47 m3/h max cap.	Op.	A	0.45	30.85	31.30
		s.b.	----	0.00	13.69	13.69
11.05	Electric powered concrete pump w. pipes, 79 m3/h max cap.	Op.	A	0.61	44.83	45.44
		s.b.	----	0.00	13.85	13.85
11.06	Truck mounted concrete pump, 21 m boom, 110 m3/h max c.	Op.	A	0.82	53.49	54.31
		s.b.	----	0.00	36.46	36.46
11.07	Truck mounted concrete pump, 36 m boom, 140 m3/h max c.	Op.	A	1.11	71.37	72.48
		s.b.	----	0.00	49.06	49.06
11.08	Folding pipe system for concrete pumps operating in tunnel	Op.	A	0.06	3.54	3.60
		s.b.	----	0.00	2.42	2.42
12	**Shotcrete equipment**					
12.01	Truck mounted electric powered shotcrete robot with boom	Op.	A	0.98	66.67	67.65
		s.b.	----	0.00	30.85	30.85
12.02	Diesel p. towed shotcrete pump, 25 m3/h m.c., hand h. nozzle	Op.	A	0.34	26.09	26.43
		s.b.	----	0.00	14.77	14.77
12.03	Electric p. towed shotcrete pump, 22 m3/h m.c., hand nozzle	Op.	A	0.33	26.52	26.85
		s.b.	----	0.00	15.54	15.54
13	**Concrete placer (Rotec System):**					
13.01	Concrete belt conveyor mounted on rought terrain crane	Op.	A	2.48	224.77	227.25
		s.b.	----	0.00	151.76	151.76
13.02	Concrete "Auger Max" including feeding belt conveyor	Op.	A	0.38	35.28	35.66
		s.b.	----	0.00	27.28	27.28
14	**Immersion type concrete vibrators**					
14.01	Air powered hand-held concrete vibrator 77 mm diameter	Op.	A	0.01	1.46	1.47
		s.b.	----	0.00	0.42	0.42
14.02	Air powered hand-held concrete vibrator 87 mm diameter	Op.	A	0.02	1.63	1.65
		s.b.	----	0.00	0.53	0.53
14.03	Air powered hand-held concrete vibrator 157 mm diameter	Op.	A	0.03	2.78	2.81
		s.b.	----	0.00	0.16	0.16
14.04	Electric powered concrete vibrator, 65 mm dia.	Op.	A	0.01	1.69	1.70
		s.b.	----	0.00	0.31	0.31
14.05	Hydraulic powered concrete vibrators, n. 4x150 mm dia.	Op.	A	0.45	36.19	36.64
	including hydraulic equipment	s.b.	----	0.00	20.39	20.39
15	**Pneumatic external vibrators**					
15.01	Vibrator with mounting device and air distribution system,	Op.	A	0.00	0.24	0.24
	11000 N centrifugal force	s.b.	----	0.00	0.17	0.17
15.02	Vibrator with mounting device and air distribution system,	Op.	A	0.01	0.31	0.32
	14000 N centrifugal force	s.b.	----	0.00	0.21	0.21

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
	MOBILE EQUIPMENT (CONT.D)					
16	**Mobile cranes**					
16.01	Rought terrain crane, 10 t nominal capacity	Op.	A	0.57	48.79	49.36
		s.b.	----	0.00	33.42	33.42
16.02	Rought terrain crane, 20 t nominal capacity	Op.	A	0.62	53.36	53.98
		s.b.	----	0.00	36.36	36.36
16.03	Rought terrain crane, 35 t nominal capacity	Op.	A	0.69	59.25	59.94
		s.b.	----	0.00	40.11	40.11
16.04	Rought terrain crane, 55 t nominal capacity	Op.	A	0.89	76.62	77.51
		s.b.	----	0.00	51.36	51.36
16.05	Rought terrain crane, 80 t nominal capacity	Op.	A	1.43	123.58	125.01
		s.b.	----	0.00	84.20	84.20
16.06	Track mounted crane, 100 t nominal capacity	Op.	A	----	----	----
		s.b.	----	----	----	----
17	**Extendable lifters**					
17.01	Extendable lifter with 1,000 kg capacity platform, 12 m reach	Op.	A	0.26	24.87	25.13
		s.b.	----	0.00	15.28	15.28
17.02	Extendable lifter with 1,000 kg capacity platform, 18 m reach	Op.	A	0.33	30.84	31.17
		s.b.	----	0.00	19.27	19.27
17.03	Extendable lifter with 10,000 kg capacity platform	Op.	A	0.64	65.27	65.91
		s.b.	----	0.00	47.51	47.51
17.04	Extendable lifter equipped with steel rib erector, 12 m reach	Op.	A	0.32	37.39	37.71
		s.b.	----	0.00	24.82	24.82
18	**Electrical powered submersible water pumps**					
18.01	Submesible water pump, 10 kW	Op.	A	0.05	4.17	4.22
		s.b.	----	0.00	0.60	0.60
18.02	Submesible water pump, 20 kW	Op.	A	0.08	7.57	7.65
		s.b.	----	0.00	0.69	0.69
18.03	Submesible water pump, 37 kW	Op.	A	0.15	13.26	13.41
		s.b.	----	0.00	1.41	1.41
18.04	Submesible water pump, 54 kW	Op.	A	0.23	18.99	19.22
		s.b.	----	0.00	2.09	2.09
18.05	Submesible water pump, 90 kW	Op.	A	0.39	31.87	32.26
		s.b.	----	0.00	2.85	2.85
19	**Electric powered centrifugal water pumps**					
19.01	Centrifugal multistage pump, 18.5 kW, 180 m max. head	Op.	A	0.07	5.82	5.89
		s.b.	----	0.00	0.31	0.31
19.02	Centrifugal multistage pump, 30.0 kW, 175 m max. head	Op.	A	0.11	9.23	9.34
		s.b.	----	0.00	0.36	0.36
19.03	Centrifugal multistage pump, 45.0 kW, 170 m max. head	Op.	A	0.16	13.74	13.90
		s.b.	----	0.00	0.47	0.47
20	**Used trucks for tunnel formworks shifting**					
20.01	Truck with turret and hydraulic jaks, 10 t pay load	Op.	A	0.09	7.91	8.00
		s.b.	----	0.00	5.13	5.13
20.02	Truck with turret and hydraulic jaks, 15 t pay load	Op.	A	0.13	11.37	11.50
		s.b.	----	0.00	7.32	7.32
20.03	Truck with turret and hydraulic jaks, 20 t pay load	Op.	A	0.15	13.48	13.63
		s.b.	----	0.00	8.88	8.88
20.04	Truck with turret and hydraulic jaks, 25 t pay load	Op.	A	0.17	15.78	15.95
		s.b.	----	0.00	10.59	10.59
20.05	Truck with turret and hydraulic jaks, 30 t pay load	Op.	A	0.20	18.17	18.37
		s.b.	----	0.00	12.41	12.41

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
	MOBILE EQUIPMENT (CONT.D)					
21	**Mining trucks**					
21.01	Articulated tunnel (mine) dump truck, 20 t pay load	Op.	h	0.63	62.22	62.85
		s.b.	h	0.00	28.86	28.86
21.02	Articulated tunnel (mine) dump truck, 25 t pay load	Op.	h	0.73	75.31	76.04
		s.b.	h	0.00	33.01	33.01
21.03	Articulated tunnel (mine) dump truck, 30 t pay load	Op.	h	0.83	86.77	87.60
		s.b.	h	0.00	37.32	37.32
21.04	Articulated tunnel(mine) dump truck, 42 t pay load	Op.	h	1.12	114.78	115.90
		s.b.	h	0.00	50.07	50.07
22	**Drilling and grouting machines**					
22.01	Electro-hydraulic rotary drill rig, 46-76 mm diameter holes	Op.	A	0.36	31.03	31.39
		s.b.	----	0.00	17.31	17.31
22.02	Electro-hydraulic rotary drill rig, 46-131 mm diameter holes	Op.	A	0.52	44.98	45.50
		s.b.	----	0.00	26.76	26.76
22.03	Water flush pump, 45 l/min., 50 bar max. pressure	Op.	A	0.06	4.41	4.47
		s.b.	----	0.00	2.53	2.53
22.04	Water flush pump, 76 l/min., 50 bar max. pressure	Op.	A	0.12	8.90	9.02
		s.b.	----	0.00	5.21	5.21
22.05	Colloidal cement grout mixer, 260 liters capacity	Op.	A	0.04	3.29	3.33
		s.b.	----	0.00	1.44	1.44
22.06	Colloidal cement grout mixer, 500 liters capacity	Op.	A	0.05	3.94	3.99
		s.b.	----	0.00	1.55	1.55
22.07	Cement grout agitator, 260 liters capacity	Op.	A	0.02	1.25	1.27
		s.b.	----	0.00	0.66	0.66
22.08	Cement grout agitator, 500 liters capacity	Op.	A	0.02	1.98	2.00
		s.b.	----	0.00	1.00	1.00
22.09	Cement grout pump, 34/40 l/min capacity, 30 bar max. pressure	Op.	A	0.06	5.13	5.19
		s.b.	----	0.00	2.62	2.62
22.10	Cement grout pump, 100/140 l/min, 50 bar max. pressure	Op.	A	0.11	9.64	9.75
		s.b.	----	0.00	4.75	4.75
22.11	Wheel-mounted compact type grout plant, 5.5 m3/h max. capac	Op.	A	0.22	25.58	25.80
	(Atlas Craelius Unigrout 200-100 E 02) or HANY 650E	s.b.	----	0.00	20.19	20.19
22.12	Wheel mounted pump for rock bolt grouting	Op.	A	0.05	5.27	5.32
		s.b.	----	0.00	3.17	3.17
23	**Miscellaneous**					0.00
23.01	Diesel powered rock bolting rig, 120 kW, 12.0 m reach	Op.	A	1.55	103.96	105.51
		s.b.	----	0.00	65.23	65.23
23.02	Mechanized scaler with hammer, 120 kW, 10.0 m reach	Op.	A	0.70	64.44	65.14
		s.b.	----	0.00	40.23	40.23
23.03	Explosive charging machine, 300 kg ANFO capacity	Op.	A	0.59	40.16	40.75
		s.b.	----	0.00	31.73	31.73
23.04	Personnel transportation vehicle, 15+1 seats	Op.	A	0.15	18.51	18.66
		s.b.	----	0.00	7.46	7.46
23.05	Scissors type elevator, capacity 450 kg, 11.70 max. height	Op.	A	0.07	5.99	6.06
		s.b.	----	0.00	4.40	4.40
23.06	Portable diesel powered floodlight, 6000 W, heigth 9.0 m	Op.	A	0.07	6.41	6.48
		s.b.	----	0.00	3.46	3.46
23.07	Halogen floodlight, 1000 W with support & connection cable	Op.	A	0.01	0.75	0.76
		s.b.	----	0.00	0.29	0.29
23.08	Halogen floodlight, 2000 W with support & connection cable	Op.	A	0.01	0.83	0.84
		s.b.	----	0.00	0.33	0.33

Item	Description	Op. & s.b.	Oper. condit. (A/S)	Hourly Cost L.C.P (US$ Eq.)	Hourly Cost F.C.P. (US$)	Aggregate Cost (US$)
	MOBILE EQUIPMENT (CONT.D)					
	Miscellaneous (cont.d)					
23.09	Hydraulic unit for tendon tensioning	Op.	A	0.05	3.39	3.44
		s.b.	----	0.00	3.96	3.96
23.10	Vibrating bar for slab finishing	Op.	A	0.01	1.46	1.47
		s.b.	----	0.00	0.42	0.42
23.11	Rail mounted traveller for tunnel form shifting, 20 t pay load	Op.	h	0.12	16.09	16.21
23.12	Rail mounted traveller for tunnel form shifting, 25 t pay load	Op.	h	0.15	20.91	21.06
23.13	Hydraulic jaking system for arch form shifting	Op.	A	0.33	37.39	37.72
23.14	Bar bending and cutting machines	Op.	A	0.05	3.57	3.62
23.15	Grinding machine for button bits, 45 to 102 mm dia.	Op.	A	0.04	5.32	5.36
23.16	Grinding machine for integrals	Op.	A	0.01	2.29	2.30
23.17	Breaker tool resharpener	Op.	A	0.01	1.57	1.58
23.18	Concrete bucket, 1.50 m3 capacity	Op.	A	0.02	1.55	1.57
23.19	Concrete bucket, 2.00 m3 capacity	Op.	A	0.03	2.35	2.38
23.20	Concrete bucket, 2.50 m3 capacity	Op.	A	0.03	3.05	3.08
23.21	Concrete bucket, 3.00 m3 capacity	Op.	A	0.04	3.52	3.56
23.22	Elephant trunk, 200 mm dia., length 25 m	Op.	A	0.01	0.98	0.99

Item	Description	Op. & s.b.	Month & hour	Montly & Hourly Cost		Aggregate Cost (US$)
				L.C.P (US$ Eq.)	F.C.P. (US$)	
		(1)				
B	**STATIONARY AND APPOINTED EQUIPMENT**					
1	**Electric power station and distribution line**					
1.01	Diesel pow. motorgenerator, 1000 kVA with control board	Op&s.b.	m.th	0.00	4,423.28	4,423.28
		----	h	0.33	167.60	167.93
1.02	Diesel pow. motorgenerator, 635 kVA with control board	Op&s.b.	m.th	0.00	2,936.43	2,936.43
		----	h	0.22	107.69	107.91
1.03	Transformer cabin 0.40/24 kV - 7.27 MVA total power	----	m.th	0.00	107.69	107.69
1.04	Fuel tanks for motorgenerators, 150,000 liters capacity	----	m.th	8.48	939.17	947.65
1.05	On pole power distribution line, 24 KV (length 1 km)	----	m.th	4.19	258.07	262.26
1.06	Firefighting system for the power station	----	m.th	65.34	4,057.87	4,123.21
2	**Aggregates and concrete plants**					
2.01	Aggregate processing plant, 70 t/h capacity	O+s.b.	m.th	0.00	9,346.86	9,346.86
		----	h	1.93	85.09	87.02
2.02	Aggregate processing plant, 190 t/h capacity	O+s.b.	m.th	0.00	26,687.79	26,687.79
		----	h	3.46	149.49	152.95
2.03	Concrete batch. & mixing plant, 4 aggregates, 55 m3/hr capacity	O+s.b.	m.th	0.00	3,953.27	3,953.27
		----	h	0.87	42.50	43.37
2.04	Concrete batch. & mixing plant, 4 aggregates, 65 m3/hr capacity	O+s.b.	m.th	0.00	8,280.96	8,280.96
		----	h	1.03	50.67	51.70
2.05	Cement silos, capacity 460 m3 with 2 cement feeders to mixer	O+s.b.	m.th	0.00	1,374.59	1,374.59
		----	h	0.00	7.71	7.71
2.06	Cement silos, capacity 1310 m3 with 4 cement feeders to mixer	O+s.b.	m.th	0.00	7,214.38	7,214.38
		----	h	0.47	15.75	16.22
2.07	Aggregate reclaming system under aggregate stockpiles	O+s.b.	m.th	0.00	1,291.52	1,291.52
		----	h	0.16	6.75	6.91
3	**Tunnelling jumbos, drillers and breakers**					
3.01	One boom tunnelling jumbo equipeed with 22 kW rock drill	O+s.b.	m.th	0.00	12,651.92	12,651.92
		----	h	1.95	50.77	52.72
3.02	Two boom tunnelling jumbo equipeed with 22 kW rock drills	O+s.b.	m.th	0.00	19,479.65	19,479.65
		----	h	3.27	94.80	98.07
3.03	Three boom tunnelling jumbo equipeed with 22 kW rock drills	O+s.b.	m.th	0.00	21,868.22	21,868.22
		----	h	3.71	122.14	125.85
3.04	Hand held drill, medium weight type	O+s.b.	m.th	0.00	130.63	130.63
		----	h	0.04	2.03	2.07
3.05	Hand held drill, heavy weight type	O+s.b.	m.th	0.00	132.39	132.39
		----	h	0.05	1.10	1.15
3.06	Hand held feed pusher leg drill, heavy weigth type	O+s.b.	m.th	0.00	187.16	187.16
		----	h	0.07	1.53	1.60
3.07	Hand held stoper drill, medium weight type	O+s.b.	m.th	0.00	129.89	129.89
		----	h	0.07	1.46	1.53
3.08	Hand held paving breaker, medium weigth type	O+s.b.	m.th	0.00	46.95	46.95
		----	h	0.03	0.91	0.94
3.09	Hand held paving breaker, heavy weigth type	O+s.b.	m.th	0.00	62.21	62.21
		----	h	0.04	1.20	1.24
4	**Tunnel loaders**					
4.01	Electro powered tunnel loader with steel belt, 55E+74D kW	O+s.b.	m.th	0.00	8,943.66	8,943.66
		----	h	1.30	33.65	34.95
4.02	Electro powered tunnel loader with steel belt, 110E+165D kW	O+s.b.	m.th	0.00	12,874.72	12,874.72
				1.95	55.22	57.17
(1)	*O=operating unit, s.b=stand-by unit, s.p.=spare parts available at Site store*					

Item	Description	Op. & s.b.	Month & hour	Montly & Hourly Cost		Aggregate Cost (US$)
				L.C.P (US$ Eq.)	F.C.P. (US$)	
	STATIONARY AND APPOINTED EQUIPMENT (CONT.D)					
5	**Tunnel dumpers**					
5.01	Articulated tunnel (mine) dump truck, 20 t pay load	O+s.b.	m.th	0.00	8310.47	8310.47
		----	h	0.63	33.37	34.00
5.02	Articulated tunnel (mine) dump truck, 25 t pay load	O+s.b.	m.th	0.00	9508.27	9508.27
		----	h	0.73	42.30	43.03
5.03	Articulated tunnel (mine) dump truck, 30 t pay load	O+s.b.	m.th	0.00	10747.12	10747.12
		----	h	0.83	49.46	50.29
5.04	Articulated tunnel (mine) dump truck, 42 t pay load	O+s.b.	m.th	0.00	14420.38	14420.38
		----	h	1.12	64.71	65.83
6	**Electric powered air compressors**					
6.01	Electric powered air compressor, 5.0 m3min, 7.5 bar p.	O+s.b.	m.th	0.00	365.28	365.28
		----	h	0.14	8.73	8.87
6.02	Electric powered air compressor, 10.0 m3min, 7.5 bar p.	O+s.b.	m.th	0.00	697.26	697.26
		----	h	0.22	19.73	19.95
6.03	Electric powered air compressor, 15.0 m3min, 7.5 bar p.	O+s.b.	m.th	0.00	1212.08	1212.08
		----	h	0.34	33.30	33.64
6.04	Electric powered air compressor, 20.0 m3min, 7.5 bar p.	O+s.b.	m.th	0.00	1267.72	1267.72
		----	h	0.43	48.61	49.04
6.05	Electric powered air compressor, 25.0 m3min, 7.5 bar p.	O+s.b.	m.th	0.00	1509.14	1509.14
		----	h	0.53	66.51	67.04
6.06	Electric powered air compressor, 30.0 m3min, 7.5 bar p.	O+s.b.	m.th	0.00	1723.27	1723.27
		----	h	0.63	86.66	87.29
7	**Tunnel fans**					
7.01	Sound-proof axial tunnel fan, 30 kW	O+s.b.	m.th	0.00	440.40	440.40
		----	h	0.12	9.00	9.12
7.02	Sound-proof axial tunnel fan, 50 kW	O+s.b.	m.th	0.00	636.14	636.14
		----	h	0.20	14.93	15.13
7.03	Sound-proof axial tunnel fan, 75 kW	O+s.b.	m.th	0.00	747.05	747.05
		----	h	0.29	22.25	22.54
7.04	Sound-proof axial tunnel fan, 100 kW	O+s.b.	m.th	0.00	856.34	856.34
		----	h	0.38	29.58	29.96
7.05	Sound-proof axial tunnel fan, 125 kW	O+s.b.	m.th	0.00	918.32	918.32
		----	h	0.46	36.86	37.32
7.06	Sound-proof axial tunnel fan, 150 kW	O+s.b.	m.th	0.00	978.67	978.67
		----	h	0.55	44.15	44.70
7.07	Sound-proof axial tunnel fan, 175 kW	O+s.b.	m.th	0.00	1027.61	1027.61
		----	h	0.64	51.43	52.07
7.08	Sound-proof axial tunnel fan, 200 kW	O+s.b.	m.th	0.00	1060.23	1060.23
		----	h	0.73	58.70	59.43
7.09	Sound-proof axial tunnel fan, 225 kW	O+s.b.	m.th	0.00	1138.52	1138.52
		----	h	0.81	66.00	66.81
7.10	Sound-proof axial tunnel fan, 250 kW	O+s.b.	m.th	0.00	1141.79	1141.79
		----	h	0.90	73.25	74.15
8	**Stand-by motorgenerators**					
8.01	Diesel powered generator including control board, 25 kVA	O+s.b.	m.th	0.00	82.94	82.94
		----	h	0.01	4.39	4.40
8.02	Diesel powered generator including control board, 50 kVA	O+s.b.	m.th	0.00	128.05	128.05
		----	h	0.03	8.70	8.73

Item	Description	Op. & s.b.	Month & hour	Montly & Hourly Cost		Aggregate Cost (US$)
				L.C.P (US$ Eq.)	F.C.P. (US$)	
	STATIONARY AND APPOINTED EQUIPMENT (CONT.D)					
9	**Winches**					
9.01	Electric powered winch, 2 t rated load, 28 m/min wire speed	O+s.b.	m.th	0.00	81.98	81.98
		----	h	0.05	3.99	4.04
9.02	Electric powered winch, 4 t rated load, 28 m/min wire speed	O+s.b.	m.th	0.00	161.50	161.50
		----	h	0.10	8.14	8.24
9.03	Electric powered winch, 6 t rated load, 28 m/min wire speed	O+s.b.	m.th	0.00	229.42	229.42
		----	h	0.15	12.38	12.53
10	**Tower cranes**					
10.01	Tower crane, h=25 m, 160 t/m capacity (4 t x L40m)	O+s.b.	m.th	0.00	5,559.90	5,559.90
		----	h	0.66	19.52	20.18
10.02	Tower crane, h=35 m, 240 t/m capacity (4 t x L60m)	O+s.b.	m.th	0.00	9,840.90	9,840.90
		----	h	0.99	29.29	30.28
10.03	Tower crane, h=50 m, 534 t/m capacity (8.9 t x L60m)	O+s.b.	m.th	0.00	########	28,521.28
		----	h	2.75	75.41	78.16
11	**Ligthing fixtures**					
12.01	Halogen floodlight, 1000 W with support & connection cable	O+s.b.	m.th	0.00	79.92	79.92
		----	h	0.01	0.43	0.44
12.02	Halogen floodlight, 2000 W with support & connection cable	O+s.b.	m.th	0.00	92.77	92.77
		----	h	0.01	0.48	0.49
12.03	Tunnel lighting line with waterproof lamp holders (L=100 m)	O+s.b.	m.th	0.00	130.82	130.82
		----	h	0.01	0.41	0.42
12	**Steel pipelines with rapid type joints**					
12.01	Steel pipeline, 50 mm diameter (L=100 m)	O+s.b.	m.th	0.14	13.13	13.27
12.02	Steel pipeline, 75 mm diameter (L=100 m)	do	m.th	0.20	18.98	19.18
12.03	Steel pipeline, 100 mm diameter (L=100 m)	do	m.th	0.24	22.33	22.57
12.04	Steel pipeline, 125 mm diameter (L=100 m)	do	m.th	0.37	34.41	34.78
12.05	Steel pipeline, 150 mm diameter (L=100 m)	do	m.th	0.44	41.32	41.76
12.06	Steel pipeline, 200 mm diameter (L=100 m)	do	m.th	0.74	69.67	70.41
12.07	Steel pipeline, 250 mm diameter (L=100 m)	do	m.th	1.40	139.97	141.37
12.08	Steel pipeline, 300 mm diameter (L=100 m)	do	m.th	1.79	167.99	169.78
13	**Compressed air tanks**					
13.01	Air tank with water separator, 4 m3 capacity	O+s.b.	m.th	1.07	105.20	106.27
13.02	Air tank with water separator, 6 m3 capacity	do	m.th	1.36	134.52	135.88
13.03	Air tank with water separator, 8 m3 capacity	do	m.th	2.01	198.33	200.34
14	**Bolted type steel water tanks**					
14.01	Steel water tank, 50 m3 capacity	O+s.b.	m.th	2.37	278.28	280.65
14.02	Steel water tank, 100 m3 capacity	do	m.th	3.15	370.12	373.27
14.03	Steel water tank, 200 m3 capacity	do	m.th	4.35	511.31	515.66
14.04	Steel water tank, 500 m3 capacity	do	m.th	5.59	657.99	663.58
15	**Supporting steel structures for tunnel fans**					
15.01	Structure for 25-50 kW axial fans	O+s.b.	m.th	0.14	33.45	33.59
15.02	Structure for 50-75 kW axial fans	do	m.th	0.31	73.58	73.89
15.03	Structure for 75-100 kW axial fans	do	m.th	0.42	100.34	100.76
15.04	Structure for 100-150 kW axial fans	do	m.th	0.57	133.79	134.36
15.05	Structure for 150-250 kW axial fans	do	m.th	0.71	167.24	167.95

Item	Description	Op. & s.b.	Month & hour	Montly & Hourly Cost		Aggregate Cost (US$)
				L.C.P (US$ Eq.)	F.C.P. (US$)	
	STATIONARY AND APPOINTED EQUIPMENT (CONT.D)					
16	**Ventilation flexible type pipes**					
16.01	Pipe 400 mm dia. (L=100 m)	O+s.b.	m.th	0.63	42.42	43.05
16.02	Pipe 600 mm dia. (L=100 m)	do	m.th	0.87	58.95	59.82
16.03	Pipe 800 mm dia. (L=100 m)	do	m.th	1.07	72.47	73.54
16.04	Pipe 1000 mm dia. (L=100 m)	do	m.th	1.31	89.04	90.35
16.05	Pipe 1200 mm dia. (L=100 m)	do	m.th	1.51	102.31	103.82
16.06	Pipe 1400 mm dia. (L=100 m)	do	m.th	1.73	117.13	118.86
16.07	Pipe 1600 mm dia. (L=100 m)	do	m.th	1.93	130.66	132.59
16.08	Pipe 1800 mm dia. (L=100 m)	do	m.th	2.21	149.88	152.09
16.09	Pipe 2000 mm dia. (L=100 m)	do	m.th	2.35	159.52	161.87
16.10	Pipe 2200 mm dia. (L=100 m)	do	m.th	2.62	177.47	180.09
17	**Transformer cabins**					
17.01	Transformer cabin, 50 kVA	O+s.b.	m.th	2.54	312.08	314.62
17.02	Transformer cabin, 100 kVA	do	m.th	4.61	566.03	570.64
17.03	Transformer cabin, 150 kVA	do	m.th	4.68	574.61	579.29
17.04	Transformer cabin, 200 kVA	do	m.th	4.98	611.06	616.04
17.05	Transformer cabin, 250 kVA	do	m.th	5.27	646.44	651.71
17.06	Transformer cabin, 300 kVA	do	m.th	5.68	696.82	702.50
17.07	Transformer cabin, 350 kVA	do	m.th	6.29	771.86	778.15
17.08	Transformer cabin, 400 kVA	do	m.th	6.80	833.80	840.60
17.09	Transformer cabin, 450 kVA	do	m.th	7.43	911.23	918.66
17.10	Transformer cabin, 500 kVA	do	m.th	7.96	976.74	984.70
17.11	Transformer cabin, 600 kVA	do	m.th	9.32	1,143.50	1,152.82
18	**Control boards**					
18.01	Control board, 10 kVA	O+s.b.	m.th	0.24	27.23	27.47
18.02	Control board, 50 kVA	do	m.th	0.34	37.60	37.94
18.03	Control board, 100 kVA	do	m.th	0.53	58.60	59.13
18.04	Control board, 150 kVA	do	m.th	0.67	74.68	75.35
18.05	Control board, 200 kVA	do	m.th	0.79	88.17	88.96
18.06	Control board, 250 kVA	do	m.th	0.87	97.24	98.11
18.07	Control board, 300 kVA	do	m.th	0.95	105.80	106.75
18.08	Control board, 350 kVA	do	m.th	1.02	113.45	114.47
18.09	Control board, 400 kVA	do	m.th	1.17	129.66	130.83
19	**Medium voltage electric power cables**					
19.01	Flexible type cable, 10 mm2 section (L=100 m)	O+s.b.	m.th	0.38	38.10	38.48
19.02	Flexible type cable, 16 mm2 section (L=100 m)	do	m.th	0.55	55.77	56.32
19.03	Flexible type cable, 25 mm2 section (L=100 m)	do	m.th	0.83	84.05	84.88
20	**Low voltage electric power cables**					
20.01	Flexible type cable, 6 mm2 section (L=100 m)	O+s.b.	m.th	0.14	13.50	13.64
20.02	Flexible type cable, 10 mm2 section (L=100 m)	do	m.th	0.24	23.30	23.54
20.03	Flexible type cable, 16 mm2 section (L=100 m)	do	m.th	0.34	34.10	34.44
20.04	Flexible type cable, 25 mm2 section (L=100 m)	do	m.th	0.52	51.39	51.91
21	**Miscellaneous units**					
21.01	Mobile reinforcing steel carrier with extensible legs	O+s.b.	m.th	0.86	213.60	214.46

PART – IV

CONSTRUCTION METHODS

TABLE OF CONTENTS

1. Construction Facilities

1.1 Roads

1.1.1 General

Rogun HPP Site is accessible from the M41 National road which connects Dushanbe to Obigarm. This road has been reconstructed before starting the works for the Project some 30 years ago by the public highway authority of Tajikistan.

At the Site a lot of temporary and permanent roads which give access to construction sites have been built, working yards, borrow areas, quarries, disposal areas, camps and other auxiliary facilities for an overall length of approx. 65 km excluding the roads which give access to the several villages existing in the area and the minor construction facilities.

Along the Site roads five main bridges have been built, of which three over the Vakhsh River, one over the Obi-Shur River and one for the access to the dam which currently is not yet completed. There are also small bridges and large culverts where the roads on the right and left bank of the valley cross the nine main creeks (small rivers) existing in the Site area.

Due to the narrow gorge with steep banks along the Vakhsh River, several transportation tunnels have been built at the Site and such tunnels will be used for the construction of both the underground works and the dam embankment.

The paving of the roads built in the open air mainly consist of a simple gravel surfacing but there are some stretches which are paved with concrete or asphalt and in general the roads have a roadway (lane) width ranging from 6 m to 12 m.

The layout of the roads of the Site is shown on the General Plan View which is annexed in Part VIII of this Volume.

1.1.2 Construction

The site roads are located both in semi-flat or hilly areas whose prevailing excavation consists of loose or rippable material and in very inclined mountainous areas whose prevailing excavation consists of fractured and sound rock.

The excavation of the roads has been planned according to the conventional two sequential steps, i.e. first the opening of the track along the upper part of the cross section and then the benching up to the established roadway level.

Where the soil is composed of loose material or weathered rock, the analyses for establishing the unit price of excavation have been simply based on the use of 231 and 306 kW bulldozers equipped with angled blade (angledozer) and mono-shank type ripper.

Where the soil is composed of sound rock, the analyses for establishing the unit price of excavation have been based on the use hand-held rock drills and small tired hydraulic drill rigs equipped with 51 mm dia. Bits for the execution of the blasting holes of the

upper part of the excavation and hydraulic crawler drill rigs equipped with 76 mm dia. for the execution of the blasting holes of the lower part.

Where possible, it was assumed that both the loose material and the blasted rock have been disposed along the downstream bank by means of the same bulldozers used for the excavation. Where the side disposal was not possible, hydraulic excavators with a heaped bucket capacity from 1.80 to 4.10 m^3 and 36.6 ton pay load off-highway dumpers have been adopted for the transport of the excavated material.

The granular materials for concrete aggregates, asphalt aggregates and roadway bases have been obtained from the several borrow areas existing along the Vakhsh River and processed by means of stationary plant as described in Chapter 8 which follows.

1.1.3 Maintenance

The cost estimate of the road maintenance has been subdivided in five main categories as follows:

a) Maintenance of roadways which are paved with concrete;

b) Maintenance of roadways which are paved with asphalt;

c) Maintenance of roadways which are not paved, i.e. roadways with gravel surfacing;

d) Removal of slides, slipouts and rock falls from roadways which mainly are excavated in loose ground formation;

e) Removal of slides, slipouts and rock falls from roadways which mainly are excavated in rock formations.

The maintenance cost of the concrete paved roads has been based on the assumption that during the time of use:

- Approx. 60% of the lanes need a repair consisting of full cleaning of the surface and the placing of six centimeter thick asphalt concrete and
- Approx. 25% of the lanes need a full repaving.

The maintenance cost of the asphalt paved roads has been based on the assumption that during the time of use, 100% of the lanes need a new four (4) centimeters thick layer of asphalt concrete wearing course.

The maintenance of the gravel surfacing roads has been based on the following main assumptions:

- Reshaping of the roadway by means of 103 kW and 136 kW motorgraders every 30 days during the dry season and every 15 days during the wet season;
- Watering of the surface immediately after the motorgrader passage by means of truck mounted tank;
- Rolling by means of 22.1 and 38 kg/cm static linear load (s.l.l.) smooth-drum vibrating roller immediately after the watering;
- Integration of the gravel surfacing where necessary in a quantity estimated in the order of 0.005 m^3/m^2 of surface every year of use;

- The employment of one unskilled workman every two kilometer of road length for executing the routine trimming works necessary to maintain the surfaces free from stones and other main deformations where the lanes are subject to heavy traffic.

1.2 Contractor's Camps

The temporary camp area necessary for the execution of the works related to the existing works was located on the right bank, close to Rogun Town, as shown on the annexed Drawing N°30004 B "General Plan View".

The camp includes but not necessarily is limited to houses, dormitories, guest house, dining halls, laundries, catering, recreational facilities, mini-markets, shops, medical care facilities, offices, schools, and police station.

Buildings structurally sound, compatible with the weather conditions of the Site, of neat appearance and supplied with all the necessary furniture, equipment and accessories have been considered.

Contractor's camps are complete with all services and facilities such as electrical power, potable water, drainage and sewerage systems, fire fighter equipment, fencing, and permanent garbage disposal service.

The cost estimate of the camps has been divided into steps, i.e. first the preparation of the camp areas and then the construction of the houses and appurtenants in such areas. The areas for camps are prepared by performing the: (a) earthmovings for obtaining flat or semi-flat areas, (b) sufficient drainages compatible with the local weather conditions, and (c) base course with granular material of the areas subject to traffic. The quantities of the preparatory works have been established in accordance with the extension of the camps and contour lines of the land in the area.

Since the total cost of the temporary camps and of the related facilities can be very variable in accordance with the custom, practice and organization of the contractors, the estimate of these works has been based on actual costs which have been recorded during the construction of several similar hydroelectric projects all over the world and tabulated according to the different total contract price of the works to be done.

1.3 Construction Yards and Buildings

There are two construction site areas for the existing works, which are located on the right bank upstream of the dam site and named N1 and N2 as shown on the annexed Drawing N°30004 B "General Plan View".

The construction yard named N1, located between Rogun Town and Vakhsh River, is the area where the main temporary buildings (stores, warehouses, laboratory etc.), fuel and oil station and similar premises have been planned.

The main aggregate processing plant and concrete batching/mixing plant necessary for the concrete works are located on this area as well.

The construction yard named N2, located close to the camp area, is merely an auxiliary area of the N1 yard.

Buildings structurally sound, compatible with the weather condition of the Site and provided with the necessary facilities have been considered.

The construction yards have been prepared for receiving the buildings and the material storages by performing: (a) earthmovings for obtaining flat or semi-flat areas, (b) sufficient drainages compatible with the local weather conditions, and (c) paving of the areas subject to traffic with granular material and concrete. The quantities of the work to be done have been established in accordance with the extension of the yards and contour lines of the land in the area.

Since the total cost of the temporary buildings built in the construction yards can be very variable in accordance with the custom, practice and organization of the contractors, the estimate of these works has been performed as described in Sub-Chapter 1.2 for the camps.

2. Borrow Areas and Quarries

2.1 Borrow area for concrete aggregates

The aggregates for the concrete are obtained from the alluvial borrow area located on the right bank of the Vakhsh River approx. 500 m upstream of the Construction Yard N1 and named N°15(a) on the annexed Drawing N°30004 B "General Plan View".

The granulometric composition of this borrow area is as follows:

- Boulder fraction > 100 mm: 30.4%;
- Pebble fraction 10-100 m: 44.7%;
- Coarse sand fraction 10-50 mm: 7.4%;
- Fraction < 5 mm: 17.1 %.

Significant quantity of sand grains are covered with a crust of gypsum and carbonate and the content of dust and clay in gravel can reach 3.5%.

2.2 Borrow areas for dam embankment located u/s of dam site

Three borrow areas suitable for the shell, filters and core of the dam embankment are located upstream of the dam site.

The shell and filters are obtained both from the borrow area N° 15 and the borrow area "Lyabidora" both located on the left bank of the Vakhsh River.

The pure clay for the core enrichment is obtained from the borrow area N°11 located on the right bank of the Vakhsh River near the Rogun Town.

The granulometric composition of N°15 borrow area i s as follows:

- Boulder fraction > 100 mm: 23.6%;
- Pebble fraction 10-100 m: 46.0%;
- Coarse sand fraction 10-50 mm: 7.9%;
- Fraction < 5 mm: 21.3 %.

The granulometric composition of the Lyabidora borrow area is as follows:

- Boulder fraction > 100 mm: 37.0%;
- Pebble fraction 10-100 m: 25.0%;
- Coarse sand fraction 10-50 mm: 11.0%;
- Fraction < 5 mm: 18.0 %.

2.3 Borrow areas for dam embankment located d/s of dam site

The loam material for the dam embankment is obtained from both the borrow areas N° 17(a) and from the borrow area N° 17(b), both located on the left bank of the Vakhsh River downstream of the dam site.

The materials of these borrow areas have a non-uniform grain-size composition and therefore they need specific treatments before placement on the dam.

2.4 Preparation of borrow areas

Before starting the exploitation of the borrow areas, it is necessary to remove the overburden that is not suitable for the construction of the dam.

The removal of the material is executed with the same construction method described in the hereinafter Sub-chapter 6.1 for the common excavation. This material is transported to the nearest suitable areas with a transport length ranging from 350 to 900 m.

2.5 Quarry Areas

The quarries necessary for the rocky material of the dam are located downstream of the dam on the left bank of the Vakhsh River.

Such quarries are named N° 26(a) and N° 26(b) on the annexed General Plan View (DWG. 30004 B).

The rock consists of a sandstone formation having an in-situ average specific weight of approx. 2600 kg/m^3.

3. Stockpile Areas

3.1 Stockpile Areas Located Upstream of the Dam Site

3.1.1 General

Two main stockpile areas have been allotted for the temporary deposit of the alluvial material that has to be used for the dam construction on the left bank of the Vakhsh River upstream of the dam site.

Such stockpile areas are named LG 1 and LG 2 on the annexed General Plan View (DWG. 30004 B).

The stockpile LG1 is composed of a main area named LG1 (a) and three surrounding areas named LG1 (b), LG1 (c) and LG1 (d).

The stockpile LG2 is composed of a main area named LG2 (a) and four surrounding areas named LG2 (b), LG3 (c), LG2 (d) and LG3 (e).

The stockpiles of LG1 area are composed of alluvial material coming from the Borrow Area 15.

The stockpiles of LG2 area are composed of alluvial material coming both from the Borrow Area 15 and from “Lyabidora” borrow area.

Before storing materials, the stockpiling areas are prepared by removing the main existing spurs and hollows which can increase the losses of the stockpiled material.

The work mainly consists of a simple cut-and-fill operation executed by means of bulldozers equipped with mono-shank rippers.

3.1.2 Construction method

The following construction method has been foreseen for the stockpiling of the alluvium proceeding from the borrow area N15:

- Excavation and loading on dump trucks by means of hydraulic front shovels with 5.70 m^3 heaped bucket capacity and wheel loaders with 7.30 m^3 heaped bucket capacity;
- Removal and stockpiling in the surrounding area of large boulders by means of 157 kW wheel loaders equipped with hydraulic rock grapple;
- Transport of the excavated material to designated stockpile area by means of 55.60 tons payload off-highway dump trucks;
- Roughs spreading of the unloaded material in stockpile area by means of 153 kW bulldozers;
- Lighting of the work areas by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

The following construction method has been foreseen for the stockpiling of the alluvium proceeding from the borrow area Lyabidora:

- Excavation and loading on dump trucks by means of hydraulic front shovels with 4.10 m^3 heaped bucket capacity and wheel loaders with 5.80 m^3 heaped bucket capacity;
- Removal and stockpiling in the surrounding area of large boulders by means of 157 kW wheel loaders equipped with hydraulic rock grapple;
- Transport of the excavated material to designated stockpile area by means of 46.20 tons payload off-highway dump trucks;
- Roughs spreading of the unloaded material in stockpile area by means of 153 kW bulldozer;
- Lighting of the work area by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

3.1.3 Transport from borrow area 15 to LG1 and LG2 stockpiles

The transport times of the dumpers from the borrow area 15 to LG1 and LG2 stockpiles, have been calculated taking the following key data into account:

a) Lengths (sections) composing the total route of the dumper;

b) Effective grade of each road section;

c) Rolling resistances of each roadway sections;

d) Factors for conversion of maximum speed to average speed according to the length of sections, sharp curves etc.

The total transport lengths established for the unit price analyses are as follows:

- From area 15 to LG1(a): 3,000 m
- From area 15 to LG1(b): 2,850 m
- From area 15 to LG1(c): 2,770 m
- From area 15 to LG1(d): 2,570 m
- From area 15 to LG2(a): 5,850 m
- From area 15 to LG2(b): 5.310 m
- From area 15 to LG2(c): 6,880 m.

3.1.4 Transport from Lyabidora borrow area to LG2 stockpiles

The transport times of the dumpers from the Lyabidora borrow area to LG2 stockpiles, have been calculated as described before in Paragraph 3.1.3.

The total transport lengths established for the unit price analyses are as follows:

- From area Lyabidora to LG2(d): 4,050 m
- From area Lyabidora to LG2(e): 3,500 m.

3.2 Stockpile Areas Located Downstream of the Dam Site

3.2.1 General

Two main stockpile areas have been allotted for the temporary deposit of the loam and of the blasted rock that have to be used for the dam embankment on the left bank of the Vakhsh River downstream of the dam site.

Such stockpile areas are named LL3 and LR4 on the annexed General Plan View (DWG. 30004 B).

The stockpile LL3 stores the loam proceeding from the borrow area N° 17(b). The stockpile LR4 stores the blasted rock proceeding from the quarry N°26(a).

3.2.2 Construction method

The following construction method has been foreseen for the stockpiling of the loam:

- Excavation by means of 170 kW bulldozer;

- Loading on dump trucks by means of wheel loader with 5.80 m^3 heaped bucket capacity;
- Transport of the excavated material to designated stockpile area by means of 46.20 tons payload off-highway dump trucks;
- Roughs spreading of the unloaded material in stockpile area by means of 153 kW bulldozer;
- Lighting of the work area by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

The following construction method has been foreseen for the stockpiling of the blasted rock:

- Drilling by means of crawler rock drills of 116 kW and 149 kW;
- Loading of the rock on dump trucks by means of hydraulic front shovels with 4.10 m^3 heaped bucket capacity;
- Transport of the excavated material to designated stockpile area by means of 46.20 tons payload off-highway dump trucks;
- Roughs spreading of the unloaded material in stockpile area by means of 153 kW bulldozer;
- Lighting of the work area by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

The transport times of the dumpers from the borrow area and quarry to the stockpiles, have been calculated as described before in Paragraph 3.1. 3.

The total transport lengths established for the unit price analyses are as follows:

- From area 17(b) to area LL3: 770 m,
- From area 26(a) to LR4: 1620 m.

4. Spoil Areas

There are two spoil areas located upstream of the dam site, of which one on the right bank of the Vakhsh River close to the Construction Yard N1 (named SA1) and the other on the left bank approx. 1200 upstream of the diversion tunnel inlets (named SA2) as shown on the annexed Drawing N°30004 B “General Plan View”.

The spoil area SA1 has been chosen for disposing the material excavated for the construction of Transportation Tunnels T1, T3, T5, T7, T37, the ventilation gallery parallel to T3 and the other surrounding tunnels and galleries.

The spoil area SA2 has been chosen for disposing the excavation materials coming for all the remaining temporary and permanent works.

The spoil areas for the overburden to be removed from the borrow areas and the quarries have been deemed located close to the same areas and however with a transport distance ranging from 350 m to 900 m.

5. Electricity Power for Construction

The electric power necessary for the temporary facilities, the temporary works and permanent works belonging to the cost estimate of Phase 1 is produced by means of a temporary powerhouse installed in the Construction Yard N°1.

The powerhouse has a covered area of approx. 600 m^2 and is composed of:

a) Six (6) 1000 KVA motor-generators;

b) Three (3) 635 KVA motor-generators;

c) Transformer units for a total power of 7.3 MVA for raising the voltage from 400 to 24,000;

d) Fuel tanks with a capacity of 150,000 liters;

e) A firefighting system, and

f) On-pole 24 KV power distribution lines with a length sufficient to serve all the utilization points planned for the temporary facilities as well as for the temporary and permanent works to be done.

The transformer cabins for lowering the tension of the electric power from 24 kV to the 400/500 voltage of electric engines which are installed on the construction equipment, have been included in the unit price analyses of each BoQ item.

6. Surface Excavation

6.1 Surface Excavation, Common

6.1.1 General

Common excavation is intended to include all loose materials such as clay, loam, earth, sand, gravel and disintegrated rock that can be removed by means of conventional equipment such as bulldozers with standard blade, wheel loaders and hydraulic excavators.

6.1.2 Construction Method

The following main equipment has been foreseen for the execution of the common excavation:

- Excavation of the material by means of 179 kW bulldozers working in front of loader machines where the material to be loaded is hard and tough;
- Loading of the material on dump trucks by means of 157 kW (3.30 m^3 heaped bucket) where the material has been moved by the bulldozer;
- Loading of the material on dump trucks by means of 161 kW (2.35 m^3 heaped bucket) hydraulic backhoes, where the material can be excavated and loaded without the assistance of the bulldozer;
- Transport of the excavated material to designated spoil areas or to the fill areas by means of 36.6 t payload off-highway dump trucks;

- Roughs spreading of the unloaded material in spoil area by means of 72 kW bulldozer;
- Lighting of the work areas by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

The common excavation on very steep areas will be executed adopting the "sliding method" which consists in pushing the excavated material by means of bulldozer towards the loading area so that it can slides downward when the angle of natural repose is exceeded.

6.2 Surface Excavation, Rippable

6.2.1 General

The rippable excavation is intended to include the soft and disintegrated (weathered) rock which can be removed by means of bulldozers with a minimum power of 250 kW equipped with mono shank type ripper.

6.2.2 Construction Method

The following construction method has been foreseen for the execution of the rippable excavation:

- Ripping of the weak rock (rock whose seismic velocity does not exceeds 2,000 m/s) by means of 228 kW crawler type tractor equipped with mono-shank ripper;
- Loading on dump trucks by means of 157 kW (3.30 m^3 heaped bucket) and/or 161 kW (2.35 m^3 heaped bucket) hydraulic backhoes according to material type a;
- Transport of the excavated material to designated spoil area or to the fill area by means of 36.6 t payload off-highway dump trucks;
- Roughs spreading of the unloaded material in spoil area by means of 72 kW bulldozers;
- Lighting of the work area by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

The excavation of weathered rock on steep slopes has been foreseen with the "sliding method" as described before in Paragraph 6.1.2 for the common excavation.

6.3 Surface Excavation, Rock

6.3.1 General

The hydro-power area is made up of interlaying Lower Cretaceous formation complex and the structures are mainly located in rock characterized by sandstones and aleurolites with occasional layers of argillites. The sandstone is predominant in the area. On the surface there are some deposits represented by gypsified argillites, small gypsum pockets and salt-bearing rock.

The rock has an average specific weight of ranging from 2.4 to 2.6 t/m^3.

The compressive strength in dry condition ranges from 80 to 119 MPa for the sandstone, 60 to 70 MPa for the aleurolites and 40 to 50 MPa for the argillites.

The rock has been considered with a drillability index ranging from 50 to 60 DRI. The abrasiveness of the material has been classified of intermediate degree.

6.3.2 Construction Method

The following construction method has been foreseen for the execution for the rock excavation:

- Drilling in limited and/or steep areas by means of hand-held drills outfitted with 38-40 mm diameter and 800-4000 mm long integral drill steels;
- Drilling in steep areas by means of tired hydraulic type drills outfitted with 51 mm diameter and 3660 mm long rods;
- Drilling in large and not steep areas by means of 116 kW hydraulic type crawler-mounted rock drills outfitted with automatic rod exchanger and operating with button bits with diameter of 76 mm;
- Height of drilling benches ranging from 2 to 4 m for hand held drills, 3 to 6 m for tired hydraulic drill and from 10 to 12 m for crawler hydraulic drills;
- Hole pattern of approx. 1.20 x 1.50 m (burden x spacing) for hand held drill, of approx. 1.80 x 2.00 m for tired hydraulic drill and of approx. 2.70 x 3.40 m for crawler rock drill according to specific conditions of each excavation to be carried out;
- Transport of explosive by means of 10 t pay load flat-bed lorry outfitted with 7.0 t/m capacity hydraulic crane;
- Charging of the holes with ammonite and gramonite type explosive;
- Firing with detonating fuse along the entire drilled length and electric detonators connected with the shot-firing cable;
- Loading of the excavated material on dump trucks by means of 301 kW hydraulic front shovel (4.1 m^3 heaped bucket) equipped with bottom dump type bucket;
- Assistance to the front shovel with 231 kW bulldozer equipped with straight or angled blade;
- Trimming works in excavation area where necessary by means of 130 kW (1.80 m^3 heaped bucket) hydraulic backhoe;
- Transport of the excavated material to the approved spoil area or stockpile by means of 36.6 t pay load off-highway dump trucks;
- Spreading of the unloaded material in spoil area or stockpile: by means of 72 kW bulldozer;
- Lighting of the work areas by means of mobile diesel powered 6,000 W floodlights when the work is carried out during night shifts.

The presplitting method has been considered for the final lines of excavation where there it is the necessity to control the overbreak such as some surfaces which are in contact with concrete structures.

7. Underground Excavation

7.1 Tunnels

7.1.1 General

For this chapter the word “tunnels” includes tunnels, adits, galleries and any access executed in underground as well.

The rock to be excavated in underground mainly consists of sandstone and aleurolites with occasional layers of argillites as described before in Paragraph 6.3.1.

For establishing the unit price of most tunnel excavations, the rock has been subdivided in five classes according to the ground conditions as follows:

Class I - Competent rock which needs for each round only random (spot) rock bolts both on arch and sidewalls;

Class II - Moderately fractured rock which needs for each round pattern rock bolts associated with possible thin layer of shotcrete on arch and random rock bolts on sidewalls;

Class III - Fractured rock which needs for each round pattern rock bolts associated with a moderate layer of shotcrete reinforced with welded wire both on arch and sidewalls;

Class IV - High fractured rock which needs for each round pattern rock bolts associated with thick layer of shotcrete reinforced with welded wire fabric both on arch and sidewalls;

Class V - Fault crossings and decomposed rock which needs for each round steel ribs with lagging in conjunction with thick layer of shotcrete reinforced with welded wire fabric and possible rock bolts.

The above mentioned rock supports are intended to be installed immediately after the removal of the muck of each round and the completion of the scaling.

The rock classification of the main underground works that have been analyzed for establishing the unit prices is given in the following table:

N°	Tunnel	Rock Class				
		I	II	III	IV	V
1	**Transportation tunnels**					
1.01	Tunnel T1			66.7%	33.3%	
1.02	Tunnel T2			89.9%	10.1%	
1.03	Tunnel T3			12.4%	87.6%	
1.04	Tunnel T3’			74.6%	25.4%	
1.05	Tunnel T4		100%			
1.06	Tunnel 5A		20.0%	39.0%	40.0%	1.0%
1.07	Tunnel T6		100%			
1.08	Tunnel 7			96.6%	3.4%	
1.09	Tunnel 8			100%		

1.10	Tunnel 37			59.9%	40.1%	
2	**Access adits**					
2.01	Adit P1			100%		
2.02	Adit P1B			100%		
2.03	Adit P3			86.4%	5.3%	8.3%
2.04	Adit P11			100%		
2.05	Adit P13				100%	
2.06	Adit P16				100%	
2.07	Adit P16B			100%		
2.08	Adit P21				100%	
2.09	Adit P23				100%	
2.10	Adit P25A			100%		
2.11	Adit P25 & 25'			100%		
2.12	Adit P28			100%		
2.13	Adit P35				100%	
2.14	Adit P40					100%
2.15	Adit P80				25.6%	74.4%
3	**Grouting and drainage galleries**					
3.01	Dam grouting galleries 1, 2 & 3					100%
3.02	Combined saline and dam curtain grouting gallery			100%		
3.03	Dam curtain grouting gallery, active and passive stretch			100%		
3.04	Drainage galleries of powerhouse			100%		
3.05	Drainage galleries of diversion tunnel gate chambers			100%		
3.06	Drainage galleries of stage 1 power tunnel gate chamber			100%		
4	**Others underground works**					
4.01	Stage 1 power tunnel			100%		
4.02	Powerhouse			66.67%	33.33%	
4.03	Transformer chamber			100%		
4.04	Diversion tunnel, pressure stretch			83.93%	16.17%	
4.05	Diversion tunnel, free-flow stretch left bank			62.83%	37.17%	
4.06	Diversion tunnel, free-flow stretch right bank				100%	
4.07	Auxiliary diversion tunnel			100%		
4.08	Diversion tunnel gate chambers			100%		
4.09	Cable tunnel 1				100%	
4.10	Cable tunnel 2			82.6%	17.4%	
4.11	Cable tunnel 1 & 2 (common stretch)				100%	
4.12	Collector of draft tubes of units 1-2-3			100%		
4.13	Ventilation adit parallel to T3			74.6%	25.4%	
4.14	Cross slit N°1			83.93%	16.17%	
4.15	Miscellaneous tunnels, adits and galleries		20.0%	45.0%	30.0%	5.0%

7.1.2 Cycle times

The construction times of the tunnels have been analyzed in detail and each round includes the following work phases which take place in sequential times:

- Drilling by means of tunneling jumbos;
- Explosive charging and blasting;
- Ventilation time before resuming the activities after blasting;

- Primary scaling of the excavated surfaces;
- Loading and transport of the muck;
- Bolt drilling and tensioning;
- Welded wire fabric placing;
- Steel ribs and lagging placing;
- Shotcrete spraying.

The total time of each round takes the efficiency of the site organization and mechanical availability of construction equipment into account as well.

The work in underground has been organized with 3-8 hour shifts per day and 6 working days per week.

7.1.3 Drilling and blasting

Drilling of tunnels has been based on hydraulic tunneling drill rigs (jumbos) having different number of heavy-duty booms ranging from one to three.

All the units are equipped with the following basic components:

a) Computer-based drilling system control panel;

b) Advance boom control which assists the operator to achieve accurate drill hole location, optimization of drilling pattern and limited overbreak;

c) Top hammer hydraulic rock drills with an impact power of 22 kW.

The hydraulic tunneling drill rigs with one boom have been used for tunnels having a cross section area ranging from 15 to 50 m^2 and a max. vertical reach approx.8 m.

The hydraulic tunneling drill rigs with two booms have been used for tunnels having a cross section area ranging from 50 to 80 m^2 and a max. vertical reach of approx. 10 m.

The hydraulic tunneling drill rigs with three booms have been used for tunnels having a cross section area ranging from 80 to 110 m^2 and a max. vertical reach of approx. 12 m.

Where the cross section area of tunnels was more than approx. 110 m^2, the drilling has been planned with the use of two jumbos working side by side.

The length of the holes for each round has been varied according to the rock class as follows:

- Rock Class I length 4.20 m
- Rock Class II length 3.50 m
- Rock Class III length 3.00 m
- Rock Class IV length 2.60 m
- Rock Class v length 2.00 m

The advance of the excavation per round (pull or yield per round) has been assumed with a length of approx. 92% of the hole length.

The blasting sequence in the tunnels has been established starting from the "cut" based on parallel holes close to the center of the face, designed to provide the ideal line of deformation. The basic layout of the "cuts" involves two uncharged holes with a diameter of 102 mm which provide empty space for the adjacent blasted holes to swell into and six blasting holes having the same diameter of the other holes of the round.

For the charging of drilled holes with the explosive, hydraulic extendable lifters outfitted with platforms having a capacity of 1,000 kg and a reach ranging from 12 to 18 m have been used. A manually charging with conventional tamping wooden or plastic rod has been adopted.

All rounds have been prepared with sufficient contour holes drilled along the perimeter of the drilling pattern with an interval not exceeding 50 cm. The contour holes are blasted with the same detonating number and simultaneously with the other holes to achieve a smooth and even surface with the minimum overbreak.

7.1.4 Overbreak

The overbreak or over-excavation, is the excavation behind the theoretical lines shown on the drawings that occurs in the tunneling works due to both the drilling look-out and the detachment or collapse of rock fragments during the blasting operation because of joints, limited cohesion and other equivalent factors of the rock formation.

The value of the look-out, i.e. the unavoidable necessity to angle the boreholes with reference to the tunnel longitudinal axis due to the size of the rock drills head, has been assumed within five centimeters plus three centimeters per meter of hole depth.

The collapse of rock during blasting has been controlled with the smooth blasting method described before in Paragraph 7.1.3.

The total average overbreak caused by the above mentioned factors which has been assumed for the unit price analyses of the tunnel excavation range from 12 cm to 30 cm according to the pull and the rock conditions.

7.1.5 Loading of muck

Loading of the muck has been planned by means of different types of equipment according to the width of the invert of each tunnel.

For tunnels having a width ranging from approx. 3.0 m to 5.0 m, the loader consists of an approx. 1.90 m wide crawled backhoe equipped with inclined steel conveyor (continuous loader) having a length sufficient to unload the muck into a dumper located just at the back of the same loader. The main benefit of the continuous loader is that it does not require turning niches.

For tunnels having a width ranging from approx. 5.0 m to 8.0 m, the loader consists of an approx. 2.90 m wide crawled backhoe having the characteristics described before for tunnels having a width ranging from approx. 3.0 m to 5.0 m but with a bigger loading capacity.

For tunnels having a width over approx. 8.0 m, the machine consist of wheel loaders having a width ranging approx. from 2.80 to 3.40 m, a power ranging from 157 to 275 kW and a rock type bucket designed for the side dumping method. The main benefit of the

wheel loaders equipped with side-dump-bucket is that they can transfer the muck to the dumper with a reduced cycle time and a reduced tire wearing.

7.1.6 Transport of muck

As described in the previous paragraph for the muck loading, the transport of the excavated material has been planned by means of different types of equipment according to the width of the invert of each tunnel.

For tunnels having a width ranging from approx. 3.0 m to 5.0 m, the muck transport has been planned by means of tunnel articulated dump trucks (mine trucks) having a width ranging from 1.90 to 2.40 m, a payload capacity ranging from 20 to 30 tons, all wheel drive and a reverse seat.

For tunnels having a width ranging from approx. 5.0 m to 8.0 m, for the muck transport has been planned by means of tunnel articulated dump trucks having a width ranging from 2.40 to 3.20 m, a payload capacity ranging from 30 to 42 tons, all wheel drive and a reverse seat.

For tunnels having a width over approx. 8.0 m, the muck transport has been planned by means of articulated dump trucks having a width of approx. 3.20 m and a payload capacity of 42 tons and by means of conventional off-highway rear dump trucks having a width of approx. 4.80 m and a payload capacity of 36.6 tons.

The tunnel articulated dump trucks during the loading phase are placed in line at the back of the loader.

The off-highway dump trucks during the loading phase are placed at the side of the loader.

7.1.7 Excavation stages

The tunnels having a cross section area up to approx. 110 m^2 have been considered drilled and blasted in one stage using tunneling jumbos designed to drill horizontal holes.

The tunnels having a cross section area over approx. 110 m^2 have been considered drilled and blasted in two or three stages as shown on the annexed Figure 1.

Where the drilling and blasting is executed in two stages, the first stage concerns the top heading and the second stage concerns the benching and both stages are drilled with a tunneling jumbo designed to drill horizontal holes.

Where the drilling and blasting is executed in three stages:

- the first stage concerns the top heading using a tunneling jumbo which drills horizontal holes;
- the second stage concerns the upper benching using a tunneling jumbo which drills horizontal holes and;
- the third stage concerns the lower benching using air powered crawled rock rigs which drill sub-vertical holes.

7.1.8 Ventilation

To this purpose, a blowing ventilation system has been provided during both the excavation and concrete works in all tunnels, so that a healthy working environment for the personnel working or in transit in the same tunnels is maintained during the time of the rounds.

The ventilation in underground has been designed with a variable return flow according to the number of persons and the diesel powered equipment at work at the face of heading and along the tunnels .It has considered a minimum of 2.0 m^3/min of fresh air for each horsepower at work within the tunnel plus of 3 m^3/min of fresh air for each person present in the tunnel.

However in general the fresh air return flow ranges from 0.25 m/s to 0.40 m/s respectively for tunnels where the use of diesel powered equipment is limited and for tunnels where the use of diesel equipment is greater.

7.1.9 Electric power

The electric power is supplied to the portals of the tunnels by mean of the 24 kV line that is connected to the temporary power station equipped with diesel generating sets as detailed before in Chapter 5.

A transformer cabin located near the tunnel portals change the voltage of the electric power from 24 kV to 3.0 kV, to 1.0 kV and 0.4 kV.

The 0.4 kV voltage supplies power to the fans which are located in the nearby of the transformer cabin.

The 1 kV voltage supplies power to the line along the tunnel which at interval of approx. 400/500 m will connect the auxiliary line installed for lighting, floodlights and small electric powered tools by means small 1.0 kV/0.25 kV transformers.

The 3 kV voltage supplies power to the line that is used by the tunneling jumbos and the electric powered muck loaders operating at the tunnel face of heading.

With interval of approx. 500 m along the tunnel a mobile transformer cabin is installed with the function of changing the voltage from 3 kV to 0.4 kV as required by the engines of tunneling jumbos and of the electric powered muck loaders.

7.1.10 Compressed air

The compressed air, during the excavation phase of the tunnels, is mainly used for hand-held drills, hand-held breakers, air powered diaphragm water pumps and other air powered tools which are necessary for performing the auxiliary works of each round.

The air is supplied by diesel powered compressors and distributed along the tunnel by means of steel pipes outfitted with fast-type joints and conventional fittings necessary along the lines.

Steel tanks with a capacity ranging from 4 to 6 m^3 equipped with proper water separators designed for removing moisture condensation and shut-off valves are installed near the compressors and along the lines.

The size of the pipelines for the compressed air has been established taking the necessities of both the excavation and the concrete works into account and in general range from 100 mm to 250 mm diameter.

7.1.11 Main data about tunnels, adits and galleries

The main data about the main tunnels, adits and galleries whose unit price has been analyzed in detail are as follows:

N°	Description	Total length (m)	Average c. s. area (m2)	Number of blast holes	Explosive (kg/m^3 of rock)	Muck transport (m)
1	**Transportation tunnels**					
1.01	Tunnel T2	775.5	87.80	87	1.20	5,490
1.02	Tunnel T3	1,529.6	106.00	92	1.15	2,300
1.03	Tunnel T3'	674.0	94.40	89	1.15	2,970
1.04	Tunnel T4	1,946.6	55.60	71	1.32	5,290
1.05	Tunnel T5A	194.0	68.5	78	1.26	4,220
1.06	Tunnel T6	110.0	102.20	92	1.13	2,750
1.07	Tunnel T7	185.6	113.10	94	1.14	3,780
1.08	Tunnel T8	287.6	79.20	85	1.24	2,320
1.09	Tunnel T37	491.0	58.50	73	1.32	2,360
2	**Access adits**					
2.01	Adit P1	466.7	69.10	79	1.28	1,880
2.02	Adit P1B	295.0	24.40	50	1.88	2,360
2.03	Adit P3	611.7	40.00	62	1.44	1,960
2.04	Adit P11	215.0	95.10	90	1.14	2,860
2.05	Adit P13	180.0	51.50	68	1.34	2,120
2.06	Adit P16B	108.0	75.00	82	1.24	1,750
2.07	Adit P21	234.0	35.30	57	1.54	2,710
2.08	Adit P23	431.2	37.90	60	1.46	2,480
2.09	Adit P25A	114.9	104.90	93	1.15	2,350
2.10	Adit P25 & 25'	898.8	63.80	70	1.27	2,230
2.11	Adit P28	225.4	47.50	67	1.35	2,270
2.12	Adit P35	169.5	51.50	68	1.34	2,420
2.13	Adit P80	359.6	67.20	77	1.27	2,130
3	**Grouting galleries**					
3.01	Dam grouting gallery 1	234.55	34.85	57	1.54	2,670
3.02	Dam grouting gallery 2	191.96	23.19	47	1.96	2,640
3.03	Dam curtain gallery joint left-right	247.85	58.28	73	1.32	1,770
3.04	Dam curtain gallery left bank, active stretch	315.79	43.74	65	1.40	1,790
3.05	Dam curtain gallery left bank, passive stretch	318.03	43.74	65	1.40	1,760
3.06	Combined saline and dam curtain grouting gallery	529.28	42.64	63	1.42	3,210
4	**Drainage galleries**					
4.01	Drainage gallery of powerhouse, low level	793.65	25.04	49	1.87	2,460
4.02	Drainage gallery of powerhouse, mid level	864.78	28.27	52	1.77	2,180
4.03	Drainage gallery of diversion tunnel gate chambers	466.50	31.94	53	1.63	2,130
4.04	Drainage gallery of stage 1 power	173.81	22.95	48	1.97	2,170

	tunnel gate chamber					
5	**Miscellaneous tunnels and galleries**					
3.01	Stage 1 power tunnel	307.7	72.05	80	1.26	2,110
3.02	Cable tunnel 1	623.41	47.50	67	1.35	2,700
3.03	Cable tunnel 2	404.50	52.48	71	1.33	2,700
3.04	Auxiliary tunnel of diversion tunnel	167.91	99.98	91	1.13	2,180
3.05	Ventilation gallery parallel to T3	548.90	21.72	46	2.04	3,530

7.1.12 List of construction equipment and tools

The list of construction equipment and tools used for the excavation of the tunnels accounts approx. 40 units whose details are given in the unit price analyses which are included in Volume e 2 of Phase I Cost Estimate.

7.2 Powerhouse and Transformer Chamber

7.2.1 Powerhouse

The powerhouse was considered to be built in several steps.

During the first step the excavation and concrete works for the construction of the arch and of the benching up to approx. elevation 962.20 masl would be executed.

During the second step the excavation and concrete works necessary for the installation of the generating Units N°1 and N°2 would be execu ted.

During the third step the works that are necessary for the installation of the remaining generating units, i.e. the Units from N°3 to N°6 w ould be executed.

The excavation of the first step has been divided into several drilling and blasting stages as shown on the annexed Figure 2 as follows:

1) Stage 1 - Arch

The arch is excavated up to the El. 993.10 masl in three top headings, i.e. a central heading having a width of approx. 6.0 m and two lateral reamings having a width of approx. 8-9 m by means of horizontal holes drilled with two-boom tunneling jumbo.

The muck is loaded by means of crawled backhoe equipped with inclined steel belt conveyor and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 20 tons. The excavation of this stage would be executed through the access adit excavated just for the powerhouse crown.

During the excavation, the rock supports which mainly are composed of rock bolts, welded wire fabric and shotcrete are installed along the crown surface.

When the excavation of this stage is completed, the concrete lining of the crown is poured in sections.

From El. 993.10 to El.974.60 an inclined access with a city gate shape having a cross section of approx. 38 m^2 would be excavated, a length of approx. 210 m and a slope of approx. 9% which would be mainly used for the mucking activity and the services necessary for this portion of excavation.

2) Stage 2 – From El. 993.10 masl to El. 986.00 masl

This stage with a height of approx. 7.10 m is excavated up to the El. 986.00 masl in three sections, i.e. two lateral drifts having a width of approx. 5.50 m by means of horizontal holes drilled with two-boom tunneling jumbo type and a central drift having a width of approx. 11.70 m by means of air-powered crawled drills and sub-vertical holes.

The services for the excavation of this stage are supplied through the inclined access and the muck is transported to the disposal area via the powerhouse access tunnel.

When the excavation of this stage is completed, the tendons and the concrete works for the main crane beams are performed.

3) Stage 3 – From El. 986.00 masl to El. 967.90 masl

This stage, with a height of approx. 18.10 m, is excavated up to the El. 967.90 masl with three benches of approx. 6.0 m each by means of air-powered crawled drills and sub-vertical holes.

The services for the excavation of this stage are supplied through the inclined access and the muck is transported to the disposal area via the powerhouse access tunnel.

A ramp is provided for the transport of the muck which is excavated below El. 974.60, i.e. the elevation of the powerhouse access tunnel.

4) Stage 4 – From El. 967.90 masl to El. 962.20 masl

This stage, with a height of approx. 18.10 m, is excavated up to the El. 967.90 masl with three benches of approx. 6.0 m each by means of air-powered crawled drills and sub-vertical holes.

The services for the excavation of this stage are supplied through the inclined access and the muck is transported to the disposal area via the powerhouse access tunnel.

The ramp designed for the transport of the muck of Stage 3 is extended up to El. 962.20.

7.2.2 Transformer chamber

The Transformer Chamber is excavated with a construction method similar to that described before in Paragraph 7.2.1.

The excavation of the chamber starts from the top using the access adits built just for serving this part of the powerhouse construction and proceeds in several stages up to the bottom as shown on the annexed Figure 3.

The excavation has been planned as follows:

1) Stage 1 - Crown

The crown is excavated up to the El. 1012.80 masl in three sections, i.e. a central drift having a width of approx. 5.5 m and two lateral drifts having a width of approx.7.30 m by means of horizontal holes drilled with a two booms tunneling jumbo.

The muck is loaded by means of crawled backhoe equipped with inclined a steel conveyor and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 25 tons.

When the excavation of this stage is completed, the concrete lining of the crown will be poured.

From El. 1012.80 to El.983.00 an inclined access with a city gate shape having a cross section of approx. 30 m^2 is excavated, a length of approx. 380 m and a slope of approx. 8%, which is used for the mucking activity and the services necessary for this portion of excavation.

2) Stage 2 – From El. 1012.80 masl to El. 1008.30 masl

This stage, with a height of approx. 4.5 m, is excavated up to the El. 1008.3 masl in three sections, i.e. two lateral drifts having a width of approx. 5.0 m by means of horizontal holes drilled with a two booms tunneling jumbo and a central drift having a width of approx. 10.0 m by means of air-powered crawled drills and sub-vertical holes.

The services for the excavation of this stage are to be supplied through the inclined access and the muck is transported to the disposal area via the transformer chamber access gallery.

When the excavation of this stage is completed, the tendons and the concrete works for the main crane beams are performed.

3) Stage 3 – From El. 1008.30 masl to El. 991.30

This stage, with a height of approx. 17.0 m, is excavated up to the El. 991.3 masl with three benches of approx. 5.7 m each by means of air-powered crawled drills and sub-vertical holes.

The services for the excavation of this stage are to be supplied through the inclined access and the muck is transported to the disposal area via the transformer chamber access tunnel.

4) Stage 4 – From El. 1991.30 masl to El. 982.00

This stage, with a height of approx. 9.3 m, is excavated up to the El. 982.0 masl with a sole bench by means of air-powered crawled drills and sub-vertical holes.

The services for the excavation of this stage are to be supplied through the transformer hall access tunnel.

The excavation executed with horizontal drifts is performed with the smooth blasting method and 0.50 m hole interval. The excavation by means of air-powered crawled drills and sub-vertical holes is performed with the presplitting method and 0.45 m hole interval.

The muck of sections from stage 2 to Stage 4 are loaded on dumper by means of 157 kW wheel loaders and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 25 tons.

7.3 Gate Chambers

7.3.1 Diversion tunnel maintenance gate chamber

The excavation of the maintenance gate chambers starts from the top when the excavation of the related access adit reaches the crown and proceeds in several stages up to the bottom, as shown on the annexed Figure 1 related to large tunnels and Figure 3 related to the transformer chamber.

The excavation has been planned as follows:

1) Stage 1 - Crown

The crown is excavated up to the crane beam elevation in one section having an approx cross section of 83 m^2 by means of horizontal holes drilled with a two booms tunneling jumbo.

The muck is loaded by means of crawled backhoe equipped with inclined steel conveyor and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 20 tons. The excavation of this stage is executed through the access adit to the crown.

When the excavation of this stage is completed, the concrete lining of the crown is poured.

From the crane beam elevation is excavated a shaft up to the crown of the beneath tunnel which has to be excavated before starting the stage 2 of this chamber. Such shaft has a diameter of approx. 3.00 m which is mainly used for the mucking operation.

2) Stage 2 – From Crane beams to gate operation level

This stage, with a height of approx. 14.0 m, is excavated with two benches of approx. 7.0 m each by means of air-powered crawled drills and sub-vertical holes.

The muck is moved to the vertical shaft by means of 157 kW (3.10 m3 heaped bucket) wheel loaders and then reloaded by means of the same machines and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 25 tons.

3) Stage 3 – From gate operation level to the beneath tunnel

This stage, with a height of approx. 13.80, m is excavated with two benches of approx. 6.9 m each by means of air-powered crawled drills and sub-vertical holes.

The drilling and blasting in contact with final excavation surfaces is performed with the presplitting method having hole intervals of 0.45 m.

The muck is loaded on dumper by means of a157 kW wheel loader and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 25 tons.

7.3.2 Diversion tunnel emergency & main sector gate chamber

The excavation of the emergency and main sector gate chambers starts from the top after the excavation of the related access adit and proceeds in several stages up to the bottom, as shown on the figures mentioned before in Paragraph 7.3.1 for the maintenance gate chamber.

The excavation has been planned as follows:

1) Stage 1 - Crown

The crown is excavated up to the crane beams elevation in three sections, i.e. a central drift having a width of approx. 5.5 m and two lateral drifts having a width of approx. 9-10 m by means of horizontal holes drilled with a two-booms tunneling jumbo.

The muck is loaded by means of crawled backhoe equipped with inclined steel conveyor and transported to the disposal area by means of articulated dump trucks having a pay

load capacity of 20 tons. The excavation of this stage is executed through the related access adit.

When the excavation of this stage is completed, the concrete lining of the crown is poured.

From the crane beam elevation is excavated a shaft up to the crown of the beneath tunnel which has to be excavated before starting the stage 2 of this chamber. Such shaft has a diameter of approx. 3.00 m and is mainly used for the mucking operation.

2) Stage 2 – From gate operation level to the beneath tunnel

This stage, with a height of approx. 11.70, m is excavated with two benches of approx. 5.9 m each by means of air-powered crawled drills and sub-vertical holes.

The muck is moved to the vertical shaft by means of 157 kW (3.10 m^3 heaped bucket) and then reloaded by means of the same loaders and transported to the disposal area by means of articulated dump trucks having a pay load capacity of 25 tons.

7.3.3 Other chambers

The excavation of other chambers of the power plant has been performed as described before in Paragraphs 7.3.1 and 7.3.2.

8. Concrete

8.1 Borrow area

8.1.1 General

The concrete aggregates are obtained by processing the alluvial material of the Borrow Area 15(a) which is located on the left bank of the Vahksh River close to the Construction Yard N°1 and approx. 1500 m from the portal of the Transportation Tunnel T3.

The granulometric composition of the alluvium of this borrow area are given before in Paragraph 2.1.

8.1.2 Construction Method

The following construction method has been foreseen for the aggregates of Lot 1 concrete:

- Excavation of the hard alluvium to be loaded on the dump trucks by means of 157 kW bulldozer;
- Loading on the dump trucks of the alluvium excavated with bulldozers by means of 115 kW (2.40 m^3 heaped bucket) wheel loaders and 157 kW (3.30 m^3 heaped bucket) wheel loaders;
- Loading on the dump trucks of the other alluvium by means of 130 kW (1.80 m^3 heaped bucket) hydraulic backhoes and 161 kW (2.35 m^3 heaped bucket) hydraulic backhoes;

- Transport of the alluvium to the processing plant by means of 24 tons pay load rear tippers.

The following construction method has been foreseen for the aggregates of Lot 2 concrete:

- Excavation of the hard alluvium to be loaded on the dump trucks by means of 179 kW bulldozer;
- Loading on the dump trucks of the alluvium excavated with bulldozers by means of 157 kW (3.30 m^3 heaped bucket) wheel loaders and 199 kW (4.30 m^3 heaped bucket) wheel loaders;
- Loading on the dump trucks of the other alluvium by means of 130 kW (1.80 m^3 heaped bucket) hydraulic backhoes and 161 kW (2.35 m^3 heaped bucket) hydraulic backhoes;
- Transport of the alluvium to the processing plant by means of 36.60 tons pay load off-highway dump trucks.

8.2 Location of the processing plants

The processing plant has been located in the Construction Yard N° 1 close to the batching/mixing plant and close to the road that leads to the Transportation Tunnel T3.

8.3 Quantity of concrete aggregates

The quantities of concrete aggregates have been based on the following volumes of concrete:

a) Concrete for works belonging to Lot 1: 150,000 m^3;

b) Concrete for works belonging to Lot 2: 1,503,000 m^3.

The volume of Lot 1 includes the concretes and asphalt concretes of permanent works as well as the concretes necessary for the construction facilities.

Considering the losses during the processing and an average weight of the aggregates per cubic meter of concrete in the order of 2.10 t/m^3, the total weight of aggregates to be processed for the concretes is as follows:

a) Lot 1: 346,500 tons,

b) Lot 2: 3, 471,930 tons.

8.4 Aggregates Processing Plants

8.4.1 General

The rock is processed by means of stationary plants mainly composed of a primary jaw type crusher(s), secondary gyratory (cone) type crushers, vibratory screens, sand treatment section, conveyor belts, steel hoppers and vibrating feeders. The plants include units suitable to limit flaky shaped aggregates.

From the plant four sizes of aggregates would be obtained, in accordance with the technical specifications that normally are in force for similar works, i.e. two sands (0. to 1.2 mm and 1.2 to 4.75 mm), and two coarse aggregates (4.75 to 19 mm and 19 to 37.5 mm) as shown on the annexed Figure 4.

8.4.2 Plant for Lot 1

A plant with having a 70 t/h capacity has been foreseen for the concretes of Lot 1.

The capacity of this plant is based on one shift of 10 h/day and 20 working days per month.

The classified aggregates of Lot 1 wold be stockpiled on a flat or semi-flat area close to the plant. The sand stockpiles would be kept under proper sheds.

A similar plant, but without some units which are not necessary for the final material, has been foreseen for the production of the road granular materials.

8.4.3 Plant for Lot 2

A plant with having a 190 t/h capacity has been foreseen for the concretes of Lot 2.

The capacity of this plant is based on two shifts of 10 h/day and 20 working days per month.

The classified aggregates of Lot 2 will be stockpiled on a flat or semi-flat area close to the plant. The sand stockpiles would be kept under proper sheds.

8.5 Batching and mixing concrete plants

8.5.1 Plant for Lot 1

The concrete of Lot 1 is mixed in a stationary batching plant equipped with horizontal shaft mixer having a capacity of 55 m^3/h based on cycles of 90 seconds.

The main characteristics of the batching/mixing plant are as follows:

- Linear storage bins for aggregate divided in 4 compartments with a total capacity of 170 m^3;
- Batching gates in number of 2 for each compartment;
- Aggregate weighting hopper with a water volume of 6,000 litters;
- Weight/extraction belt conveyor for aggregates having a width of 800 mm;
- Inclined conveyor belt from the bins to the top of the steel structure which support the mixer having a width of 800 mm;
- Sand moisture measuring device with two probes;
- Liquid admixture batching unit;
- Twin-shaft compulsory mixer with two mixing zones by counter-rotating synchronized shafts;
- Discharge hopper from the mixer to the truck-mixer;

- Automatic washing system of mixer;
- Automatic control system equipped with software for PC and PLC to manage and control the batching plant.

The processed aggregates are transported to the hopper of the batching/mixing plant by means of a 115 kW (2.40 m^3 heaped bucket) wheel loader.

Cement silos with a capacity of 460 m^3, i.e. a capacity sufficient for approx. six consecutive working days according to the expected average daily production are installed close to the plant. The cement is transported from the silos to the mixer by means of screw conveyors.

8.5.2 Plant for Lot 2

The concrete of Lot 2 is mixed in two stationary batching plant equipped with horizontal shaft mixer having a capacity of 65 m^3/h based on cycles of 90 seconds.

The main characteristics of the batching/mixing plant are those listed before in Paragraph 8.5.2 for Lot 1.

The processed aggregates are transported to the hopper of the batching/mixing plant by means of a belt conveyor installed in ARMCO type steel pipe located below the yard level.

Cement silos with a capacity of 1,310 m^3, i.e. a capacity sufficient for approx. six consecutive working days according to the expected average daily production, are installed close to the plant. The cement is transported from the silos to the mixer by means of screw conveyors.

8.6 Cement

The quantity of cement used for each classes of concrete has been established according to the size of the aggregates, the compressive strength and the expected slump (slump which is connected to the placing construction equipment used).

The following cement contents have been considered for the various classes of concrete:

Class	Compressive Strength (N/mm^2-28 days)	Cement Content (kg/m3)	
		(placing with bucket)	(placing with pump)
A1-30/19	30	410	470
A2-30/37	30	360	420
B1-25/19	25	360	420
B2-25/37	25	310	360
C1-16/19	16	300	-----
C2-16/37	16	260	-----
Class: 19=19 mm (3/4") & 37=37 mm (1-1/2") maximum aggregate size			

For the underground works, sulfate resistant cement has been used both for normal concrete and shotcrete. A 50% of sulphate resistant cement by weight has been included in the Bill of Quantities.

8.7 Transport of Concrete

The conventional concrete is in general transported to the placing areas by means of truck-mixers having a nominal capacity ranging from 5 to 12 m^3. The actual capacity of the truck mixers has been established with a proper coefficient.

The maximum capacity of the truck-mixers to be used for transport of the concrete has been chosen according to the volume of concrete to be poured and the dimensions of the access adits and tunnels.

8.8 Placing of Surface Concrete

8.8.1 Formworks

The formworks necessary for the confinement of the surface concrete have been subdivided into six basic types as follows:

a) Type 1 - Flat type for walls with modular use

These formworks are composed of steel panels outfitted with adjustable masts, bolts for anchoring with tyloops and service platform.

b) Type 2 - Flat type for walls of non-modular use

These formworks are composed partly of modular steel panels connected with clamps and partly of timber planks, timber squares and plywood.

c) Type 3 - Flat type for columns, piers, and pillars

These formworks are composed of steel modular panels, timber planks and plywood.

d) Type 4 - Flat type for slabs

These formworks are composed partly of timber planks, timber squares and plywood.

e) Type 5 - Flat type for mixed structures

These formworks are composed steel panels outfitted with adjustable masts, modular steel panels, timber planks, timber squares and plywood.

f) Type 6 - Curved for miscellaneous structures

These formworks are composed of timber planks, plywood and timber squares.

Where necessary the formworks have been combined in order to meet the necessities of the specific working conditions.

8.8.2 Scaffoldings

The scaffoldings to be used in connection with the formworks have been subdivided into two types as follows:

a) Scaffoldings for slabs

These scaffoldings are composed of vertical, horizontal and inclined high grade steel pipes which are connected in such a way to form a structure having sufficient strength to supports the weight of concrete for slabs. Scaffoldings designed for supporting a max.

load of 20 KN/m^2 and 50 KN/m^2 have been considered for the concrete structures to be built.

b) Scaffoldings for walls

The scaffoldings for walls are composed of prefabricated elements installed at interval of approx. 1.80 m in elevation and designed to form walkways to be used by the personnel working along the external surfaces of the structures.

8.8.3 Placing

The pouring and compaction of the conventional concrete has been planned as follows:

- Placing by means of diesel powered towed concrete pumps with a maximum capacity ranging from 28 to 71m^3/h, truck mounted concrete pumps with nominal capacity ranging from 110 to 140 m^3/h, and mobile tired cranes equipped with conventional concrete type bucket;
- Compaction by means of 77 mm and 80 mm diameter hand-held air powered immersion type vibrators;
- Supply of compressed air for the air powered vibrators and the general services such as the preparation of construction joints etc. by means of diesel powered compressors.
- Finishing of slabs by means of manual trowels;
- Curing by means of water sprinkles and moistened sack-cloths (burlaps).

8.9 Placing of Underground Concrete

8.9.1 Blinding (Lean) Concrete

The blinding concrete on the invert of the tunnels and other areas to be covered with concrete is placed after the removal of the loose materials and the cleaning of the rock surface.

The existing loose material is removed mainly manually but with the assistance of small hydraulic type backhoe (41 kW) and hand-held air powered breakers. The removed material is transported to the spoil area by means of 2.5 t pay load 4WD dumpers equipped with reversible steering.

After the removal of the loose materials, the cleaning of the rock surface is carried out by means of proper brushes and water jets under pressure.

Before starting the pouring operations, the possible water inflows is controlled by installing suitable pipes and other devices so that the concrete lining cannot be affected both during pouring and curing times.

The concrete is transported from the batching/mixing plant to the placing site by means of transit mixers having a nominal capacity from 5 m^3 to 8 m^3 and unloaded on the invert with the chute which is attached to the same mixers.

The material is spread and tamped on the surfaces by manual tools in such a way to fill the existing overbreak and leave a reasonable flat surface.

The pouring of blinding concrete on invert has been planned in section ranging from 50 to 80 m long.

8.9.2 Lining of tunnels, adits, galleries and similar works

a) Inverts

The concrete of inverts is poured on an existing blinding concrete, if any, or on rock according to the details shown on the drawings.

Where the concrete is poured on an existing blinding concrete, the surface is cleaned and the possible stagnant water removed.

Where the concrete is poured on rock, the surface preparation and water control are carried out as described in the previous Paragraph 8.9.1 related to the blinding concrete.

Where the concrete has to be placed on different levels (side-walks, ditches, curbs and similar), conventional formworks composed of timber and/or steel are installed.

The closure of the formworks for the confinement of the concrete along the vertical joints is carried out as described in the herein-below Paragraph (b) related to the lining of arch/sidewalls.

The concrete is transported from the batching/mixing plants to the placing site by means of transit mixers having a capacity ranging from 5 to 10 cubic meters according to the volume of concrete to be placed and the dimensions of the tunnel.

The pouring of invert has been planned in sections with a length ranging from 30 to 50 meters and in accordance with the following method:

- Placing the concrete by means of the chute which is attached to the mixer where it is possible to unload the material directly into the slab such as inverts steel reinforcement, side-ways, curbs and similar;
- Placing the concrete by means of towed electric powered concrete pumps having a nominal capacity from 47 to 79 m^3/h where it is not possible to use the chute as described before, i.e. for all inverts which are reinforced;
- Vibration by means of immersion type hand-held air powered vibrators having a diameter ranging from 77 to 80 mm;
- Flattening and/or shaping of the concrete surface according to the lines shown on the drawings by means of vibrating bars and manual steel trowels;
- Finishing of the concrete surface by means of trowels and other hand tools.

b) Arch and sidewalls

The arches and sidewalls of the tunnels are poured in sections having lengths of formworks which are established according to the length of the tunnel and the necessities imposed by the construction schedule.

The formworks are of steel telescopic type in general composed of 1.50 m rings bolted together to form sections equipped with pneumatic external type vibrators, inspection windows and lateral closure for the formation of vertical joints.

Concrete curbs necessary for obtaining a correct leveling and alignment of the steel formworks anchor bolts are poured along the sidewalls at least 15 days before starting the lining of arch and sidewalls.

The formworks sections with a span up to 12 m are in general relocated (displaced) by means of trucks having a pay load in accordance with the weight of the sections to be moved which can ran range from 15 to 30 tons. The trucks are equipped with turret and hydraulic jacks.

The formworks having a span over 12 m are relocated (displaced) by means of rail mounted steel travelers equipped with hydraulic jacks. The travelers have a pay load in accordance with the weight of the sections to be moved.

The concrete is transported from the batching/mixing plants to the placing site by means of transit mixers having a nominal capacity ranging from 5 m^3 to 10 m^3 according to the volume of concrete to be placed and the dimensions of the tunnel.

The pouring of concrete is done by means of electric powered concrete pumps having a maximum capacity ranging from 47 to 79 m^3/h equipped with a 125 mm diameter pipeline supported by means of a sliding snorkel type system.

The vibration of the concrete is carried out by means of the stationary vibrators attached to the formworks. Where necessary, the stationary vibrators are supplemented by means of 77 mm and/or 80 mm diameter air powered hand-held vibrators operating through the windows which are installed along the forms.

The closure of the formworks for the confinement of the concrete along the vertical joints is executed with ribbed steel sheets fixed to steel dowels inserted into holes to be drilled into the rock for a length of approx 0.30-0.50 m.

The equipment related to the general services of the tunnels, such as ventilation, lighting, compressed air etc. is the same that has been used for the excavation of the tunnel.

8.9.3 Powerhouse and transformer chamber

a) Powerhouse

The powerhouse concrete has been planned according to the following steps:

- Step 1: pouring of the arch by means of steel formworks composed of steel panels, steel girder beams and a side structures; the side structure is supported by wheels which can be moved along steel rails installed on a concrete base built when the excavation up to El. 993.10 masl is terminated; the power system is composed of jacks and hydraulic pump;
- Step 2: pouring of the crane beams as soon the excavation up to El. 986.00 masl is terminated;
- Step 3: pouring of the lateral walls and pillars up to elevation 962.20 masl.

The formworks and the scaffolding for walls, beams, columns and slabs are the same described in Paragraphs 8.8.1 and 8.8.2 for the surface works.

The concrete is transported by means of transit mixers having a nominal capacity ranging from 6 m^3 to 10 m^3. The transit mixers with capacity of 6 m^3 are mainly used for

the concrete of the arch, which is transported through the top adit and the concrete of the crane beams through the inclined access excavated from the powerhouse access tunnel (transportation tunnel T4).

The transit mixers with capacity from 8 to 10 m^3 are mainly be used for the concrete which is poured for the walls.

The concrete placing for the powerhouse is performed as described in Paragraph 8.9.2 for the tunnels.

The equipment related to the general services such as ventilation, lighting, compressed air, etc. is the same that have been used for the excavation phase.

g) Transformer hall

The transformer hall concrete has been planned according to the following steps:

- Step 1: pouring of the arch by means of steel formworks as described before for the powerhouse;
- Step 2: pouring of the crane beams as soon the excavation up to El. 1008.30 masl is terminated;
- Step 3: pouring of the walls from the bottom to El. 991.30 El. masl and then up to El. 1008.30 masl;
- Step 4: pouring of the mat (floor).

The concrete is transported by means of transit mixers having a nominal capacity ranging from 6 m^3 to 10 m^3.

The formworks and the scaffolding for walls, beams, columns and slabs are the same described in Paragraphs 8.8.1 and 8.8.2 for the surface works.

The concrete placing for the transformer chamber is performed as described in Paragraph 8.9.2 for the tunnel works.

The equipment related to the general services such as ventilation, lighting, compressed air, etc. is the same that have been used for the excavation phase.

8.9.4 Diversion tunnels, collectors of draft tubes, and similar large tunnels

The concrete of these large tunnels has been planned according to the following steps:

- Step 1: pouring of the arch by means of steel formworks relocated by means of trucks equipped with turret and hydraulic rams as describe in Paragraph 8.9.2 for the other tunnel of the power plant;
- Step 2: pouring of the walls from the bottom to the arch;
- Step 3: pouring of the invert.

The formworks for the walls are the same described in Paragraph 8.8.1 for the surface works.

The construction method related to the concrete transport and placing is the same that has been described before in Paragraph 8.9.2.

9. Reinforcing Steel

The reinforcing steel is transported to the Site by truck and then deposited on flat yards equipped with 40 t/m tower crane which is used both for the unloading and loading of the bars. The area where the bars are deposited is prepared with a concrete pavement.

The preparation, transport and fixing of reinforcing steel has been based on the following construction method:

- Loading and unloading of the bars in the yard by means of 40 t/m tower crane;
- Cut and bend of steel bars by means of electric powered equipment suitable to work up to 32 mm diameters bars of high grade steel;
- Transport of the worked bars from the yard to the placing locations by means of 10 ton pay load flat bed truck equipped with 7.0 t/crane;
- Lifting of the re-steel in the placing area by means of the same stationary or mobile cranes which is used for the erection of the formworks and the pouring of the concrete;
- Distribution and fixing of re-steel in outdoor structures by hand with the assistance of rough terrain cranes;
- Distribution and fixing of re-steel in tunnel linings by hand with the assistance of mobile carriers where possible.

The re-steel placed for slabs are supported with proper U shape trestles while that placed vertically or inclined are properly spaced with stirrups.

10. Drilling and Grouting

The drilling and grouting works mainly concern the contact grouting, the consolidation grouting and the drains for the underground works.

The execution of holes and grouting has been based on the following construction method:

- Holes for the contact grouting with length ranging from 1.0 to 1.50 m. and diameter 38 mm are carried out by means of hand-held heavy weight percussion type drill rigs equipped with integral drill rods;
- Holes for the contact grouting with length ranging from 1.0 to 1.50 m. and diameter ranging from 40 to 48 mm are carried out by means of percussion type electric powered hydraulic drill rigs equipped with 46 mm ballistic type rock bits;
- Holes for the consolidation grouting with length up to 20.0 m. and diameter ranging from 40 to 48 mm are carried out by means of rotary type electric powered hydraulic drill rigs equipped with 3,000 mm long rods and diamond-impregnated bits.
- Holes for the drains with length ranging from 6.0 to 20.0 m are carried out by means of rotary type electric powered hydraulic drill rigs equipped with 3600 mm long rods and 76 mm diameter diamond-impregnated bits.

- Grouting operation by means of electric powered mobile units composed of a mixer, an agitator and a pump mounted on tired cart and having a maximum injection capacity of 5.5 m^3/h.

For performing the drilling and grouting works in underground, the use of scissors type (parallelogram type) platforms and/or extendable platforms have been considered where necessary.

11. Maintenance of Transportation Tunnels after Construction

After the construction, the main transportation tunnels have to be maintained with care in order to allow an uninterrupted transit of the construction equipment and to provide an acceptable working environment for the people who are involved in the works along the same tunnels.

To this purpose the following main services have been foreseen for the time spanning from the completion of the main transportation tunnels to the completion of the underground works:

a) Care of the lanes with the purpose of removing rock fallen from dumpers, clean ditches and pits, repair slides, check the rock supports, maintain the power lines and compressed air lines etc.;

b) Care of the main water inflows with the purpose of assuring the uninterrupted operation of the dewatering pumps, maintenance of the pipelines, control of the inflows etc.;

c) Ventilation of the tunnels by means of sound proof axial type fans having the purpose of keeping the values of gases and concentration of impurities within acceptable limits;

d) Lighting of the tunnels by means of water proof fluorescent lamps and floodlights where necessary.

For every one of these activities a squad of seven to eight men with a foreman working 1-shift/day, 24 days/month and 12 months a year has been assumed for the cost estimate. Each squad is equipped with a personnel transportation vehicle and other construction equipment deemed necessary for performing the maintenance works.

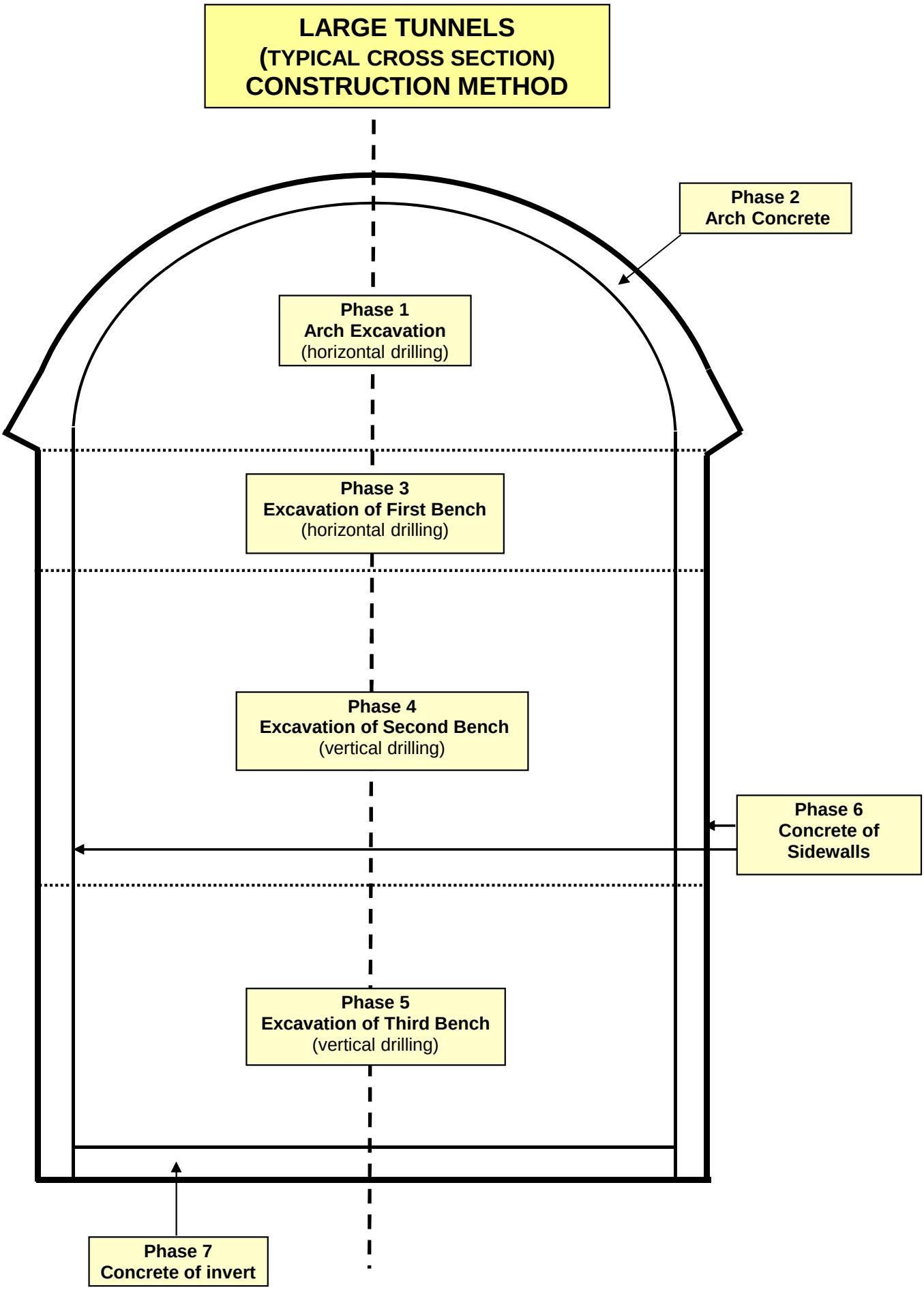
LARGE TUNNELS
(TYPICAL CROSS SECTION)
CONSTRUCTION METHOD
Phase 2
Arch Concrete
Phase 1
Arch Excavation
(horizontal drilling)
Phase 3
Excavation of First Bench
(horizontal drilling)
Phase 4
Excavation of Second Bench
(vertical drilling)
Phase 6
Concrete of
Sidewalls
Phase 5
Excavation of Third Bench
(vertical drilling)
Phase 7
Concrete of invert

Figure 1

POWERHOUSE
(TYPICAL CROSS SECTION)
EXCAVATION METHOD

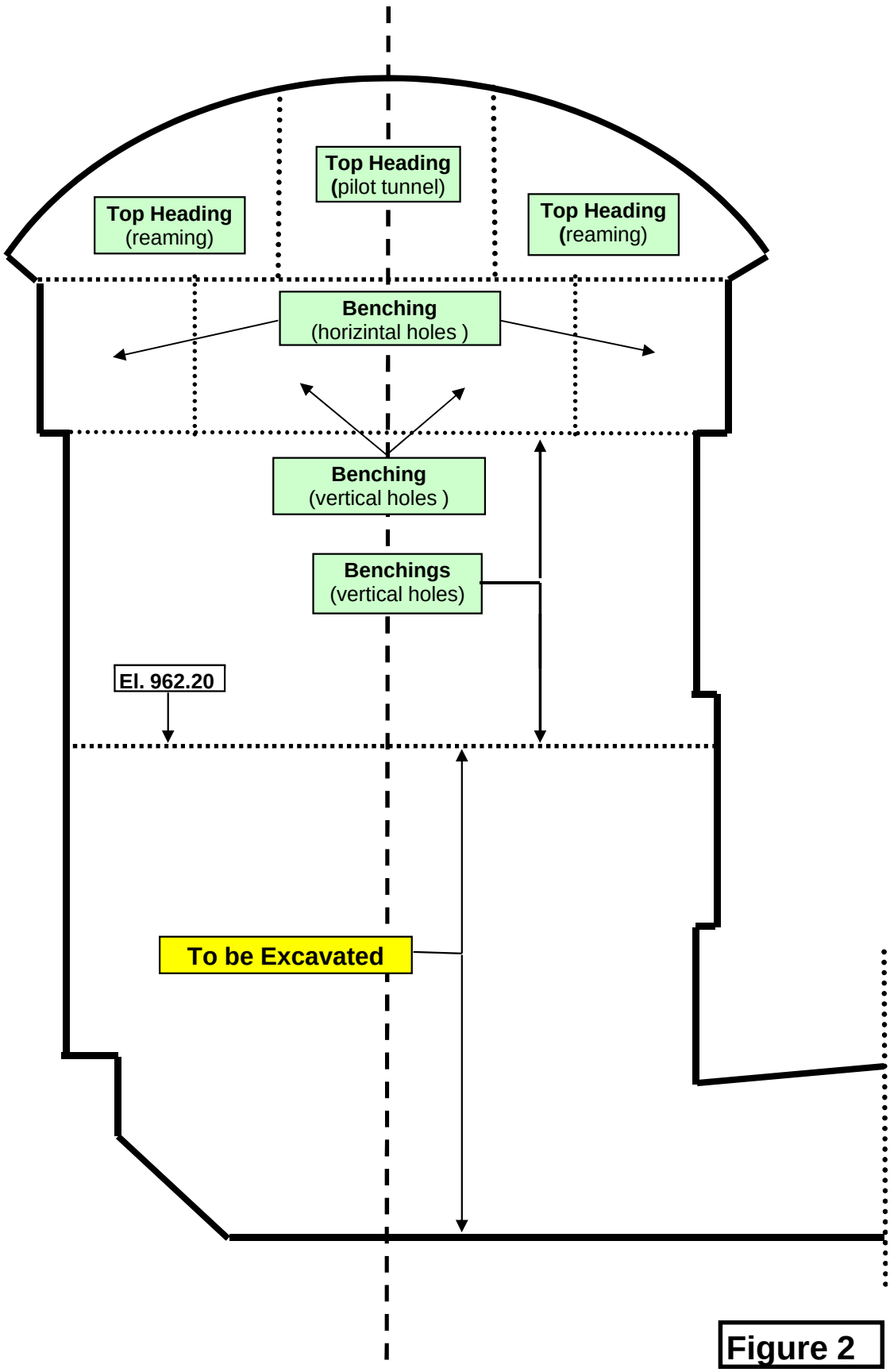

Figure 2

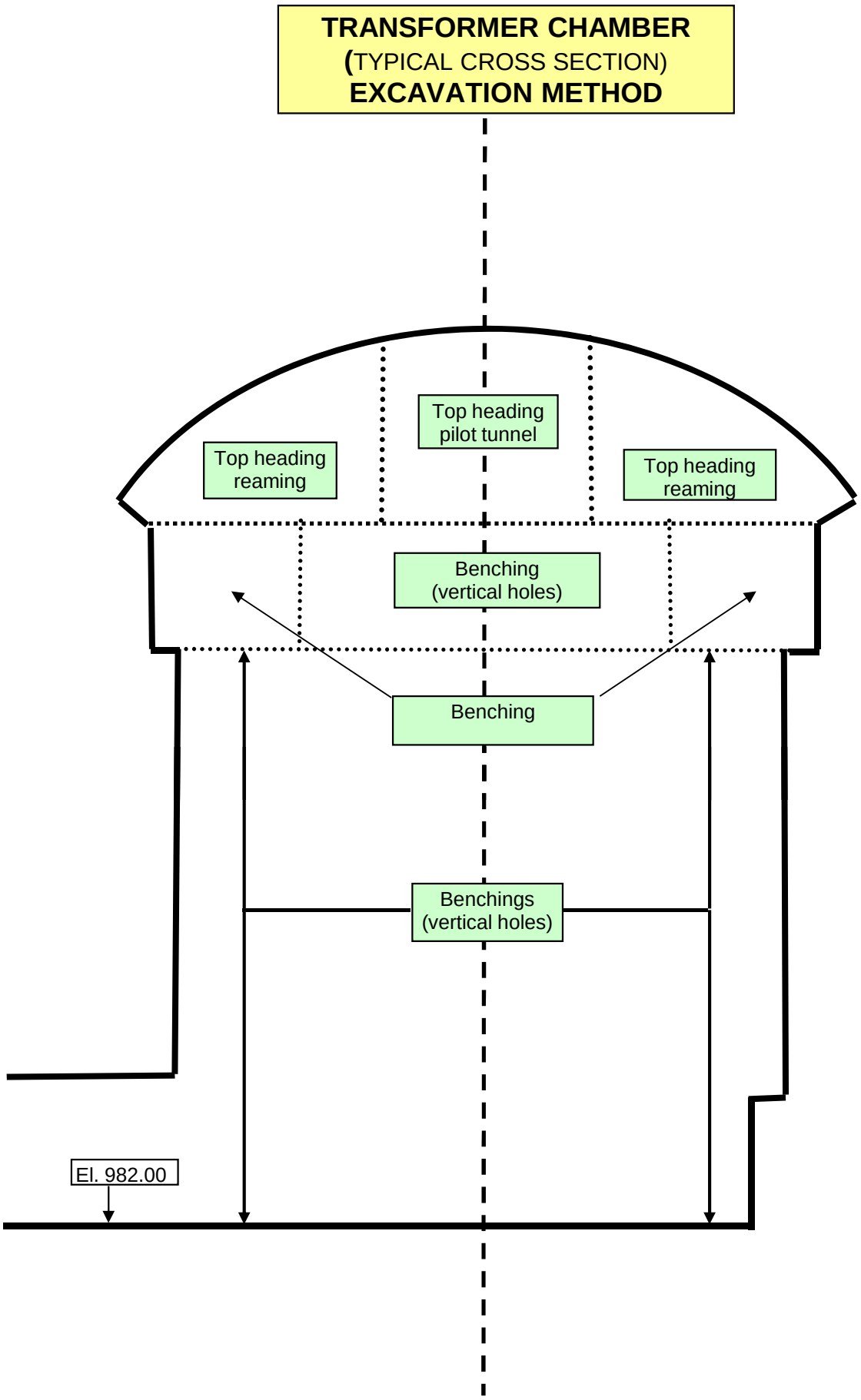
TRANSFORMER CHAMBER
(TYPICAL CROSS SECTION)
EXCAVATION METHOD
Top heading pilot tunnel
Top heading reaming
Top heading reaming
Benching (vertical holes)
Benching
Benchings (vertical holes)
El. 982.00

Figure 3

CONCRETE AGGREGATE PROCESSING PLANT
(Flow Sheet)

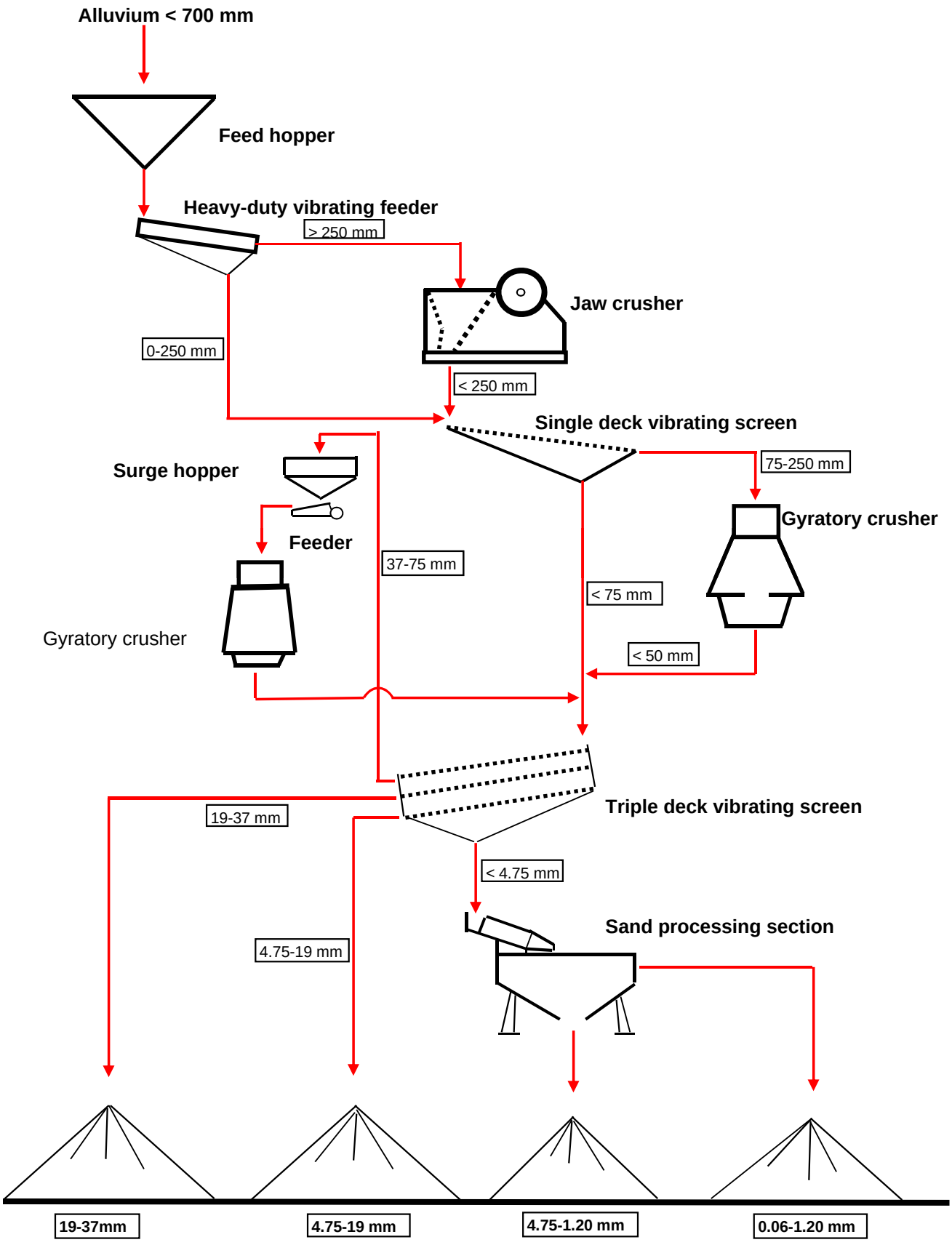

Figure 4

PART – V

PRICE LIST

1 INTRODUCTION

The Part V of this volume includes the list of the unit prices that have been applied to the Priced Bill of Quantities which compose the Part VI of this Volume 1.

The unit prices of the main items of the Bill of Quantities have been established with the detailed analyses which are included in Volume 2.

The unit prices of minor works have been established partly from analogy with 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 analyses given in Volume 2. The splitting of the currency for the unit prices that have not been analyzed has been established by analogy.

2 UNIT PRICES OF MISCELLANEOUS TUNNELS, GALLERIES AND ADITS

The unit prices of excavation and concrete for tunnels, galleries and access adits which have not been individually analyzed, have been established by means of analyses grouped according to different cross section areas.

The list of these underground works analyzed according to the cross section area is as follows:

Cross section range (m^2)	N°	Description	Actual cross section area (m^2)	Length (m)
15 - 20	1	Belt gallery 3-T	18.05	70.00
20 - 30	1	Access adit P22	23.15	123.64
	2	Access adit P34	28.27	122.67
	3	Access adit P36	28.91	94.58
	4	Seismic adit at T2 and at P19	22.92	178.13
	5	Test chamber	25.53	61.00
	6	Test gallery	23.63	71.96
30 - 40	1	Access adit P1A	32.86	100.64
	2	Access adit P1D	33.50	253.00
	3	Access adit P10	34.00	128.23
	4	Access adit P10’	32.86	17.44
	5	Access adit P16	32.22	218.06
	6	Access adit P18	39.49	19.70
	7	Access adit P19	23.05	140.12
	8	Access adit P21	35.30	234.00
	9	Access adit P26	36.62	31.38

	10	Access adit P28’	34.86	68.49
	11	Access adit P29	35.83	89.51
	12	Access adit P30	33.18	42.90
	13	Access adit P33	31.56	143.00
	14	Access adit P35A	37.70	63.64
	15	Access adit P67	34.62	248.50
	16	Access adit P68	37.70	162.90
	17	Access adit P69	34.80	100.37
	18	Access to DG1-P4	39.89	86.20
	19	Connection tunnel 4	35.33	56.01
	20	Connection tunnel 5	33.18	13.80
	21	Connection tunnel 6	32.54	16.48
	22	Connection tunnel 10	33.18	19.12
	23	Pedestrian tunnel 1	36.15	43.83
	24	Pedestrian tunnel 2	35.15	62.66
40 - 50	1	Access adit P1E	41.89	30.00
	2	Access adit P6	42.35	27.06
	3	Access adit P14	42.07	51.41
	4	Access adit P16A	42.51	111.75
	5	Access adit P17	42.34	18.50
	6	Access adit P27	47.26	33.07
	7	Access from T8 to gate chamber of stage 1 power tunnel	43.80	93.41
	8	Transportation tunnel T37A	40.60	40.00
	9	Transportation tunnel connection T37-T3’	40.60	61.00
50 - 60	1	Access adit P5	55.36	30.20
	2	Access adit P12	59.07	54.00
	3	Transportation tunnel T37’	55.64	174.05
60 - 70	1	Access adit P2	62.27	68.02
70 - 80	1	Access adit P37	70.97	106.35
80 - 90	1	Access adit P9	82.77	52.10
	2	Access adit P38	87.27	50.00

3 ANALYZED UNIT PRICES CONVERTED TO A SINGLE PRICE

The excavation unit price of tunnels, adits and galleries that have been analyzed according to two or more classes of rock have been established considering the percentages by volume of such different classes of rock.

Likewise the unit prices of the underground excavations that have been analyzed taking several construction methods into account have been established according to the percentages by volume of the zones where the different methods have been adopted.

The unit prices that have been obtained from several unit prices are as per following Table.

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	AGGREGATE UNIT PRICE (US$)	(TJS)
1		**SURFACE EXCAVATION**							
1.01		Roads							
	1	Common excavation, general	m^3	0.15	6.7%	2.10	93.3%	2.25	10.72
	2	Common excavation, trench and foundation	m^3	0.55	10.3%	4.81	89.7%	5.36	25.54
	3	Rock excavation, general	m^3	1.58	18.5%	6.97	81.5%	8.55	40.73
	4	Rock excavation, trench and foundation	m^3	4.10	18.9%	17.63	81.1%	21.73	103.52
1.02		Preparation of yards and camp areas							
	1	Cut and fill excavation	m^3	0.19	9.0%	1.91	91.0%	2.10	10.00
1.03		Diversion tunnel inlets							
	1	Common excavation	m^3	0.30	8.5%	3.24	91.5%	3.54	16.86
	2	Rock excavation	m^3	1.52	19.6%	6.23	80.4%	7.75	36.92
1.04		Diversion tunnel outlets							
	1	Common excavation	m^3	0.40	8.2%	4.47	91.8%	4.87	23.20
	2	Rock excavation	m^3	1.73	17.2%	8.30	82.8%	10.03	47.78
1.05		Stage 1 power tunnel intake							
	1	Common excavation	m^3	0.31	8.4%	3.37	91.6%	3.68	17.53
	2	Rock excavation	m^3	1.53	19.3%	6.38	80.7%	7.91	37.68
1.06		Transportation tunnel N°3 portal							
	1	Common excavation	m^3	0.45	8.3%	4.94	91.7%	5.39	25.68
	2	Rock excavation	m^3	1.72	17.0%	8.40	83.0%	10.12	48.21
1.07		Transportation tunnel N°4 and cable tunnel por tal							
	1	Common excavation	m^3	0.40	8.2%	4.45	91.8%	4.85	23.11
	2	Rock excavation	m^3	2.01	16.6%	10.11	83.4%	12.12	57.74
1.08		Transportation tunnel 22 portals							
	1	Common excavation	m^3	0.28	8.5%	3.01	91.5%	3.29	15.67
	2	Rock excavation	m^3	1.52	19.8%	6.17	80.2%	7.69	36.64
1.09		Removal of overburden material from borrow areas							
		and quarries							
	1	Overburden of borrow area N°15	m^3	0.18	7.4%	2.26	92.6%	2.44	11.62
	2	Overburden of borrow area N°15a	m^3	0.17	7.6%	2.07	92.4%	2.24	10.67
	3	Overburden of Lyabidora borrow area	m^3	0.18	7.9%	2.11	92.1%	2.29	10.91
	4	Overburden of borrow area N°17b	m^3	0.19	7.8%	2.25	92.2%	2.44	11.62
	5	Overburden of quarry area N°26a	m^3	0.21	7.8%	2.47	92.2%	2.68	12.77
1.10		Removal of unsuitable material from borrow areas							
	1	Unsuitable material of borrow area N°15	m^3	0.14	5.3%	2.48	94.7%	2.62	12.48
2		**UNDERGROUND EXCAVATION**							
2.01		Transportation tunnels							
	1	Tunnel T1	m^3	9.15	16.9%	44.87	83.1%	54.02	257.35
	2	Tunnel T2	m^3	8.42	16.1%	43.85	83.9%	52.27	249.01
	3	Tunnel T3	m^3	7.62	15.8%	40.70	84.2%	48.32	230.20
	4	Tunnel T3'	m^3	7.74	17.0%	37.81	83.0%	45.55	217.00
	5	Tunnel T4	m^3	6.60	17.3%	31.66	82.7%	38.26	182.27
	6	Tunnel T5A	m^3	8.75	17.4%	41.59	82.6%	50.34	239.82
	7	Tunnel T6	m^3	6.56	17.6%	30.80	82.4%	37.36	177.98
	8	Tunnel T7	m^3	6.83	16.9%	33.50	83.1%	40.33	192.13
	9	Tunnel T7A	m^3	7.20	17.0%	35.20	83.0%	42.40	201.99
	10	Tunnel T8	m^3	7.67	18.6%	33.65	81.4%	41.32	196.85

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE				AGGREGATE UNIT PRICE	
				Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	(US$)	(TJS)
	11	Tunnel T22	m^3	6.76	18.5%	29.84	81.5%	36.60	174.36
	12	Tunnel T37	m^3	8.69	18.8%	37.52	81.2%	46.21	220.14
	13	Tunnel T37'	m^3	9.04	17.5%	42.60	82.5%	51.64	246.01
	14	Tunnel T37A	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	15	Tunnel connection T37-T3'	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	16	Tunnel stretch from T3 to T37	m^3	6.69	15.1%	37.62	84.9%	44.31	211.09
2.02		Access adits							
	1	Access adit P1	m^3	7.83	18.5%	34.50	81.5%	42.33	201.66
	2	Access adit P1A	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	3	Access adit P1B	m^3	15.64	18.5%	68.76	81.5%	84.40	402.08
	4	Access adit P1D	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	5	Access adit P1E	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	6	Access adit P2	m^3	8.46	17.6%	39.53	82.4%	47.99	228.62
	7	Access adit P3	m^3	11.16	19.4%	46.47	80.6%	57.63	274.55
	8	Access adit P5	m^3	9.04	17.5%	42.60	82.5%	51.64	246.01
	9	Access adit P6	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	10	Access adit P9	m^3	8.15	17.9%	37.29	82.1%	45.44	216.48
	11	Access adit P10	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	12	Access adit P10'	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	13	Access adit P11	m^3	7.51	17.8%	34.59	82.2%	42.10	200.56
	14	Access adit P12	m^3	9.04	17.5%	42.60	82.5%	51.64	246.01
	15	Access adit P 13	m^3	10.11	16.9%	49.57	83.1%	59.68	284.32
	16	Access adit P14	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	17	Access adit P16	m^3	13.24	19.0%	56.27	81.0%	69.51	331.15
	18	Access adit P16A	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	19	Access adit P 16B	m^3	7.96	18.9%	34.22	81.1%	42.18	200.95
	20	Access adit P17	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	21	Access adit P18	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	22	Access adit P19	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	23	Access adit P 21	m^3	13.20	18.0%	60.27	82.0%	73.47	350.01
	24	Access adit P22	m^3	15.19	19.5%	62.57	80.5%	77.76	370.45
	25	Access adit P 23	m^3	12.29	18.3%	54.80	81.7%	67.09	319.62
	26	Access adit P 25 & 25'	m^3	8.04	17.9%	36.83	82.1%	44.87	213.76
	27	Access adit P 25A	m^3	7.48	17.7%	34.79	82.3%	42.27	201.37
	28	Access adit P26	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	29	Access adit P27	m^3	10.69	18.2%	48.12	81.8%	58.81	280.17
	30	Access adit P 28	m^3	10.35	18.2%	46.38	81.8%	56.73	270.26
	31	Access adit P28'	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	32	Access adit P29	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	33	Access adit P30	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	34	Access adit P33	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	35	Access adit P34	m^3	15.19	19.5%	62.57	80.5%	77.76	370.45
	36	Access adit P 35	m^3	9.43	17.8%	43.57	82.2%	53.00	252.49
	37	Access adit P35A	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	38	Access adit P36	m^3	15.19	19.5%	62.57	80.5%	77.76	370.45
	39	Access adit P37	m^3	8.25	17.9%	37.94	82.1%	46.19	220.05
	40	Access adit P38	m^3	8.15	17.9%	37.29	82.1%	45.44	216.48
	41	Access adit P40	m^3	17.71	17.5%	83.30	82.5%	101.01	481.21
	42	Access adit P67	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	AGGREGATE UNIT PRICE (US$)	(TJS)
	43	Access adit P68	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	44	Access adit P69	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	45	Access adit P 80	m^3	9.33	18.4%	41.34	81.6%	50.67	241.39
	46	Access to DG1-P4	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
2.03		Diversion tunnels							
	1	Tunnel level 1, pressure stretch	m^3	6.62	17.5%	31.12	82.5%	37.74	179.79
	2	Tunnel level 1, u/s free-flow stretch, left bank	m^3	6.18	16.3%	31.73	83.7%	37.91	180.60
	3	Tunnel level 1, free-flow stretch, right bank	m^3	6.70	17.5%	31.65	82.5%	38.35	182.70
	4	Tunnel level 2, pressure stretch, left bank	m^3	6.62	17.5%	31.12	82.5%	37.74	179.79
	5	Tunnel level 2, u/s free-flow stretch, left bank	m^3	6.18	16.3%	31.73	83.7%	37.91	180.60
	6	Tunnel level 2, free-flow stretch, right bank	m^3	6.70	17.5%	31.65	82.5%	38.35	182.70
	7	Auxiliary tunnel of level 1 divesion tunnel	m^3	7.52	16.8%	37.36	83.2%	44.88	213.81
2.04		Diversion tunnel chambers							
	1	Maintenance gate chamber	m^3	7.48	17.7%	34.67	82.3%	42.15	200.80
	2	Emergency & sector gate chamber	m^3	7.65	18.0%	34.78	82.0%	42.43	202.14
	3	Downstream gate & ventilation chamber, upper part	m^3	12.58	18.5%	55.60	81.5%	68.18	324.81
	4	Downstream gate & ventilation chamber, mid part	m^3	11.90	18.4%	52.70	81.6%	64.60	307.75
	5	Downstream gate & ventilation chamber, lower part	m^3	24.00	20.2%	95.00	79.8%	119.00	566.92
2.05		Stage 1 power tunnel, gate/erection chambers & penstocks							
	1	Tunnel	m^3	7.80	19.3%	32.64	80.7%	40.44	192.66
	2	Gate chamber	m^3	10.50	17.8%	48.50	82.2%	59.00	281.08
	3	Erection chamber	m^3	10.50	17.8%	48.50	82.2%	59.00	281.08
	4	Penstocks	m^3	11.60	17.9%	53.30	82.1%	64.90	309.18
2.06		Powerhouse and transformer hall							
	1	Powerhouse	m^3	5.42	15.7%	29.14	84.3%	34.56	164.64
	2	Tansformer chamber	m^3	6.48	17.6%	30.25	82.4%	36.73	174.98
2.07		Bush duct galleries and draft tubes							
	1	Bush duct galleries, unclassified rock	m^3	9.10	16.9%	44.59	83.1%	53.69	255.78
	2	Draft tubes	m^3	11.99	17.0%	58.71	83.0%	70.70	336.81
2.08		Collectors of draft tubes							
	1	Main collector of units 1-2-3 (sections 3 & 4)	m^3	6.61	17.3%	31.63	82.7%	38.24	182.18
	2	Main collector of units 4-5-6 (sections 1 & 2)	m^3	9.35	21.2%	34.80	78.8%	44.15	210.33
	3	Main collector of units 4-5-6 (sections 3 & 4)	m^3	6.61	17.3%	31.63	82.7%	38.24	182.18
2.09		Cable tunnels							
	1	Cable tunnel 1	m^3	11.18	19.2%	47.13	80.8%	58.31	277.79
	2	Cable tunnel 2	m^3	9.35	18.6%	40.93	81.4%	50.28	239.53
	3	Cable tunnel 1and 2 (common stretch)	m^3	9.53	16.5%	48.15	83.5%	57.68	274.79
2.10		Grouting galleries							
	1	Grouting gallery 1	m^3	15.45	17.4%	73.23	82.6%	88.68	422.47
	2	Grouting gallery 2	m^3	19.92	17.6%	92.99	82.4%	112.91	537.90
	3	Grouting gallery 3	m^3	15.50	17.5%	73.30	82.5%	88.80	423.04
	4	Dam curtain grouting gallery, joint left-right	m^3	8.00	17.1%	38.80	82.9%	46.80	222.96
	5	Dam curtain grouting gallery left bank, active stretch	m^3	9.39	18.4%	41.62	81.6%	51.01	243.01
	6	Dam curtain grouting gallery left bank, passive stretch	m^3	9.38	18.4%	41.53	81.6%	50.91	242.54
	7	Combined saline & dam curtaing grouting gallery, right bank	m^3	9.68	17.5%	45.78	82.5%	55.46	264.21
2.11		Drainage galleries							
	1	Drainage galleries 1& 2 of diversion tunnel gate chambers:							
		a) Small cross section	m^3	11.93	19.0%	50.97	81.0%	62.90	299.66
		b) Large cross section	m^3	8.50	17.7%	39.53	82.3%	48.03	228.81

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	AGGREGATE UNIT PRICE (US$)	(TJS)
	2	Drainage gallery 3 of stage 1 power tunnel gate chamber	m^3	15.99	19.5%	65.90	80.5%	81.89	390.12
	3	Drainage gallery 4 of stage 1 power tunnel gate chamber	m^3	15.99	19.5%	65.90	80.5%	81.89	390.12
	4	Powerhouse drainage gallery, Low level	m^3	14.28	18.1%	64.48	81.9%	78.76	375.21
	5	Powerhouse drainage gallery, mid level (DT2)	m^3	13.21	19.0%	56.29	81.0%	69.50	331.10
	6	Powerhouse drainage gallery, mid level (DT3)	m^3	13.21	19.0%	56.29	81.0%	69.50	331.10
2.12		Other tunnels and galleries							
	1	Ventilation gallery parallel to transportation tunnel T3	m^3	15.84	19.1%	67.09	80.9%	82.93	395.08
	2	Cross slit 1	m^3	7.88	18.2%	35.33	81.8%	43.21	205.85
	3	Conveyor, line 7A	m^3	8.80	19.0%	37.45	81.0%	46.25	220.34
	4	Conveyor, line 8A	m^3	9.30	19.1%	39.30	80.9%	48.60	231.53
	5	Connection tunnels 4, 5, 6 & 10	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	6	Pedestrian tunnels 1 & 2	m^3	12.58	18.5%	55.57	81.5%	68.15	324.67
	7	Belt gallery 3-T	m^3	19.22	19.7%	78.11	80.3%	97.33	463.68
	8	Seismic adit at T2 and at P19	m^3	15.19	40.2%	22.57	59.8%	37.76	179.89
	9	Test chamber and test gallery	m^3	15.19	40.2%	22.57	59.8%	37.76	179.89
3		**SURFACE CAST-IN-SITU CONCRETE**							
		(EXCLUDING CEMENT AND FORMWORKS)							
3.01		Roads							
	1	Concrete, lean and backfill	m^3	6.35	15.6%	34.33	84.4%	40.68	193.80
	2	Concrete, foundation	m^3	5.81	12.5%	40.79	87.5%	46.60	222.00
	3	Concrete, culverts and small bridges	m^3	8.66	15.3%	47.82	84.7%	56.48	269.07
	4	Concrete, retaining walls	m^3	7.83	15.1%	43.91	84.9%	51.74	246.49
	5	Concrete, side sfety walls cast -in-situ	m^3	9.00	17.3%	43.10	82.7%	52.10	248.20
	6	Concrete, paving	m^3	8.79	14.3%	52.64	85.7%	61.43	292.65
3.02		Main bridges							
	1	Concrete, lean and backfill	m^3	6.35	15.6%	34.33	84.4%	40.68	193.80
	2	Concrete, foundation	m^3	5.81	12.5%	40.79	87.5%	46.60	222.00
	3	Concrete, retaining walls	m^3	7.98	15.2%	44.39	84.8%	52.37	249.49
	4	Concrete, beams and slabs	m^3	9.31	14.0%	57.17	86.0%	66.48	316.71
3.03		Diversion tunnel inlets							
	1	Concrete, foundation	m^3	6.19	15.4%	34.09	84.6%	40.28	191.89
	2	Concrete, structures above foundation	m^3	7.67	16.8%	38.07	83.2%	45.74	217.91
	3	Concrete, abutment stabilization	m^3	8.30	14.5%	48.99	85.5%	57.29	272.93
3.04		Diversion tunnel outlets							
	1	Concrete, foundation	m^3	6.14	15.4%	33.64	84.6%	39.78	189.51
	2	Concrete, structures above foundation	m^3	7.73	17.0%	37.67	83.0%	45.40	216.29
3.05		Stage 1 power tunnel intake							
	1	Concrete, miscellaneous structures	m^3	7.08	16.4%	35.98	83.6%	43.06	205.14
	2	Concrete, abutment stabilization	m^3	8.30	14.5%	48.99	85.5%	57.29	272.93
3.06		Transpostation tunnel T3 portal							
	1	Concrete, foundation	m^3	5.61	15.1%	31.62	84.9%	37.23	177.36
	2	Concrete, structures above foundation	m^3	6.15	15.6%	33.18	84.4%	39.33	187.37
3.07		Transpotation tunnel T4 and cable tunnel portals							
	1	Concrete, foundation	m^3	5.97	14.8%	34.45	85.2%	40.42	192.56
	2	Concrete, structures above foundation	m^3	6.88	15.8%	36.66	84.2%	43.54	207.42
3.08		Transpotation tunnel T22 portals							
	1	Concrete, miscellaneous	m^3	7.57	16.3%	38.98	83.7%	46.55	221.76
3.09		Formworks							

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE				AGGREGATE UNIT PRICE	
				Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	(US$)	(TJS)
	1	Flat type for walls, modular use	m2	3.77	20.5%	14.61	79.5%	18.38	87.56
	2	Flat type for walls, non-modular use	m2	6.06	25.4%	17.78	74.6%	23.84	113.57
	3	Flat type for columns, piers and pillars	m2	8.32	26.0%	23.68	74.0%	32.00	152.45
	4	Flat type for slabs	m2	5.14	23.3%	16.90	76.7%	22.04	105.00
	5	Flat type for mixed structures	m2	6.73	25.1%	20.10	74.9%	26.83	127.82
	6	Curved type for miscellaneous structures	m2	10.67	28.5%	26.77	71.5%	37.44	178.36
3.10		Scaffoldings							
	1	Wall type scaffoldings	m2	2.12	44.2%	2.68	55.8%	4.80	22.87
	2	Scaffoldings for concrete slabs, max. load 20 KN/m2	m^3	2.69	48.4%	2.87	51.6%	5.56	26.49
	3	Scaffoldings for concrete slabs, max. load 50 KN/m2	m^3	3.18	43.3%	4.17	56.7%	7.35	35.02
4		**UNDERGROUND CAST-IN-SITU CONCRETE**							
		(EXCLUDING CEMENT)							
4.01		Transportation tunnels							
	1	Tunnel T1							
		a) Arch and sidewalls	m^3	9.46	10.5%	80.96	89.5%	90.42	430.76
		b) Invert	m^3	8.08	12.8%	55.14	87.2%	63.22	301.18
	2	Tunnel T2							
		a) Arch and sidewalls	m^3	10.19	10.2%	89.32	89.8%	99.51	474.07
		b) Invert	m^3	6.39	13.3%	41.51	86.7%	47.90	228.20
	3	Tunnel T3							
		a) Arch and sidewalls	m^3	9.08	9.8%	83.31	90.2%	92.39	440.15
		b) Invert	m^3	7.65	12.1%	55.70	87.9%	63.35	301.80
	4	Tunnel T3'							
		a) Arch and sidewalls	m^3	11.30	11.2%	89.91	88.8%	101.21	482.16
		b) Invert	m^3	10.44	14.2%	63.10	85.8%	73.54	350.34
	5	Tunnel T4							
		a) Arch and sidewalls, first stage	m^3	10.44	10.3%	90.83	89.7%	101.27	482.45
		b) Arch and sidewalls, second stage	m^3	8.85	10.2%	78.16	89.8%	87.01	414.52
		c) Invert, first stage	m^3	12.96	14.9%	74.13	85.1%	87.09	414.90
		d) Invert, second stage	m^3	11.47	15.7%	61.78	84.3%	73.25	348.96
	6	Tunnel T5A							
		a) Arch and sidewalls	m^3	10.65	11.1%	84.97	88.9%	95.62	455.53
		b) Invert	m^3	7.38	13.1%	49.10	86.9%	56.48	269.07
	7	Tunnel T6							
		a) Arch and sidewalls	m^3	11.29	11.0%	91.34	89.0%	102.63	488.93
		b) Invert	m^3	5.30	11.7%	39.97	88.3%	45.27	215.67
	8	Tunnel T7							
		a) Arch and sidewalls	m^3	8.87	10.3%	76.91	89.7%	85.78	408.66
		b) Invert	m^3	10.02	13.9%	62.28	86.1%	72.30	344.44
	9	Tunnel T7A							
		a) Arch and sidewalls	m^3	8.87	10.3%	76.91	89.7%	85.78	408.66
		b) Invert	m^3	8.76	13.1%	58.17	86.9%	66.93	318.85
	10	Tunnel T8							
		a) Arch and sidewalls	m^3	10.43	11.0%	84.40	89.0%	94.83	451.77
		b) Invert	m^3	8.90	13.6%	56.53	86.4%	65.43	311.71
	11	Tunnel T22							
		a) Arch and sidewalls	m^3	11.68	11.8%	87.51	88.2%	99.19	472.54
		b) Invert	m^3	6.06	12.4%	42.99	87.6%	49.05	233.67

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	12	Tunnel T37							
		a) Arch and sidewalls	m^3	11.38	11.1%	91.13	88.9%	102.51	488.36
	13	Tunnel T37'							
		a) Arch and sidewalls	m^3	13.66	12.1%	99.16	87.9%	112.82	537.47
		b) Invert	m^3	11.33	15.4%	62.15	84.6%	73.48	350.06
	14	Tunnel T37A							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	15	Tunnel connection T37-T3'							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	16	Tunnel connection T3 to T37							
		a) Arch and sidewalls	m^3	11.38	11.1%	91.13	88.9%	102.51	488.36
		b) Invert	m^3	7.80	13.5%	50.15	86.5%	57.95	276.07
4.02		Access Adits							
	1	Adit P1							
		a) Arch and sidewalls	m^3	12.32	11.7%	93.00	88.3%	105.32	501.74
		b) Invert	m^3	8.89	13.7%	55.97	86.3%	64.86	308.99
	2	Adit P1A							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	3	Adit P1B							
		a) Arch and sidewalls	m^3	18.93	13.9%	116.92	86.1%	135.85	647.19
		b) Invert	m^3	9.53	15.5%	52.00	84.5%	61.53	293.13
	4	Adit P1D							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	5	Adit P1E							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	6	Adit P2							
		a) Arch and sidewalls	m^3	11.81	10.8%	97.93	89.2%	109.74	522.80
		b) Invert	m^3	10.94	15.1%	61.29	84.9%	72.23	344.10
	7	Adit P3							
		a) Arch and sidewalls	m^3	15.39	14.4%	91.76	85.6%	107.15	510.46
		b) Invert	m^3	14.49	17.8%	67.11	82.2%	81.60	388.74
	8	Adit P5							
		a) Arch and sidewalls	m^3	13.66	12.1%	99.16	87.9%	112.82	537.47
		b) Invert	m^3	11.33	15.4%	62.15	84.6%	73.48	350.06
	9	Adit P6							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	10	Adit P9							
		a) Arch and sidewalls	m^3	11.21	11.3%	87.71	88.7%	98.92	471.25
		b) Invert	m^3	10.24	14.3%	61.12	85.7%	71.36	339.96
	11	Adit P10							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	12	Adit P10'							

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		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	13	Adit P11							
		a) Arch and sidewalls	m^3	10.70	11.6%	81.77	88.4%	92.47	440.53
		b) Invert	m^3	8.07	13.6%	51.35	86.4%	59.42	283.08
	14	Adit P12							
		a) Arch and sidewalls	m^3	13.66	12.1%	99.16	87.9%	112.82	537.47
		b) Invert	m^3	11.33	15.4%	62.15	84.6%	73.48	350.06
	15	Adit P13							
		a) Arch and sidewalls	m^3	15.78	14.1%	96.31	85.9%	112.09	534.00
		b) Invert	m^3	8.16	14.7%	47.52	85.3%	55.68	265.26
	16	Adit P14							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	17	Adit P16							
		a) Arch and sidewalls	m^3	17.40	15.2%	97.09	84.8%	114.49	545.43
		b) Invert	m^3	16.64	18.6%	73.03	81.4%	89.67	427.19
	18	Adit P16A							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	19	Adit P16B							
		a) Arch and sidewalls	m^3	12.81	12.4%	90.50	87.6%	103.31	492.17
		b) Invert	m^3	10.54	16.1%	54.93	83.9%	65.47	311.90
	20	Adit P17							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	21	Adit P18							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	22	Adit P19							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	23	Adit P21							
		a) Arch and sidewalls	m^3	20.55	14.8%	118.22	85.2%	138.77	661.10
		b) Invert	m^3	10.16	16.0%	53.15	84.0%	63.31	301.61
	24	Adit P22							
		a) Arch and sidewalls	m^3	17.25	14.1%	104.83	85.9%	122.08	581.59
		b) Invert	m^3	13.13	16.9%	64.56	83.1%	77.69	370.12
	25	Adit P23							
		a) Arch and sidewalls	m^3	19.04	14.3%	114.21	85.7%	133.25	634.80
		b) Invert	m^3	9.43	15.7%	50.60	84.3%	60.03	285.98
	26	Adit P25 & 25'							
		a) Arch and sidewalls	m^3	13.28	12.7%	91.26	87.3%	104.54	498.03
		b) Invert	m^3	9.82	13.9%	60.98	86.1%	70.80	337.29
	27	Adit P25A							
		a) Arch and sidewalls	m^3	12.13	12.3%	86.50	87.7%	98.63	469.87
		b) Invert	m^3	10.04	13.4%	64.87	86.6%	74.91	356.87
	28	Adit P26							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96

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		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	29	Adit P27							
		a) Arch and sidewalls	m^3	15.04	13.0%	100.31	87.0%	115.35	549.53
		b) Invert	m^3	12.27	16.3%	63.03	83.7%	75.30	358.73
	30	Adit P28							
		a) Arch and sidewalls	m^3	16.70	14.1%	101.96	85.9%	118.66	565.30
		b) Invert	m^3	16.07	17.5%	75.91	82.5%	91.98	438.19
	31	Adit P28'							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	32	Adit P29							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	33	Adit P30							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	34	Adit P33							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	35	Adit P34							
		a) Arch and sidewalls	m^3	17.25	14.1%	104.83	85.9%	122.08	581.59
		b) Invert	m^3	13.13	16.9%	64.56	83.1%	77.69	370.12
	36	Adit P35							
		a) Arch and sidewalls	m^3	15.02	13.6%	95.20	86.4%	110.22	525.09
		b) Invert	m^3	9.95	15.6%	53.94	84.4%	63.89	304.37
	37	Adit P35A							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	38	Adit P36							
		a) Arch and sidewalls	m^3	17.25	14.1%	104.83	85.9%	122.08	581.59
		b) Invert	m^3	13.13	16.9%	64.56	83.1%	77.69	370.12
	39	Adit P37							
		a) Arch and sidewalls	m^3	11.39	11.3%	89.06	88.7%	100.45	478.54
		b) Invert	m^3	10.71	15.0%	60.91	85.0%	71.62	341.20
	40	Adit P38							
		a) Arch and sidewalls	m^3	11.21	11.3%	87.71	88.7%	98.92	471.25
		b) Invert	m^3	10.24	14.3%	61.12	85.7%	71.36	339.96
	41	Adit P40							
		a) Arch and sidewalls	m^3	20.22	15.1%	114.12	84.9%	134.34	640.00
		b) Invert	m^3	14.19	16.7%	70.86	83.3%	85.05	405.18
	42	Adit P67							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	43	Adit P68							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	44	Adit P69							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	AGGREGATE UNIT PRICE (US$)	(TJS)
	45	Adit P80							
		a) Arch and sidewalls	m^3	15.59	13.8%	97.23	86.2%	112.82	537.47
		b) Invert	m^3	11.70	15.9%	61.82	84.1%	73.52	350.25
	46	Adit to DG 1 - P4							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
4.03		Diversion tunnels and auxiliary tunnel							
	1	Diversion tunnel level 1 & level 2, pressure stretch:							
		a) Arch							
		b) Sidewalls	m^3	7.98	11.2%	63.45	88.8%	71.43	340.29
		c) Invert	m^3	21.43	18.1%	96.98	81.9%	118.41	564.11
	2	Diversion tunnel level 1 & level 2, freeflow stretch left bank:	m^3	5.58	10.6%	46.94	89.4%	52.52	250.21
		a) Arch							
		b) Sidewalls	m^3	8.15	10.3%	71.03	89.7%	79.18	377.21
		c) Invert	m^3	15.17	17.0%	73.97	83.0%	89.14	424.66
	3	Diversion tunnel level 1 & level 2, freeflow stretch right bank:	m^3	5.57	11.8%	41.50	88.2%	47.07	224.24
		a) Arch							
		b) Sidewalls	m^3	8.98	10.7%	75.18	89.3%	84.16	400.94
		c) Invert	m^3	11.37	17.2%	54.63	82.8%	66.00	314.42
4.04		Auxiliary tunnel of level 1 diversion tunnel	m^3	5.61	11.8%	41.85	88.2%	47.46	226.10
	1	Arch and sidewalls							
	2	Invert	m^3	9.91	11.2%	78.35	88.8%	88.26	420.47
4.05		Diversion tunnel chambers	m^3	5.55	11.8%	41.40	88.2%	46.95	223.67
	1	Maintenance gate chamber:							
		a) Arch							
		b) Sidewalls	m^3	11.43	7.7%	136.13	92.3%	147.56	702.98
		c) Below operation level	m^3	26.92	22.4%	93.11	77.6%	120.03	571.82
	2	Emergency & sector gate chamber:	m^3	6.85	14.3%	41.07	85.7%	47.92	228.29
		a) Arch							
		b) Sidewalls	m^3	15.08	9.1%	149.98	90.9%	165.06	786.35
	3	Downstream gate & ventilation chamber:	m^3	23.88	22.4%	82.89	77.6%	106.77	508.65
		a) Arch and wall lining							
4.06		Power tunnel stage 1 and gate chamber	m^3	38.59	24.2%	120.61	75.8%	159.20	758.43
	1	Tunnel							
	2	Gate chamber:	m^3	11.30	12.4%	79.87	87.6%	91.17	434.33
		a) Arch							
		b) Sidewalls	m^3	15.10	9.1%	150.00	90.9%	165.10	786.54
		c) Bifurcations	m^3	23.90	22.4%	82.90	77.6%	106.80	508.80
4.07		Power tunnel stage 1 erection chamber and penstocks	m^3	7.60	14.4%	45.20	85.6%	52.80	251.54
	1	Arch of erection chamber							
	2	Sidewalls of erection chamber	m^3	15.10	9.1%	150.00	90.9%	165.10	786.54
	3	Penstocks	m^3	23.90	22.4%	82.90	77.6%	106.80	508.80
4.08		Powerhouse	m^3	5.99	12.9%	40.60	87.1%	46.59	221.95
	1	Arch and arch shoulders							
	2	Sidewalls and beams	m^3	12.93	9.3%	126.70	90.7%	139.63	665.20
4.09		Transformer chamber	m^3	29.97	22.7%	101.89	77.3%	131.86	628.18
	1	Arch and arch shoulders							
	2	Sidewalls and beams	m^3	15.16	9.4%	145.39	90.6%	160.55	764.86
4.10		Bush duct galleries	m^3	32.45	23.0%	108.38	77.0%	140.83	670.91

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	AGGREGATE UNIT PRICE (US$)	(TJS)
	1	Arch and sidewalls							
	2	Invert	m^3	13.00	11.0%	105.00	89.0%	118.00	562.15
4.11		Draft tubes and main collectors of draft tubes	m^3	6.10	11.7%	46.00	88.3%	52.10	248.20
	1	Draft tubes full ring lining							
	2	Main collectors of draft tubes of units 1-2-3:	m^3	20.60	17.1%	99.62	82.9%	120.22	572.73
		a) Arch							
		b) Sidewalls	m^3	13.95	8.1%	157.60	91.9%	171.55	817.26
		c) Invert	m^3	16.43	17.1%	79.43	82.9%	95.86	456.68
	3	Main collectors of draft tubes of units 4-5-6, u/s stretch:	m^3	5.75	11.8%	42.99	88.2%	48.74	232.20
		a) Arch							
		b) Sidewalls	m^3	14.65	8.1%	165.48	91.9%	180.13	858.13
	4	Main collectors of draft tubes of units 4-5-6, d/s stretch:	m^3	17.25	17.1%	83.40	82.9%	100.65	479.51
		a) Arch							
		b) Sidewalls	m^3	13.95	8.1%	157.60	91.9%	171.55	817.26
		c) Invert	m^3	16.43	17.1%	79.43	82.9%	95.86	456.68
4.12		Cable tunnels	m^3	5.75	11.8%	42.99	88.2%	48.74	232.20
	1	Cable tunnel 1:							
		a) Arch and sidewalls							
		b) Invert	m^3	11.53	10.9%	93.81	89.1%	105.34	501.84
	2	Cable tunnel 2:	m^3	6.40	58.0%	4.64	42.0%	11.04	52.59
		a) Arch and sidewalls							
		b) Invert	m^3	12.13	11.1%	97.22	88.9%	109.35	520.94
	3	Cable tunnel 1 and 2 (common stretch):	m^3	6.84	13.7%	42.93	86.3%	49.77	237.10
		a) Arch and sidewalls							
		b) Invert	m^3	11.17	10.4%	95.90	89.6%	107.07	510.08
4.13		Grouting galleries	m^3	6.68	13.6%	42.41	86.4%	49.09	233.86
	1	Grouting gallery 1:							
		a) Arch and sidewalls	m^3	15.15	12.8%	102.78	87.2%	117.93	561.82
		b) Invert	m^3	13.66	16.4%	69.69	83.6%	83.35	397.08
	2	Grouting gallery 2:							
		a) Arch and sidewalls	m^3	13.73	12.3%	97.64	87.7%	111.37	530.57
	3	Grouting gallery 3:							
		a) Arch and sidewalls	m^3	15.20	12.9%	102.80	87.1%	118.00	562.15
		b) Invert	m^3	13.70	16.4%	69.70	83.6%	83.40	397.32
	4	Dam curtain grouting gallery, joint left-right:							
		a) Full ring lining	m^3	6.86	12.5%	48.05	87.5%	54.91	261.59
	5	Dam curtain grouting gallery left bank, active stretch:							
		a) Full ring lining	m^3	7.38	12.9%	49.78	87.1%	57.16	272.31
	6	Dam curtain grouting gallery left bank, passive stretch:							
		a) Full ring lining	m^3	7.38	12.9%	49.78	87.1%	57.16	272.31
	7	Combined saline & dam curtaing grouting gallery, right bank:							
		a) Full ring lining	m^3	7.71	13.5%	49.55	86.5%	57.26	272.79
	8	Drainage galleries 1 & 2 of diversion tunnel gate chambers:							
		a) Arch and sidewalls	m^3	16.10	13.9%	100.10	86.1%	116.20	553.58
		b) Invert	m^3	13.56	17.0%	66.21	83.0%	79.77	380.02
4.14		Drainage galleries							
	1	Drainage gallery 3 of stage 1 power tunnel gate chamber:							
		a) Arch and sidewalls	m^3	15.71	14.2%	95.10	85.8%	110.81	527.90
		b) Invert	m^3	16.85	18.4%	74.85	81.6%	91.70	436.86

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	2	Drainage gallery 4 of stage 1 power tunnel gate chamber:							
		a) Arch and sidewalls	m^3	15.71	14.2%	95.10	85.8%	110.81	527.90
		b) Invert	m^3	16.85	18.4%	74.85	81.6%	91.70	436.86
	3	Powerhouse drainage gallery, Low level:							
		a) Arch and sidewalls	m^3	17.52	13.9%	108.42	86.1%	125.94	599.98
		b) Invert	m^3	15.32	18.6%	67.17	81.4%	82.49	392.98
	4	Powerhouse drainage galleries, mid level (DT2 & DT3):							
		a) Arch and sidewalls	m^3	10.64	9.8%	97.47	90.2%	108.11	515.04
		b) Invert	m^3	11.69	16.4%	59.80	83.6%	71.49	340.58
4.15		Other tunnels and galleries							
	1	Ventilation gallery parallel to transportation tunnel T3:							
		a) Arch and sidewalls	m^3	12.11	12.4%	85.84	87.6%	97.95	466.63
	2	Cross slit 1:							
		a) Arch and sidewalls	m^3	9.51	10.9%	77.82	89.1%	87.33	416.04
		b) Invert	m^3	7.34	12.5%	51.25	87.5%	58.59	279.12
	3	Conveyor, line 7A:							
		a) Arch and sidewalls	m^3	14.49	13.0%	96.90	87.0%	111.39	530.66
		b) Invert	m^3	11.75	14.9%	67.34	85.1%	79.09	376.78
	4	Conveyor, line 8A:							
		a) Arch and sidewalls	m^3	14.50	13.0%	96.90	87.0%	111.40	530.71
		b) Invert	m^3	11.80	14.9%	67.40	85.1%	79.20	377.31
	5	Connection tunnels 4, 5, 6 & 10:							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	6	Pedestrian tunnels 1 & 2:							
		a) Arch and sidewalls	m^3	15.62	13.5%	100.45	86.5%	116.07	552.96
		b) Invert	m^3	12.59	16.6%	63.48	83.4%	76.07	362.40
	7	Belt gallery 3-T:							
		a) Arch and sidewalls	m^3	18.37	14.8%	105.64	85.2%	124.01	590.78
		b) Invert	m^3	13.26	17.1%	64.27	82.9%	77.53	369.35
	8	Seismic adit at T2 and at P19:							
		a) Arch and sidewalls	m^3	17.25	14.1%	104.83	85.9%	122.08	581.59
		b) Invert	m^3	13.13	16.9%	64.56	83.1%	77.69	370.12
	9	Test chamber and test gallery:							
		a) Arch and sidewalls	m^3	17.25	14.1%	104.83	85.9%	122.08	581.59
		b) Invert	m^3	13.13	16.9%	64.56	83.1%	77.69	370.12
5		**STOCKPILING OF DAM MATERIALS**							
5.01		Preparation of stockpiling areas:							
	1	Cut-and-fill earthmoving for LG1, LG2 & LL3 areas	m^3	0.14	8.0%	1.61	92.0%	1.75	8.34
5.02		Stockpiling of alluvial material from borrow area N°15							
	1	Stockpiling in area LG1 (a)	m^3	0.23	5.0%	4.33	95.0%	4.56	21.72
	2	Stockpiling in area LG1 (b)	m^3	0.21	5.1%	3.90	94.9%	4.11	19.58
	3	Stockpiling in area LG1 (c)	m^3	0.20	5.1%	3.73	94.9%	3.93	18.72
	4	Stockpiling in area LG1 (d)	m^3	0.22	5.0%	4.14	95.0%	4.36	20.77
	5	Stockpiling in area LG2 (a)	m^3	0.27	4.9%	5.29	95.1%	5.56	26.49
	6	Stockpiling in area LG2 (b)	m^3	0.26	5.0%	4.97	95.0%	5.23	24.92
	7	Stockpiling in area LG2 (c)	m^3	0.29	4.9%	5.62	95.1%	5.91	28.16
5.03		Stockpiling of alluvial material from Liabidora borrow area							

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	1	Stockpile in area LG2 (d)	m^3	0.25	5.1%	4.63	94.9%	4.88	23.25
	2	Stockpiling in area LG2 (e)	m^3	0.23	5.2%	4.22	94.8%	4.45	21.20
5.04		Stockpiling of loam from borrow area N°17b							
	1	Stockpiling in area LL3	m^3	0.12	4.8%	2.37	95.2%	2.49	11.86
5.05		Stockpiling of rock from quarries N°26a							
	1	Stockpiling in area LR4	m^3	1.26	21.4%	4.63	78.6%	5.89	28.06
5.06		Stockpiling of boulders							
	1	Stockpiling of boulders of borrow area 15 in same area	m^3	0.50	13.7%	3.14	86.3%	3.64	17.34
6		**REINFORCING STEEL**							
6.01		Steel for surface concrete							
	1	Deformed reinforcing bars	t	232.54	15.1%	1,308.26	84.9%	1,540.80	7,340.37
	2	High tensile steel strands and wires	kg	0.54	11.9%	3.98	88.1%	4.52	21.53
	3	Welded wire fabric	kg	0.50	20.6%	1.93	79.4%	2.43	11.58
6.02		Steel for underground concrete							
	1	Deformed reinforcing bars	t	325.47	19.3%	1,359.52	80.7%	1,684.99	8,027.29
	2	Welded wire fabric	kg	0.58	21.2%	2.16	78.8%	2.74	13.05
7		**PROTECTION & SUPPORTS - SURFACE WORKS**							
7.01		Rock bolts							
	1	Diameter 22.0 mm, length from 3.00 to 6.00 m	m	1.71	7.4%	21.50	92.6%	23.21	110.57
	2	Diameter 26.5 mm, length from 3.00 to 6.00 m	m	2.62	8.8%	27.27	91.2%	29.89	142.40
	3	Diameter 32.0 mm, length from 3.00 to 9.00 m	m	2.81	7.4%	35.42	92.6%	38.23	182.13
7.02		Grouted anchor bars (dowels)							
	1	Bar diameter 22.0 mm	m	1.44	11.6%	10.97	88.4%	12.41	59.12
	2	Bar diameter 26.0 mm	m	1.58	11.0%	12.80	89.0%	14.38	68.51
	3	Bar diameter 32.0 mm	m	1.63	9.4%	15.71	90.6%	17.34	82.61
	4	Bar diameter 36 mm diameter	m	2.06	9.4%	19.88	90.6%	21.95	104.55
	5	Bar diameter 50 mm diameter	m	3.98	9.4%	38.35	90.6%	42.33	201.68
7.03		Welded wire fabric	kg	0.50	20.6%	1.93	79.4%	2.43	11.58
7.04		Shotcrete (excluding cement)							
	1	Nominal thickness 5 cm	m2	0.89	13.8%	5.55	86.2%	6.44	30.68
	2	Nominal thickness 10 cm	m2	1.53	13.9%	9.51	86.1%	11.04	52.59
	3	Nominal thickness 15 cm	m2	2.17	13.9%	13.47	86.1%	15.64	74.51
	4	Nominal thickness 20 cm	m2	2.81	13.9%	17.44	86.1%	20.25	96.47
	5	Nominal thickness 25 cm	m2	3.45	13.9%	21.40	86.1%	24.85	118.39
	6	Average rate per cubic meter	m3	15.10	13.9%	93.73	86.1%	108.83	518.47
8		**PROTECTION & SUPPORTS - UNDERGROUND WORKS**							
8.01		Rock bolts							
	1	Diameter 22.0 mm, length from 3.00 to 6.00 m	m	1.71	6.6%	24.13	93.4%	25.84	123.10
	2	Diameter 26.5 mm, length from 3.00 to 6.00 m	m	2.83	8.3%	31.18	91.7%	34.01	162.02
	3	Diameter 32.0 mm, length from 3.00 to 9.00 m	m	3.02	7.2%	39.12	92.8%	42.14	200.75
	4	Bar diameter 36 mm diameter	m	3.82	7.2%	49.51	92.8%	53.33	254.08
	5	Bar diameter 50 mm diameter	m	7.37	7.2%	95.51	92.8%	102.88	490.12
8.02		Grouted anchor bars (dowels)							
	1	Bar diameter 22.0 mm	m	1.49	9.9%	13.63	90.1%	15.12	72.03
	2	Bar diameter 26.0 mm	m	1.58	9.4%	15.28	90.6%	16.86	80.32
	3	Bar diameter 32.0 mm	m	1.62	8.4%	17.76	91.6%	19.38	92.33

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	4	Bar diameter 50.0 mm	m	3.96	8.4%	43.36	91.6%	47.31	225.41
8.03		Tendons, 50 t capacity							
	1	Length 10 m	ea	176.99	17.2%	849.67	82.8%	1,026.66	4,891.01
	2	Length 15 m	ea	242.14	17.7%	1,123.51	82.3%	1,365.65	6,505.96
	3	Length 20 m	ea	314.45	18.3%	1,403.05	81.7%	1,717.50	8,182.17
	4	Length 25 m	ea	393.91	18.9%	1,688.00	81.1%	2,081.91	9,918.22
	5	Length 30 m	ea	480.53	19.5%	1,978.48	80.5%	2,459.01	11,714.72
8.04		Tendons, 70 t capacity							
	1	Length 10 m	ea	212.11	17.5%	998.63	82.5%	1,210.74	5,767.97
	2	Length 15 m	ea	289.79	17.9%	1,325.48	82.1%	1,615.27	7,695.15
	3	Length 20 m	ea	374.63	18.4%	1,657.86	81.6%	2,032.49	9,682.78
	4	Length 25 m	ea	466.63	18.9%	1,995.82	81.1%	2,462.45	11,731.11
	5	Length 30 m	ea	565.79	19.1%	2,399.30	80.9%	2,965.09	14,125.69
8.05		Welded wire fabric	kg	0.58	21.2%	2.16	78.8%	2.74	13.05
8.06		Shotcrete (excluding cement)							
	1	Nominal thickness 5 cm	m2	0.86	12.3%	6.12	87.7%	6.98	33.25
	2	Nominal thickness 10 cm	m2	1.48	12.4%	10.49	87.6%	11.97	57.03
	3	Nominal thickness 15 cm	m2	2.10	12.4%	14.86	87.6%	16.96	80.80
	4	Nominal thickness 20 cm	m2	2.71	12.4%	19.23	87.6%	21.94	104.52
	5	Nominal thickness 25 cm	m2	3.33	12.4%	23.60	87.6%	26.93	128.29
	6	Average rate per cubic meter	m3	14.59	12.4%	103.39	87.6%	117.98	562.06
8.07		Steel ribs and lagging							
	1	Steel ribs	t	130.00	30.7%	294.00	69.3%	424.00	2,019.94

ITEM	SI	DESCRIPTION	UNIT	UNIT PRICE Local Currency (US$ Equiv.)	%	Foreign Currency (US$)	%	AGGREGATE UNIT PRICE (US$)	(TJS)
	2	Steel lagging	t	111.00	30.6%	252.00	69.4%	363.00	1,729.33
9		**DRILLING AND GROUTING (UNDERGROUND WORKS)**							
9.01		Percussion contact grout holes, 38 mm dia., length to 1.5 m	m	8.61	45.3%	10.38	54.7%	18.99	90.47
9.02		Percussion contact grout holes, 40-48 mm dia., length to 1.5 m	m	4.04	18.0%	18.36	82.0%	22.40	106.71
9.03		Rotary consolidation grout holes Ø 40-48 mm, length to 20 m	m	8.99	19.2%	37.90	80.8%	46.89	223.38
9.04		Drain boreholes, 75 mm dia, length to 20 m	m	5.68	16.4%	28.91	83.6%	34.59	164.79
9.05		Contact pressure grouting, excluding injected materials	t	39.94	24.8%	121.05	75.2%	160.99	766.96
9.06		Consolidation pressure grouting, excluding injected materials	t	42.60	25.4%	124.85	74.6%	167.45	797.73
9.07		Bentonite	t	9.93	2.2%	437.33	97.8%	447.26	2,130.75
9.08		Superplasticizer admixture	kg	0.05	2.0%	2.41	98.0%	2.46	11.72
10		**MISCELLANEOUS WORKS**							
10.01		Fills and backfills:							
	1	Random fill, roads	m^3	0.23	12.6%	1.59	87.4%	1.82	8.67
	2	Random backfill, roads	m^3	0.26	12.4%	1.83	87.6%	2.09	9.96
	3	Random fill and backfill compaction only	m^3	0.12	11.0%	0.97	89.0%	1.09	5.19
10.02		Sundries works for roads							
	1	Subgrade preparation and compaction	m^2	0.01	8.3%	0.11	91.7%	0.12	0.57
	2	Selected alluvial material for subbase	m^2	0.66	10.7%	5.53	89.3%	6.19	29.49
	3	Granular material for subbase and base course	m^3	2.58	11.5%	19.89	88.5%	22.47	107.05
	4	Granular material for surface course	m^3	2.68	11.5%	20.66	88.5%	23.34	111.19
	5	Asphalt paving, base course	m^3	20.40	15.0%	115.60	85.0%	136.00	647.90
	6	Asphalt paving, binder 60 mm thick	m^2	1.58	15.0%	8.93	85.0%	10.51	50.07
	7	Asphalt paving, wearing course 40 mm thick	m^2	1.17	15.0%	6.63	85.0%	7.80	37.16
10.03		Road maintenance							
	1	Maintenance of concrete pavings	m^2/year	0.27	6.3%	4.04	93.7%	4.31	20.53
	2	Maintenance of asphalt pavings	m^2/year	0.23	15.2%	1.28	84.8%	1.51	7.19
	3	Maintenance of gravel surfacing pavings	m^2/year	0.20	13.2%	1.31	86.8%	1.51	7.19
	4	Removal of landslide and rock falls from roadbeds	m^3	0.14	10.1%	1.25	89.9%	1.39	6.62
10.04		Precast concrete units (excluding cement)							
	1	Concrete blocks for abutment stabilization	m^3	15.19	17.0%	74.36	83.0%	89.55	426.62
	2	Wayside precast concrete protection barriers	m^3	10.40	17.2%	49.90	82.8%	60.30	287.27
10.05		Steel works							
	1	Steel structures of bridges, conventional type bridge	kg	0.83	15.1%	4.67	84.9%	5.50	26.20
	2	Steel structures of bridges, suspension type bridge	kg	1.05	15.0%	5.95	85.0%	7.00	33.35
	3	Steel lining of tunnel and galleries	kg	0.77	12.8%	5.23	87.2%	6.00	28.58
	4	High strength steel for cables of suspension bridge	kg	2.80	20.0%	11.20	80.0%	14.00	66.70
	5	Tendons for suspension bridge anchoring	m	32.30	17.0%	157.70	83.0%	190.00	905.16
	6	Miscellaneous steel works	kg	0.82	14.9%	4.68	85.1%	5.50	26.20

CIVIL WORKS COST ESTIMATE - PHASE I

UNDERGROUND EXCAVATION - UNIT PRICE MAKE UP AS PER THE PERCENTAGE OF EACH ZONE

N°	DESCRIPTION	UNIT	QUANTITY	%	UNIT COSTS		TOTAL COSTS	
					L.C.P (US$ Eq.)	F.C.P. (US$)	L.C.P (US$ Eq.)	F.C.P. (US$)
1	**Level 1 diversion tunnel - Pressure stretch**							
1.01	Arch	m3	29,040.30	38.2%	8.24	36.67	3.15	14.00
1.02	Upper benching	m3	16,556.40	21.8%	6.46	32.73	1.41	7.12
1.03	Lower benching	m3	30,463.30	40.1%	5.16	24.95	2.07	9.99
			76,060.00	**100%**			**6.62**	**31.12**
2	**Level 1 diversion tunnel - Free-flow stretch**							
	Left Bank							
2.01	Arch	m3	58,005.80	41.6%	7.33	37.14	3.05	15.44
2.02	Upper benching	m3	27,020.15	19.4%	6.18	33.16	1.20	6.42
2.03	Lower benching	m3	54,490.63	39.1%	4.95	25.27	1.93	9.87
			139,516.58	**100%**			**6.18**	**31.73**
3	**Level 1 diversion tunnel - Free-flow stretch**							
	Right Bank							
3.01	Arch	m3	31,517.18	40.5%	7.67	38.70	3.11	15.69
3.02	Upper benching	m3	8,417.18	10.8%	6.57	34.01	0.71	3.68
3.03	Lower benching	m3	37,792.58	48.6%	5.91	25.24	2.87	12.27
			77,726.94	**100%**			**6.70**	**31.65**
4	**Level 1 diversion tunnel - Maintenance gate**							
	chamber							
4.01	Arch	m3	8,173.02	23.1%	7.33	26.03	1.69	6.01
4.02	First benching	m3	6,154.89	17.4%	7.53	37.27	1.31	6.48
4.03	Other benchings	m3	21,056.29	59.5%	7.53	37.27	4.48	22.18
			35,384.20	**1.00**			**7.48**	**34.67**
5	**Level 1 diversion tunnel - Emergency and**							
	sector gate chamber							
5.01	Top heading, central pilot tunnel	m3	3,868.79	14.5%	10.21	37.01	1.48	5.36
5.02	Top heading, right side reaming	m3	4,061.39	15.2%	10.13	37.01	1.54	5.63
5.03	Top heading, left side reaming	m3	4,061.39	15.2%	10.13	37.01	1.54	5.63
5.04	Benching	m3	14,714.00	55.1%	5.60	32.96	3.09	18.16
			26,705.57	**100%**			**7.65**	**34.78**
6	**Collector of draft tubes 1-2-3 (section 3)**							
6.01	Arch	m3	13,304.56	36.0%	7.98	35.83	2.87	12.91
6.02	Upper benching	m3	7,801.25	21.1%	6.28	31.10	1.33	6.57
6.03	Lower benching	m3	15,825.39	42.9%	5.63	28.36	2.41	12.15
			36,931.20	**100%**			**6.61**	**31.63**
7	**Powerhouse**							
7.01	Top heading, central pilot tunnel	m3	11,768.00	6.5%	3.93	37.54	0.25	2.43
7.02	Top heading, right side reaming	m3	12,796.00	7.0%	9.45	38.23	0.67	2.69
7.03	Top heading, left side reaming	m3	12,796.00	7.0%	9.45	38.23	0.67	2.69
7.04	Horizontal benching N°1 (993.10-986.00), right side	m3	8,911.50	4.9%	9.18	41.33	0.45	2.03
7.05	Horizontal benching N°1(993.10-986.00), left s ide	m3	8,911.50	4.9%	9.18	41.33	0.45	2.03
7.06	Vertical benching N°1 (993.10-986.00), central	m3	18,988.00	10.4%	4.52	23.26	0.47	2.43
7.07	Vertical benchings N°2a (986.00-974.60)	m3	25,78 8.51	14.2%	4.42	25.30	0.63	3.59
7.08	Vertical benchings N°2b (986.00-974.60)	m3	25,78 8.51	14.2%	4.42	25.30	0.63	3.59
7.09	Vertical benchings N°3a (974.00-962.20)	m3	28,01 1.91	15.4%	3.92	24.87	0.60	3.83
7.10	Vertical benchings N°3b (974.60-962.20)	m3	28,01 1.91	15.4%	3.92	24.87	0.60	3.83
			181,771.84	**100%**			**5.42**	**29.14**
8	**Transformer Chamber**							
8.01	Top heading, central pilot tunnel	m3	6,367.24	5.0%	13.34	47.27	0.66	2.35
8.02	Top heading, right side reaming	m3	6,706.56	5.2%	13.87	49.13	0.73	2.58
8.03	Top heading, left side reaming	m3	6,706.56	5.2%	13.87	49.13	0.73	2.58
8.04	Horizontal benching N°1 (1012.80-1008.30), right s ide	m3	3,592.80	2.8%	16.24	56.93	0.46	1.60
8.05	Horizontal benching N°1 (1012.80-1008.30), lef t side	m3	3,592.80	2.8%	16.24	56.93	0.46	1.60
8.06	Vertical benching N°1 (1012.80-1008.30), centr al	m3	10,778.40	8.4%	4.82	23.70	0.41	2.00
8.07	Vertical benchings N°2a (1008.30-991.30)	m3	21,2 76.56	16.6%	4.37	24.80	0.73	4.13
8.08	Vertical benchings N°2b (1008.30-991.30)	m3	21,2 76.56	16.6%	4.37	24.80	0.73	4.13
8.09	Vertical benchings N°2c (1008.30-991.30)	m3	21,2 76.56	16.6%	4.37	24.80	0.73	4.13
8.10	Vertical benching N°3 (991.30-982.00)	m3	26,306.35	20.6%	4.20	25.13	0.86	5.17
			127,880.39	**100%**			**6.48**	**30.25**

PART – VI

PRICED BILL OF QUANTITIES

&

COST SUMMARY

(Civil Works)

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
1		**GENERAL PROJECT COSTS**								
1.1		**Mobilization and Demobilization**								
1.1.01		Mobilization and demobilization	l.s.	1		1,320,000		11,880,000		13,200,000
		Total No. 1.1 ----------->>				**1,320,000**		**11,880,000**		**13,200,000**
1.2		**Camp Areas Preparation**								
1.2.01		Excavation and fills								
	1	Cut and fill excavation (common excavation)	m^3	360,000.0	0.19	68,400	1.91	687,600	2.10	756,000
	2	General excavation, rock	m^3	674,250.0	1.58	1,065,315	6.97	4,699,523	8.55	5,764,838
	3	Fill compaction	m^3	360,000.0	0.12	43,200	0.97	349,200	1.09	392,400
	4	Trench and foundation excavation	m^3	34,000.0	0.55	18,700	4.81	163,540	5.36	182,240
1.2.02		Concrete works								
	1	Concrete, retaining walls	m^3	21,000.0	7.98	167,580	44.39	932,190	52.37	1,099,770
	2	Portland cement, ASTM I or II type	t	6,510.0	5.16	33,592	252.60	1,644,426	257.76	1,678,018
	3	Formworks	m^2	23,000.0	6.06	139,380	17.78	408,940	23.84	548,320
1.2.03		Sundries								
	1	Subgrade preparation	m^2	50,000.0	0.01	500	0.11	5,500	0.12	6,000
	2	Base course with classified granular material	m^3	12,000.0	2.58	30,960	19.89	238,680	22.47	269,640
	3	Surface course with classified granular material	m^3	7,000.0	2.68	18,760	20.66	144,620	23.34	163,380
	4	Drainage system	l.s.	1		37,500		212,500		250,000
	5	Miscellaneous works	%	10.0%		162,389		948,672		1,111,061
		Total No. 1.2 ----------->>				**1,786,275**		**10,435,390**		**12,221,666**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
1.3		**Construction Yard Areas Preparation**								
1.3.01		Excavation and fills								
	1	Cut and fill excavation (common excavation)	m^3	520,000.0	0.19	98,800	1.91	993,200	2.10	1,092,000
	2	Fill compaction	m^3	520,000.0	0.12	62,400	0.97	504,400	1.09	566,800
1.3.02		Paving:								
	1	Subgrade preparation	m^2	210,000.0	0.01	2,100	0.11	23,100	0.12	25,200
	2	Base course with classified granular material	m^3	31,000.0	2.58	79,980	19.89	616,590	22.47	696,570
	3	Surface course with classified granular material	m^3	10,300.0	2.68	27,604	20.66	212,798	23.34	240,402
	4	Concrete paving	m^3	10,000.0	8.79	87,900	52.64	526,400	61.43	614,300
	5	Portland cement, ASTM I or II type	t	3,500.0	5.16	18,060	252.60	884,100	257.76	902,160
	6	Reinforcing steel	t	50.0	242.54	12,127	1,308.26	65,413	1550.80	77,540
1.3.03		Sundries								
	1	Drainage system	l.s.	1		30,000		170,000		200,000
	2	Miscellaneous works	%	10.0%		41,897		399,600		441,497
		Total No. 1.3 ---------->>				**460,868**		**4,395,601**		**4,856,469**
1.4		**Camps, buildings and appurtenant facilities**								
	1	Construction	l.s.	1		6,353,847		36,005,133		42,358,980
	2	Maintenance	l.s.	1		1,715,539		9,721,386		11,436,925
	3	Administrative building of JSC "Rogun HPP"	l.s.	1		179,034		1,014,525		1,193,559
	4	N°4 residential buildings (9-stores)	l.s.			1,161,538		6,582,047		7,743,585
	5	Ilok base	l.s.			2,481,686		14,062,885		16,544,570
		Total No. 1.4 ---------->>				**11,891,643**		**67,385,976**		**79,277,618**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
1.5		**Roads Construction:**								
1.5.01		Excavation								
	1	General excavation, common and rippable	m^3	1,100,000.0	0.15	165,000	2.10	2,310,000	2.25	2,475,000
	2	General excavation, rock	m^3	490,000.0	1.58	774,200	6.97	3,415,300	8.55	4,189,500
	3	Trench and foundation excavation, common	m^3	41,000.0	0.55	22,550	4.81	197,210	5.36	219,760
	4	Trench and foundation excavation, rock	m^3	37,000.0	4.10	151,700	17.63	652,310	21.73	804,010
1.5.02		Fills and backfills								
	1	Fills, random material	m^3	130,000.0	0.23	29,900	1.59	206,700	1.82	236,600
	2	Backfill, random material	m^3	25,000.0	0.26	6,613	1.83	45,713	2.09	52,325
1.5.03		Concrete works, excluding main bridges and pavements								
	1	Concrete, lean and backfills	m^3	4,800.0	6.35	30,480	34.33	164,784	40.68	195,264
	2	Concrete, foundations	m^3	35,100.0	5.81	203,931	40.79	1,431,729	46.60	1,635,660
	3	Concrete, culverts and small bridges	m^3	5,400.0	8.66	46,764	47.82	258,228	56.48	304,992
	4	Concrete, retaining walls	m^3	8,400.0	7.83	65,772	43.91	368,844	51.74	434,616
	5	Concrete, side safety walls (cast-in situ concrete)	m^3	2,000.0	9.00	18,000	43.10	86,200	52.10	104,200
	6	Concrete, side safety walls (precast concrete)	m^3	1,500.0	10.40	15,600	49.90	74,850	60.30	90,450
	7	Portland cement, ASTM I or II type	t	18,206.0	5.16	93,943	252.60	4,598,823	257.76	4,692,766
	8	Formworks, flat surface	m^2	22,000.0	6.73	148,060	20.10	442,200	26.83	590,260
	9	Formworks, curved surface	m^2	4,500.0	10.67	48,015	26.77	120,465	37.44	168,480
	10	Scaffoldings for slab & arch concrete, 20 N/m^2 load type	m^3	21,000.0	2.69	56,490	2.87	60,270	5.56	116,760
	11	Reinforcing steel	t	717.0	242.54	173,901	1,308.26	938,022	1550.80	1,111,924
1.5.04		Concrete works, main bridges								
	1	Concrete, lean and backfills	m^3	200.0	6.35	1,270	34.33	6,866	40.68	8,136
	2	Concrete, foundations and mats	m^3	5,400.0	5.81	31,374	40.79	220,266	46.60	251,640
	3	Concrete, retaining walls	m^3	3,000.0	7.98	23,940	44.39	133,170	52.37	157,110
	4	Concrete, beams and slabs	m^3	3,900.0	9.31	36,309	57.17	222,963	66.48	259,272
	5	Portland cement, ASTM I or II type	t	3,294.9	5.16	17,002	252.60	832,292	257.76	849,293

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
	6	Formworks, wall surface	m^2	4,300.0	6.06	26,058	17.78	76,454	23.84	102,512
	7	Formworks, slab surface	m^2	3,600.0	5.14	18,504	16.90	60,840	22.04	79,344
	8	Scaffoldings for slab & arch concrete, 50 N/m2 load type	m^3	10,000.0	3.18	31,800	4.17	41,700	7.35	73,500
	9	Reinforcing steel, deformed type	t	770.0	242.54	186,756	1,308.26	1,007,360	1550.80	1,194,116
	10	Reinforcing steel, high tensile type	kg	52,000.0	0.54	28,220	3.98	206,950	4.52	235,170
1.5.06		Pavement works								
	1	Subgrade preparation	m^2	120,000.0	0.01	1,200	0.11	13,200	0.12	14,400
	2	Sub-base with selected alluvial material	m^3	36,000.0	0.66	23,760	5.53	199,080	6.19	222,840
	3	Base course with classified granular material	m^3	24,000.0	2.58	61,920	19.89	477,360	22.47	539,280
	4	Surface course with classified granular material	m^3	42,000.0	2.68	112,560	20.66	867,720	23.34	980,280
	5	Concrete, lean	m^3	3,500.0	6.35	22,225	34.33	120,155	40.68	142,380
	6	Concrete paving	m^3	4,400.0	8.79	38,676	52.64	231,616	61.43	270,292
	7	Portland cement, ASTM I or II type	t	2,719.5	5.16	14,033	252.60	686,946	257.76	700,978
	8	Asphalt paving, base course	m^3	14,100.0	20.40	287,640	115.60	1,629,960	136.00	1,917,600
	9	Asphalt paving, binder 60 mm thick	m^2	94,000.0	1.58	148,050	8.93	838,950	10.50	987,000
	10	Asphalt paving, wearing course 40 mm thick	m^2	94,000.0	1.17	109,980	6.63	623,220	7.80	733,200
	11	Formworks for expansion/contraction joints	m^2	150.0	3.77	566	14.61	2,192	18.38	2,757
	12	Reinforcing steel	t	276.6	242.54	67,079	1,308.26	361,825	1550.80	428,905
1.5.07		Sundries								
	1	Structural steel, suspension bridge	kg	799,000.0	1.05	838,950	5.95	4,754,050	7.00	5,593,000
	2	Structural steel, Obi Shur bridge	kg	498,000.0	0.83	413,340	4.67	2,325,660	5.50	2,739,000
	3	Guardrails and miscellaneous steel works	kg	44,000.0	0.78	34,320	4.42	194,480	5.20	228,800
	4	Steel cables of suspension bridge	kg	30,000.0	2.80	84,000	11.20	336,000	14.00	420,000
	5	Tendons for suspension bridge cable anchoring	m	1,000.0	32.30	32,300	157.70	157,700	190.00	190,000
	6	Road Shulashak to Ilok base	m	9,500.0	56.15	533,425	378.85	3,599,075	435.00	4,132,500
	7	Gurghurda bridge	l.s.	1		388,560		2,621,690		3,010,250
	8	Miscellaneous works	%	5.0%		237,137		1,600,031		1,837,169
		Total No. 1.5 ----------->>				**5,901,872**		**39,821,418**		**45,723,290**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
1.6		**Road Maintenance**								
1.6.01		Maintenance of pavings								
	1	Maintenance of concrete pavings	m^2/year	140,800.0	0.27	38,304	4.04	569,262	4.32	607,566
	2	Maintenance of asphalt pavings	m^2/year	752,000.0	0.23	169,200	1.28	958,800	1.50	1,128,000
	3	Maintenance of base course with gravel surfacing	m^2/year	3,360,000.0	0.20	672,000	1.31	4,401,600	1.51	5,073,600
1.6.02		Removal of landslides and rock falls from roadbed								
	1	Roads mainly excavated in rock formations	m^3	88,000.0	0.14	12,320	1.25	110,000	1.39	122,320
	2	Roads mainly excavated in non-rocky formations	m^3	240,000.0	0.14	33,600	1.25	300,000	1.39	333,600
1.6.03		Sundries								
	1	Miscellaneous works	%	8.0%		74,034		507,173		581,207
		Total No. 1.6 ----------->>				**999,457**		**6,846,835**		**7,846,293**
1.7		**Miscellanea**								
1.7.01		Monitoring equipment Geokon USA	l.s.			286,799		2,581,187		2,867,986
1.7.02		Water and air supply	l.s.			287,769		1,630,688		1,918,457
1.7.03		Power supply	l.s.			525,334		2,976,893		3,502,227
1.7.04		Pumping stations	l.s.			311,146		1,763,159		2,074,305
1.7.05		Geological investigations	l.s.			2,250,000		12,750,000		15,000,000
1.7.06		Design	l.s.			1,500,000		13,500,000		15,000,000
1.7.07		Cost for resettlement in the flood zone	l.s.			8,830,340		41,628,744		50,459,084
1.7.08		Rehabilitation of Exploratory galleries	l.s.			687,191		3,239,614		3,926,805
		Total No. 1.7 ----------->>				**14,678,578**		**80,070,287**		**94,748,864**
2		**REMOVAL OF UNSUITABLE MATERIALS FROM BORROW**								
		AREAS AND QUARRIES								
2.01		Removal of overburden from borrow areas								
	1	Overburden of borrow area N°15	m^3	5,675,000.0	0.18	1,021,500	2.26	12,825,500	2.44	13,847,000
	2	Overburden of borrow area N°15a	m^3	1,089,000.0	0.17	185,130	2.07	2,254,230	2.24	2,439,360
	3	Overburden of Lybiadora borrow area	m^3	828,000.0	0.18	149,040	2.11	1,747,080	2.29	1,896,120
	4	Overburden of borrow area N°17b	m^3	173,000.0	0.19	32,870	2.25	389,250	2.44	422,120
2.02		Removal of overburden from quarries								
	1	Overburden of quarry N°26a	m^3	770,000.0	0.21	161,700	2.47	1,901,900	2.68	2,063,600
2.03		Removal of unsuitable materials from borrow areas								
	1	Unsuitable material of borrow area N°15	m^3	218,200.0	0.14	30,548	2.48	541,136	2.62	571,684
		Total No. 2 ----------->>				**1,580,788**		**19,659,096**		**21,239,884**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
3		**STOCKPILING OF DAM FILL MATERIALS**								
3.01		Preparation of stockpiling areas								
	1	Cut-and-fill earthmoving for LG1 areas	m^3	2,800.0	0.14	392	1.61	4,508	1.75	4,900
	2	Cut-and-fill earthmoving for LG2 areas	m^3	14,000.0	0.14	1,960	1.61	22,540	1.75	24,500
	3	Cut-and-fill earthmoving for LL3 area	m^3	20,000.0	0.14	2,800	1.61	32,200	1.75	35,000
3.02		Alluvial material of borrow area 15 stockpiled in LG1 areas								
	1	Material stockpiled in area LG1(a)	m^3	12,010,000.0	0.57	6,845,700	5.28	63,412,800	5.85	70,258,500
	2	Material stockpiled in area LG1(b)	m^3	1,900,000.0	0.55	1,045,000	4.85	9,215,000	5.40	10,260,000
	3	Material stockpiled in area LG1(c)	m^3	430,000.0	0.54	232,200	4.68	2,012,400	5.22	2,244,600
	4	Material stockpiled in area LG1(d)	m^3	290,000.0	0.56	162,400	5.09	1,476,100	5.65	1,638,500
3.03		Alluvial material of borrow area 15 stockpiled in LG2 areas								
	1	Material stockpiled in area LG2(a)	m^3	5,820,000.0	0.61	3,550,200	6.24	36,316,800	6.85	39,867,000
	2	Material stockpiled in area LG2(b)	m^3	1,050,000.0	0.60	630,000	5.92	6,216,000	6.52	6,846,000
	3	Material stockpiled in area LG2(c)	m^3	620,000.0	0.63	390,600	6.57	4,073,400	7.20	4,464,000
3.04		Processed alluvial material of Lyabidora borrow area								
		stockpiled in LG2 areas:								
	1	Material stockpiled in area LG2(d)	m^3	1,940,000.0	0.25	485,000	4.63	8,982,200	4.88	9,467,200
	2	Material stockpiled in area LG2(e)	m^3	2,090,000.0	0.23	480,700	4.22	8,819,800	4.45	9,300,500
3.05		Loam material of 17b borrow area stockpiled in LL3 area	m^3	2,500,000.0	0.12	300,000	2.37	5,925,000	2.49	6,225,000
3.06		Blasted rock of 26a quarry stockpiled in LR4 area	m^3	475,000.0	1.26	598,500	4.63	2,199,250	5.89	2,797,750
3.07		Stockpiling of boulders > 700 mm in 15 borrow area	m^3	1,106,000.0	0.50	553,000	3.14	3,472,840	3.64	4,025,840
		Total No. 3 ----------->>				**15,278,452**		**152,180,838**		**167,459,290**

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		**SURFACE WORKS**								
4.1		**Level 1 and Level 2 Diversion Tunnel - Inlets**								
		(Including Stabilization Works)								
4.1.01		Excavation and supports								
	1	Excavation, common	m^3	4,000.0	0.30	1,200	3.24	12,960	3.54	14,160
	2	Excavation, rock	m^3	3,900.0	1.52	5,928	6.23	24,297	7.75	30,225
4.1.02		Concrete works for inlets								
	1	Concrete, foundation and mat	m^3	3,626.0	6.19	22,445	34.09	123,610	40.28	146,055
	2	Concrete, above foundation	m^3	30,868.0	7.67	236,758	38.07	1,175,145	45.74	1,411,902
	3	Reinforcing steel	t	1,256.0	242.54	304,630	1,308.26	1,643,175	1,550.80	1,947,805
	4	Formworks, level 1 diversion tunnel:								
		a) Flat type for walls, modular use	m^2	5,766.0	3.77	21,738	14.61	84,241	18.38	105,979
		b) Flat type for walls, non-modular use	m^2	100.0	6.06	606	17.78	1,778	23.84	2,384
		c) Flat type for columns, piers and pillars	m^2	713.0	8.23	5,868	23.68	16,884	31.91	22,752
		d) Flat type for slabs	m^2	210.0	5.14	1,079	16.90	3,549	22.04	4,628
		e) Flat type for mixed structures	m^2	100.0	6.73	673	20.10	2,010	26.83	2,683
		f) Curved type for miscellaneous structures	m^2	372.0	10.67	3,969	26.77	9,958	37.44	13,928
	5	Formworks, level 2 diversion tunnel:								
		a) Flat type for walls, modular use	m^2	4,017.0	3.77	15,144	14.61	58,688	18.38	73,832
		b) Flat type for walls, non-modular use	m^2	100.0	6.06	606	17.78	1,778	23.84	2,384
		c) Flat type for columns, piers and pillars	m^2	496.0	8.23	4,082	23.68	11,745	31.91	15,827
		d) Flat type for slabs	m^2	210.0	5.14	1,079	16.90	3,549	22.04	4,628
		e) Flat type for mixed structures	m^2	100.0	6.73	673	20.10	2,010	26.83	2,683
		f) Curved type for miscellaneous structures	m^2	260.0	10.67	2,774	26.77	6,960	37.44	9,734
	6	Scaffolding for slab type formworks, 50 KN/m^2 max. load	m^3	8,232.0	3.56	29,306	7.61	62,646	11.17	91,951

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
4.1.03		Concrete works for abutment stabilization								
	1	Concrete, cast-in-situ	m^3	8,000.0	8.30	66,400	48.99	391,920	57.29	458,320
	2	Concrete, precast blocks	m^3	500.0	15.19	7,595	74.36	37,180	89.55	44,775
	3	Formworks	m^2	5,000.0	6.06	30,300	17.78	88,886	23.84	119,185
	4	Grouted anchor bars, 50 mm diameter, length 20 m	ea.	2,200.0	79.20	174,240	867.20	1,907,840	946.40	2,082,080
4.1.04		Sundries								
	1	Portland cement, type I or II ASTM	t	15,427.8	5.16	79,608	252.60	3,897,072	257.76	3,976,680
	2	River Protection Works	l.s.			173,300		1,565,976		1,739,276
	3	Care of water and miscellaneous works	%	5.0%		59,500		556,693		616,193
		Total No. 4.1 ---------->>				**1,249,501**		**11,690,551**		**12,940,052**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
4.2		**Level 1 and Level 2 Diversion Tunnel - Outlets**								
4.2.01		Excavation and supports								
	1	Excavation, common	m^3	518.4	0.40	207	4.47	2,317	4.87	2,525
	2	Excavation, rock	m^3	8,570.0	1.73	14,826	8.30	71,131	10.03	85,957
4.2.02		Concrete works								
	1	Concrete, foundation and mat	m^3	6,500.0	6.14	39,910	33.64	218,660	39.78	258,570
	2	Concrete, above foundation	m^3	60,000.0	7.73	463,800	37.67	2,260,200	45.40	2,724,000
	3	Reinforcing steel	t	1,549.5	242.54	375,804	1,308.26	2,027,083	1,550.80	2,402,887
	4	Formworks, flat type for walls (non-modular use)	m^2	5,000	6.06	30,300	17.78	88,900	23.84	119,200
	5	Formworks, flat type for slabs	m^2	1,240	5.14	6,374	16.90	20,956	22.04	27,330
	6	Formworks, flat type for mixed structures	m^2	3,000	6.73	20,190	20.10	60,300	26.83	80,490
	7	Scaffolding for slab formworks, 50 KN/m^2 max. load	m^3	28,520	3.56	101,531	7.61	217,037	11.17	318,568
4.2.03		Sundries								
	1	Portland cement, type I or II ASTM	t	23,940.0	5.16	123,530	252.60	6,047,244	257.76	6,170,774
	2	Bank protection works at Diversion n. 2 outlet portal	l.s.			237,000		2,132,375		2,369,375
	3	Care of water and miscellaneous works	%	3.0%		42,404		394,386		436,790
		Total No. 4.2 ----------->>				**1,455,876**		**13,540,590**		**14,996,466**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
4.3		**Stage 1 Power Tunnel - Intake (Including Stabilization**								
		Works)								
4.3.01		Excavation and supports								
	1	Excavation, common	m^3	6,217.1	0.31	1,927	3.37	20,952	3.68	22,879
	2	Excavation, rock	m^3	24,868.3	1.53	38,049	6.38	158,660	7.91	196,709
	3	Rock bolts, 32 mm diameter	m	6,466.7	2.81	18,171	35.42	229,049	38.23	247,221
	4	Grouted anchor bars, 50 mm diameter, length 15 m	ea.	93.0	59.40	5,524	650.40	60,487	709.80	66,011
	5	Grouted anchor bars, 50 mm diameter, length 20 m	ea.	248.0	79.20	19,642	867.20	215,066	946.40	234,707
	6	Grouted anchor bars, 36 mm diameter, length 9 to 11 m	ea.	152.0	33.60	5,107	367.92	55,924	401.52	61,031
	7	Grouted anchor bars, 36 mm diameter, length 17.5 m	ea.	382.0	58.80	22,462	643.86	245,955	702.66	268,416
	8	Grouted anchor bars, 36 mm diameter, length 23.5 m	ea.	118.0	78.96	9,317	864.62	102,025	943.58	111,342
4.3.02		Concrete works for intake								
	1	Concrete, intake	m^3	2,282.0	13.04	29,757	38.28	87,355	51.32	117,112
	2	Concrete, abutment stabilization	m^3	3,400.0	8.30	28,220	48.99	166,566	57.29	194,786
	3	Reinforcing steel	t	491.0	242.54	119,087	1,308.26	642,356	1,550.80	761,443
	4	Formworks, flat type for mixed structures	m^2	1,340.0	6.73	9,018	20.10	26,934	26.83	35,952
4.3.03		Sundries								
	1	Miscellaneous steel works	kg	5,800.0	0.82	4,756	4.68	27,144	5.50	31,900
	2	Portland cement, type I or II ASTM	t	2,045.5	5.16	10,555	252.60	516,698	257.76	527,253
	3	Miscellaneous	%	3.0%		9,648		76,655		86,303
		Total No. 4.3 ----------->>				**331,240**		**2,631,825**		**2,963,066**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
4.4		**Transportation Tunnel T3 - Portal**								
4.4.01		Excavation and supports								
	1	Excavation, common	m^3	8,800.0	0.45	3,960	4.94	43,472	5.39	47,432
	2	Excavation, rock	m^3	1,950.0	1.72	3,354	8.40	16,380	10.12	19,734
	3	Rock bolts, 22 mm diameter	m	101.5	1.71	174	21.50	2,182	23.21	2,356
	4	Rock bolts, 50 mm diameter	m	6,466.7	2.81	18,171	35.42	229,049	38.23	247,221
4.4.02		Concrete works								
	1	Concrete, foundation	m^3	215.4	5.61	1,208	31.62	6,811	37.23	8,019
	2	Concrete, above foundation	m^3	718.0	6.15	4,416	33.18	23,823	39.33	28,239
	3	Reinforcing steel	t	65.3	242.54	15,847	1,308.26	85,479	1,550.80	101,326
	4	Formworks	m^2	400.0	6.73	2,692	20.10	8,040	26.83	10,732
4.4.03		Sundries								
	1	Portland cement, type I or II ASTM	t	336.0	5.16	1,734	252.60	84,880	257.76	86,614
	2	Miscellaneous works	%	2.0%		1,031		10,002		11,033
		Total No. 4.4 ---------->>				**52,587**		**510,119**		**562,706**
4.5		**Transportation Tunnel T4 and Cable Tunnel - Portals**								
4.5.01		Excavation and supports								
	1	Excavation, common	m^3	30,680.0	0.40	12,272	4.46	136,833	4.86	149,105
	2	Excavation, rock	m^3	1,870.0	2.01	3,759	10.11	18,906	12.12	22,664
4.5.02		Concrete works								
	1	Concrete, foundation	m^3	165.0	5.97	985	34.45	5,684	40.42	6,669
	2	Concrete, above foundation	m^3	620.0	6.88	4,266	36.36	22,543	43.24	26,809
	3	Reinforcing steel	t	54.9	242.54	13,318	1,308.26	71,837	1,550.80	85,154
	4	Formworks	m^2	510.0	6.73	3,432	20.10	10,251	26.83	13,683
4.5.03		Sundries								
	1	Portland cement, type I or II ASTM	t	204.1	5.16	1,053	252.60	51,556	257.76	52,609
	2	Miscellaneous works	%	2.0%		782		6,352		7,134
		Total No. 4.5 ---------->>				**39,866**		**323,961**		**363,828**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
4.6		**Transportation Tunnel 22 - Portals**								
4.6.01		Excavation and supports								
	1	Excavation, common	m^3	2,550.0	0.28	714	3.01	7,676	3.29	8,390
	2	Excavation, rock	m^3	5,050.0	1.52	7,676	6.17	31,159	7.69	38,835
	3	Rock bolts, 22 mm diameter	m	475.0	1.71	812	21.50	10,213	23.21	11,025
	4	Rock bolts, 26.5 mm diameter	m	255.0	2.62	668	27.27	6,954	29.89	7,622
	5	Shotcrete	m^3	82.5	15.10	1,246	93.73	7,733	108.83	8,978
	6	Welded wire fabric	kg	3,040.0	0.50	1,520	1.93	5,867	2.43	7,387
	7	Steel ribs	kg	30,000.0	0.13	3,900	2.94	88,200	3.07	92,100
4.6.02		Concrete works								
	1	Concrete	m^3	185.0	7.57	1,400	38.98	7,211	46.55	8,612
	2	Reinforcing steel	t	11.1	242.54	2,692	1,308.26	14,522	1,550.80	17,214
	3	Formworks, flat type for miscellaneous structures	m^2	105.0	6.73	707	20.10	2,111	26.83	2,817
4.6.03		Sundries								
	1	Portland cement, type I or II ASTM	t	107.9	5.16	557	252.60	27,243	257.76	27,799
	2	Care of water and miscellaneous works	%	2.0%		438		4,178		4,616
		Total No. 4.6 ---------->>				**22,330**		**213,064**		**235,394**
4.7		**Switchyard**								
4.7.01		Excavation and supports								
	1	Excavation, common	m^3	484,280.0	0.40	193,712	4.47	2,164,732	4.87	2,358,444
	2	Excavation, rock	m^3	85,350.0	1.73	147,656	8.30	708,405	10.03	856,061
		Total No. 4.7 ---------->>				**341,368**		**2,873,137**		**3,214,504**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
4.8		**Cables Duct**								
4.8.01		Excavation and supports:								
	1	Excavation, common	m^3	10,209.5	0.40	4,084	4.47	45,636	4.87	49,720
	2	Excavation, rock	m^3	15,312.5	1.73	26,491	8.30	127,094	10.03	153,584
	3	Grouted anchor bars, 32 mm diameter	m	1,694.0	1.63	2,761	15.71	26,613	17.34	29,374
4.8.02		Concrete works:								
	1	Concrete, foundation and mat	m^3	5,789.0	6.14	35,544	33.64	194,742	39.78	230,286
	2	Concrete, above foundation	m^3	7,077.0	8.30	58,739	34.10	241,326	42.40	300,065
	3	Reinforcing steel	t	966.0	242.54	234,294	1,308.26	1,263,779	1,550.80	1,498,073
	4	Formworks	m^2	12,292.0	6.06	74,489	17.78	218,517	23.84	293,005
	5	Scaffolding for slab formworks, 20 KN/m^2 max. load	m^3	3,150.0	2.98	9,387	4.57	14,396	7.55	23,783
	6	Scaffolding for slab formworks, 50 KN/m^2 max. load	m^3		3.56		7.61		11.17	
4.8.03		Sundries:								
	1	Portland cement, type I or II ASTM	t	4,631.8	5.16	23,900	252.60	1,169,983	257.76	1,193,882
	2	Portland cement, type V ASTM (sulfate resistant)	t		6.06		296.70		302.76	
	3	Care of water and miscellaneous works	%	3%		14,091		99,063		113,153
		Total No. 4.8 ---------->>				**483,779**		**3,401,147**		**3,884,926**
4.9		**Cleaning of upper cofferdam**								
4.9.01		Excavation and supports								
	1	Common excavation	m^3	795,310.0	0.36	283,926	1.74	1,386,225	2.10	1,670,151
	2	General excavation, rock	m^3	435,500.0	1.45	632,999	7.10	3,090,526	8.55	3,723,525
4.9.02		Filling and embankments								
	1	Pebbles embankment (from Quarry №15 material)	m^3	169,200.0	2.10	354,961	10.24	1,733,046	12.34	2,088,008
	2	Rock embankment (from Quarry №26 material)	m^3	15,560.0	1.40	21,821	6.85	106,539	8.25	128,360
4.9.03		Concrete works								
	1	Concrete blocks	u.	2,267.0	35.53	80,539	248.69	563,776	284.21	644,315
	2	Concrete slab	m^3	280.0	28.21	7,898	197.44	55,284	225.65	63,182
		Total No. 4.9 ---------->>				**1,382,145**		**6,935,397**		**8,317,541**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5		**TRANSPORTATION TUNNELS**								
5.1		**Transportation Tunnel T1**								
5.1.01		Excavation and supports								
	1	Excavation	m^3	36,890.9	9.15	337,552	44.87	1,655,295	54.02	1,992,847
	2	Rock bolts, 22 mm diameter	m	4,612.0	1.71	7,887	24.13	111,288	25.84	119,174
5.1.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	9,092.0	9.46	86,010	80.96	736,089	90.42	822,099
	2	Concrete, invert	m^3	1,865.1	8.08	15,070	55.14	102,839	63.22	117,909
	3	Reinforcing steel	t	438.3	325.47	142,648	1,359.52	595,854	1,684.99	738,501
5.1.03		Sundries								
	1	Portland cement ASTM type I or II	t	1,972.3	5.16	10,177	252.60	498,196	257.76	508,372
	2	Portland cement ASTM type V (sulfate resistant)	t	1,972.3	6.06	11,952	296.70	585,173	302.76	597,125
	3	Care of water and miscellaneous works	%	3.0%		18,339		128,542		146,881
		Total N°5.1 ---------- ---------->>				**629,634**		**4,413,275**		**5,042,908**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.2		**Transportation Tunnel T2**								
5.2.01		Excavation and supports								
	1	Excavation	m^3	54,650.9	8.42	460,161	43.85	2,396,442	52.27	2,856,603
	2	Rock bolts, 22 mm diameter	m	1,880.0	1.71	3,215	24.13	45,364	25.84	48,579
	3	Rock bolts, 26.5 mm diameter	m	1,870.0	2.83	5,292	31.18	58,307	34.01	63,599
	4	Rock bolts, 32 mm diameter	m	1,750.0	3.02	5,285	39.12	68,460	42.14	73,745
	5	Steel ribs	kg	4,380.0	0.13	569	2.94	12,877	3.07	13,447
5.2.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	5,291.5	10.19	53,920	89.32	472,637	99.51	526,557
	2	Concrete, invert	m^3	2,952.5	6.39	18,866	41.51	122,558	47.90	141,425
	3	Reinforcing steel	t	187.2	325.47	60,928	1,359.52	254,502	1,684.99	315,430
5.2.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	1,855.0	4.04	7,494	18.36	34,058	22.40	41,552
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	11,254	5.32	59,871	22.59	254,228	27.91	314,099
	3	Contact and cons. grouting (excluding injected materials)	t	993.1	39.94	39,664	121.05	120,214	160.99	159,878
5.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,980.5	5.16	10,219	252.60	500,265	257.76	510,485
	2	Portland cement ASTM type V (sulfate resistant)	t	1,980.5	6.06	12,002	296.70	587,604	302.76	599,606
	3	Care of water and miscellaneous works	%	3.0%		22,125		147,825		169,950
		Total N°5.2 ---------- ---------->>				**759,612**		**5,075,341**		**5,834,953**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.3		**Transportation Tunnel T3**								
5.3.01		Excavation and supports								
	1	Excavation	m^3	162,199.6	7.62	1,235,961	40.70	6,601,525	48.32	7,837,487
	2	Rock bolts, 26.5 mm diameter	m	18,531.2	2.83	52,443	31.18	577,802	34.01	630,246
5.3.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	24,714.0	9.08	224,403	83.31	2,058,922	92.39	2,283,325
	2	Concrete, invert	m^3	5,484.1	7.65	41,953	55.70	305,464	63.35	347,417
	3	Reinforcing steel	t	245.7	325.47	79,977	1,359.52	334,070	1,684.99	414,046
5.3.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	5,382.0	4.04	21,743	18.36	98,814	22.40	120,557
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	43,950.0	5.32	233,814	22.59	992,831	27.91	1,226,645
	3	Contact and cons. grouting (excluding injected materials)	t	3,786.0	39.94	151,213	121.05	458,295	160.99	609,508
5.3.04		Sundries								
	1	Portland cement ASTM type I or II	t	7,328.7	5.16	37,816	252.60	1,851,218	257.76	1,889,034
	2	Portland cement ASTM type V (sulfate resistant)	t	7,328.7	6.06	44,412	296.70	2,174,412	302.76	2,218,823
	3	Care of water and miscellaneous works	%	3.0%		63,712		463,601		527,313
		Total N°5.3 ---------- ---------->>				**2,187,447**		**15,916,953**		**18,104,400**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.4		**Transportation Tunnel T3'**								
5.4.01		Excavation and supports								
	1	Excavation	m^3	65,603.0	7.74	507,768	37.81	2,480,451	45.55	2,988,219
	2	Rock bolts, 22 mm diameter	m	15,891.5	1.71	27,174	24.13	383,461	25.84	410,635
5.4.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	5,333.8	11.30	60,272	89.91	479,565	101.21	539,837
	2	Concrete, invert	m^3	2,041.4	10.44	21,312	63.10	128,810	73.54	150,122
	3	Reinforcing steel	t	295.0	325.47	96,016	1,359.52	401,069	1,684.99	497,085
5.4.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	2,435.0	4.04	9,837	18.36	44,707	22.40	54,544
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	19,125.0	5.32	101,745	22.59	432,034	27.91	533,779
	3	Contact and cons. grouting (excluding injected materials)	t	1,651.8	39.94	65,973	121.05	199,950	160.99	265,923
5.4.04		Sundries								
	1	Portland cement ASTM type I or II	t	2,153.4	5.16	11,112	252.60	543,958	257.76	555,069
	2	Portland cement ASTM type V (sulfate resistant)	t	2,153.4	6.06	13,050	296.70	638,924	302.76	651,974
	3	Care of water and miscellaneous works	%	3.0%		27,428		171,988		199,416
		Total N°5.4 ---------- ---------->>				**941,687**		**5,904,916**		**6,846,603**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.5		**Transportation Tunnel T37**								
5.5.01		Excavation and supports								
	1	Excavation	m^3	37,153.9	8.69	322,867	37.52	1,394,012	46.21	1,716,879
	2	Rock bolts, 22 mm diameter	m	4,665.4	1.71	7,978	24.13	112,576	25.84	120,554
5.5.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	6,451.6	11.38	73,419	91.13	587,934	102.51	661,354
	2	Reinforcing steel	t	389.4	325.47	126,738	1,359.52	529,397	1,684.99	656,135
5.5.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	1,596.0	4.04	6,448	18.36	29,303	22.40	35,750
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	9,310.0	5.32	49,529	22.59	210,313	27.91	259,842
	3	Contact and cons. grouting (excluding injected materials)	t	824.6	39.94	32,933	121.05	99,814	160.99	132,748
5.5.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,573.6	5.16	8,120	252.60	397,485	257.76	405,604
	2	Portland cement ASTM type V (sulfate resistant)	t	1,573.6	6.06	9,536	296.70	466,879	302.76	476,415
	3	Care of water and miscellaneous works	%	3.0%		19,127		114,831		133,958
		Total N°5.5 ---------- ---------->>				**656,695**		**3,942,545**		**4,599,239**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.6		**Transportation Tunnel T4**								
5.6.01		Excavation and supports								
	1	Excavation	m^3	112,717.0	6.60	743,932	31.66	3,568,620	38.26	4,312,552
5.6.02		Concrete works								
	1	Concrete, arch and sidewalls (first stage lining	m^3	18,769.0	10.44	195,948	90.83	1,704,786	101.27	1,900,734
	2	Concrete, arch and sidewalls (second stage lining)	m^3	9,370.5	8.85	82,929	78.16	732,401	87.01	815,330
	3	Concrete, invert (first stage)	m^3	2,175.4	12.96	28,193	74.13	161,259	87.09	189,452
	4	Concrete, invert (second stage)	m^3	6,901.2	11.47	79,157	61.78	426,358	73.25	505,515
	5	Reinforcing steel (first stage)	t	828.8	325.47	269,741	1,359.52	1,126,736	1,684.99	1,396,477
	6	Reinforcing steel (second stage)	t	596.1	325.47	194,020	1,359.52	810,441	1,684.99	1,004,462
5.6.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	5,395.0	4.04	21,796	18.36	99,052	22.40	120,848
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	35,280.0	5.32	187,690	22.59	796,975	27.91	984,665
	3	Contact and cons. grouting (excluding injected materials)	t	3,095.0	39.94	123,614	121.05	374,650	160.99	498,264
5.6.04		Sundries								
	1	Portland cement ASTM type I or II (first stage)	t	3,770.0	5.16	19,453	252.60	952,297	257.76	971,750
	2	Portland cement ASTM type V (first stage)	t	3,770.0	6.06	22,846	296.70	1,118,553	302.76	1,141,399
	3	Portland cement ASTM type I or II (second stage)	t	4,476.4	5.16	23,098	252.60	1,130,743	257.76	1,153,841
	4	Portland cement ASTM type V (second stage)	t	4,476.4	6.06	27,127	296.70	1,328,153	302.76	1,355,280
	5	Care of water and miscellaneous works	%	3.0%		60,586		429,931		490,517
		Total N°5.6 ---------- ---------->>				**2,080,131**		**14,760,954**		**16,841,085**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.7		**Transportation Tunnel T5A**								
5.7.01		Excavation and supports:								
	1	Excavation	m^3	13,280.4	8.75	116,203	41.59	552,331	50.34	668,534
	2	Rock bolts, 26.5 mm diameter	m	968.8	2.83	2,742	31.18	30,206	34.01	32,948
5.7.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	2,159.6	10.65	23,000	84.97	183,503	95.62	206,503
	2	Concrete, invert	m^3	809.0	7.38	5,970	49.10	39,721	56.48	45,691
	3	Reinforcing steel	t	144.0	325.47	46,869	1,359.52	195,776	1,684.99	242,645
5.7.03		Sundries:								
	1	Portland cement ASTM type I or II	t	534.3	5.16	2,757	252.60	134,976	257.76	137,733
	2	Portland cement ASTM type V (sulfate resistant)	t	534.3	6.06	3,238	296.70	158,541	302.76	161,779
	3	Care of water and miscellaneous works	%	3.0%		6,023		38,852		44,875
		Total N°5.7 ---------- ---------->>				**206,803**		**1,333,905**		**1,540,708**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.8		**Transportation Tunnel T6**								
5.8.01		Excavation and supports								
	1	Excavation	m^3	11,240.9	5.56	62,500	30.80	346,220	36.36	408,720
5.8.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,250.1	11.29	14,114	91.34	114,186	102.63	128,300
	2	Concrete, invert	m^3	929.0	5.30	4,923	39.97	37,130	45.27	42,054
	3	Reinforcing steel	t	87.2	325.47	28,369	1,359.52	118,500	1,684.99	146,868
5.8.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	310.0	4.04	1,252	18.36	5,692	22.40	6,944
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2,025.0	5.32	10,773	22.59	45,745	27.91	56,518
	3	Contact and cons. grouting (excluding injected materials)	t	177.4	39.94	7,085	121.05	21,474	160.99	28,560
5.8.04		Sundries								
	1	Portland cement ASTM type I or II	t	480.9	5.16	2,482	252.60	121,484	257.76	123,965
	2	Portland cement ASTM type V (sulfate resistant)	t	480.9	6.06	2,914	296.70	142,693	302.76	145,607
	3	Care of water and miscellaneous works	%	3%		4,032		28,594		32,626
		Total N°5.8 ---------- ---------->>				**138,445**		**981,716**		**1,120,161**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.9		**Transportation Tunnel T7**								
5.9.01		Excavation and supports								
	1	Excavation	m^3	20,399.1	6.83	139,326	33.50	683,369	40.33	822,695
	2	Rock bolts, 26.5 mm diameter	m	2,500.0	2.83	7,075	31.18	77,950	34.01	85,025
	3	Rock bolts, 32 mm diameter	m	2,376.0	3.02	7,176	39.12	92,949	42.14	100,125
	4	Steel ribs	kg	95,900.0	0.13	12,467	2.94	281,946	3.07	294,413
5.9.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	3,400.9	8.87	30,166	76.91	261,561	85.78	291,726
	2	Concrete, invert	m^3	455.0	10.02	4,559	62.28	28,334	72.30	32,893
	3	Reinforcing steel	t	272.0	325.47	88,540	1,359.52	369,842	1,684.99	458,382
5.9.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	710.0	4.04	2,868	18.36	13,036	22.40	15,904
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	6,440.0	5.32	34,261	22.59	145,480	27.91	179,740
	3	Contact and cons. grouting (excluding injected materials)	t	550.5	39.94	21,987	121.05	66,638	160.99	88,625
5.9.04		Sundries								
	1	Portland cement ASTM type I or II	t	969.3	5.16	5,002	252.60	244,845	257.76	249,846
	2	Portland cement ASTM type V (sulfate resistant)	t	969.3	6.06	5,874	296.70	287,591	302.76	293,464
	3	Care of water and miscellaneous works	%	3.0%		10,779		76,606		87,385
		Total N°5.9 ---------- ---------->>				**370,079**		**2,630,146**		**3,000,224**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.10		**Transportation Tunnel T7A**								
5.10.01		Excavation and supports								
	1	Excavation	m^3	9,549.3	7.20	68,755	35.20	336,137	42.40	404,892
	2	Rock bolts, 22 mm diameter	m	2,855.0	1.71	4,882	24.13	68,891	25.84	73,773
5.10.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,709.1	8.87	15,159	76.91	131,443	85.78	146,602
	2	Concrete, invert	m^3	250.1	8.76	2,191	58.17	14,551	66.93	16,743
	3	Reinforcing steel	t	78.4	325.47	25,506	1,359.52	106,543	1,684.99	132,049
5.1.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	360.0	4.04	1,454	18.36	6,610	22.40	8,064
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2,990.0	5.32	15,907	22.59	67,544	27.91	83,451
	3	Contact and cons. grouting (excluding injected materials)	t	258.0	39.94	10,305	121.05	31,231	160.99	41,535
5.10.04		Sundries								
	1	Portland cement ASTM type I or II	t	481.7	5.16	2,485	252.60	121,666	257.76	124,152
	2	Portland cement ASTM type V (sulfate resistant)	t	481.7	6.06	2,919	296.70	142,907	302.76	145,826
	3	Care of water and miscellaneous works	%	3.0%		4,487		30,826		35,313
		Total N°5.10 ---------- ---------->>				**154,051**		**1,058,349**		**1,212,400**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.11		**Transportation Tunnel T 22**								
5.11.01		Excavation and supports								
	1	Excavation	m^3	56,727.0	6.76	383,475	29.84	1,692,735	36.60	2,076,209
	2	Rock bolts, 26.5 mm diameter	m	4,896.0	2.83	13,856	31.18	152,657	34.01	166,513
	3	Steel ribs	kg	546,722.3	0.13	71,074	2.94	1,607,364	3.07	1,678,437
5.11.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	4,238.3	11.68	49,504	87.51	370,897	99.19	420,401
	2	Concrete, invert	m^3	3,178.5	6.06	19,262	42.99	136,644	49.05	155,906
	3	Reinforcing steel	t	382.1	325.47	124,348	1,359.52	519,415	1,684.99	643,764
5.11.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	648.5	4.04	2,620	18.36	11,906	22.40	14,525
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5,761.8	5.32	30,653	22.59	130,159	27.91	160,812
	3	Contact and cons. grouting (excluding injected materials)	t	493.4	39.94	19,704	121.05	59,720	160.99	79,424
	4	Drain holes, 75 mm diameter	m	212.0	5.68	1,204	28.91	6,129	34.59	7,333
5.11.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,581.7	5.16	8,162	252.60	399,540	257.76	407,701
	2	Portland cement ASTM type V (sulfate resistant)	t	1,581.7	6.06	9,585	296.70	469,293	302.76	478,878
	3	Care of water and miscellaneous works	%	0.03		22,003		166,694		188,697
		Total N°5.11 ---------- ---------->>				**755,449**		**5,723,152**		**6,478,601**
		Total N°5.11 to be Included in Phase I Cost Estima te:	**66%**			**498,597**		**3,777,280**		**4,275,877**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.12		**Transportation Tunnel, Stretch from T3 to T37**								
5.12.01		Excavation and supports								
	1	Excavation	m^3	5,681.2	8.69	49,370	37.62	213,728	46.31	263,097
	2	Rock bolts, 22 mm diameter	m	3,403.2	1.71	5,820	24.13	82,120	25.84	87,939
5.12.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	656.0	11.38	7,465	91.13	59,781	102.51	67,247
	2	Concrete, invert	m^3	143.0	7.80	1,115	50.15	7,171	57.95	8,287
	3	Reinforcing steel	t	5.8	325.47	1,885	1,359.52	7,873	1,684.99	9,757
5.12.03		Sundries								
	1	Portland cement ASTM type I or II	t	143.8	5.16	742	252.60	36,329	257.76	37,071
	2	Portland cement ASTM type V (sulfate resistant)	t	143.8	6.06	872	296.70	42,671	302.76	43,543
	3	Care of water and miscellaneous works	%	3.0%		2,018		13,490		15,508
		Total N°5.12 ---------- ---------->>				**69,286**		**463,163**		**532,450**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
5.13		**Transportation Tunnel T8**								
5.13.01		Excavation and supports								
	1	Excavation	m^3	22,783.0	7.67	174,745	33.65	766,647	41.32	941,393
	2	Rock bolts, 26.5 mm diameter	m	7,317.0	2.83	20,707	31.18	228,144	34.01	248,851
5.13.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,422.0	10.43	14,831	84.40	120,014	94.83	134,845
	2	Concrete, invert	m^3	522.0	8.90	4,646	56.53	29,511	65.43	34,158
	3	Reinforcing steel	t	66.9	325.47	21,761	1,359.52	90,898	1,684.99	112,658
5.13.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	926.0	4.04	3,741	18.36	17,001	22.40	20,742
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	6,910.0	5.32	36,761	22.59	156,097	27.91	192,858
	3	Contact and cons. grouting (excluding injected materials)	t	600.0	39.94	23,964	121.05	72,630	160.99	96,594
5.13.04		Sundries								
	1	Portland cement ASTM type I or II	t	649.9	5.16	3,354	252.60	164,170	257.76	167,524
	2	Portland cement ASTM type V (sulfate resistant)	t	649.9	6.06	3,939	296.70	192,832	302.76	196,770
	3	Care of water and miscellaneous works	%	3.0%		9,253		55,138		64,392
		Total N°5.13 ---------- ---------->>				**317,703**		**1,893,083**		**2,210,786**
5.14		**Transportation Tunnel T18**								
5.14.01		Excavation and supports								
	1	Excavation	m^3	3,520.0	7.67	26,998	33.65	118,448	41.32	145,446
5.13.02		Concrete works								
	1	Concrete, invert	m^3	686.0	8.90	6,105	56.53	38,780	65.43	44,885
5.13.04		Sundries								
	1	Portland cement ASTM type I or II	t	123.5	5.16	637	252.60	31,191	257.76	31,828
	2	Portland cement ASTM type V (sulfate resistant)	t	123.5	6.06	748	296.70	36,637	302.76	37,385
	3	Care of water and miscellaneous works	%	3.0%		1,035		6,752		7,786
		Total N°5.14---------- ---------->>				**35,524**		**231,807**		**267,331**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6		**ACCESS ADITS**								
6.1		**Access Adits P1**								
6.1.01		Excavation and supports								
	1	Excavation	m^3	32,265.1	7.83	252,636	34.50	1,113,146	42.33	1,365,781
	2	Rock bolts, 22 mm diameter	m	4,146.3	1.71	7,090	24.13	100,051	25.84	107,141
	3	Rock bolts, 26.5 mm diameter	m	360.0	2.83	1,019	31.18	11,225	34.01	12,244
6.1.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	3,923.9	12.32	48,343	93.00	364,927	105.32	413,270
	2	Concrete, invert	m^3	1,259.9	8.89	11,200	55.97	70,516	64.86	81,716
	3	Reinforcing steel	t	207.4	325.47	67,487	1,359.52	281,901	1,684.99	349,388
6.1.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	436.9	4.04	1,765	18.36	8,021	22.40	9,786
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2,521.9	5.32	13,416	22.59	56,969	27.91	70,386
	3	Contact and cons. grouting (excluding injected materials)	t	222.1	39.94	8,869	121.05	26,880	160.99	35,749
6.1.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,044.1	5.16	5,388	252.60	263,744	257.76	269,132
	2	Portland cement ASTM type V (sulfate resistant)	t	1,044.1	6.06	6,327	296.70	309,790	302.76	316,117
	3	Care of water and miscellaneous works	%	3.0%		12,706		78,215		90,921
		Total N°6.1 ---------- ---------->>				**436,247**		**2,685,385**		**3,121,631**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.2		**Access Adit P11**								
6.2.01		Excavation and supports								
	1	Excavation	m^3	20,439.8	7.51	153,503	34.50	705,172	42.01	858,675
	2	Rock bolts, 26.5 mm diameter	m	1,878.9	2.83	5,317	31.18	58,583	34.01	63,900
6.2.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	2,833.9	10.70	30,323	81.77	231,730	92.47	262,053
	2	Concrete, invert	m^3	709.5	8.07	5,726	51.35	36,433	59.42	42,158
	3	Reinforcing steel	t	260.6	325.47	84,828	1,359.52	354,334	1,684.99	439,162
6.2.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	21.3	5.68	121	28.91	615	34.59	736
6.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	637.8	5.16	3,291	252.60	161,113	257.76	164,404
	2	Portland cement ASTM type V (sulfate resistant)	t	637.8	6.06	3,865	296.70	189,240	302.76	193,106
	3	Care of water and miscellaneous works	%	3.0%		8,609		52,117		60,726
		Total N°6.2 ---------- ---------->>				**295,583**		**1,789,337**		**2,084,920**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.3		**Access Adit P13**								
6.3.01		Excavation and supports								
	1	Excavation	m^3	9,276.4	10.11	93,785	49.57	459,832	59.68	553,616
6.3.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,377.3	15.78	21,733	96.31	132,643	112.09	154,376
	2	Concrete, invert	m^3	607.5	8.16	4,957	47.52	28,868	55.68	33,826
	3	Reinforcing steel	t	79.4	325.47	25,839	1,359.52	107,932	1,684.99	133,772
6.3.03		Sundries								
	1	Portland cement ASTM type I or II	t	357.3	5.16	1,843	252.60	90,243	257.76	92,086
	2	Portland cement ASTM type V (sulfate resistant)	t	357.3	6.06	2,165	296.70	105,998	302.76	108,163
	3	Care of water and miscellaneous works	%	3.0%		4,510		27,765		32,275
		Total N°6.3 ----------->>				**154,832**		**953,282**		**1,108,113**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.4		**Access Adit P16**								
6.4.01		Excavation and supports								
	1	Excavation	m^3	7,206.0	13.24	95,407	56.27	405,482	69.51	500,889
	2	Rock bolts, 22 mm diameter	m	333.0	1.71	569	24.13	8,035	25.84	8,605
	3	Steel ribs	kg	3,365.0	0.13	437	2.94	9,893	3.07	10,331
6.4.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,112.5	17.40	19,358	97.09	108,013	114.49	127,370
	2	Concrete, invert	m^3	126.5	16.64	2,105	73.03	9,236	89.67	11,341
	3	Reinforcing steel	t	46.4	325.47	15,091	1,359.52	63,038	1,684.99	78,129
6.4.03		Sundries								
	1	Portland cement ASTM type I or II	t	223.0	5.16	1,151	252.60	56,334	257.76	57,484
	2	Portland cement ASTM type V (sulfate resistant)	t	223.0	6.06	1,351	296.70	66,169	302.76	67,520
	3	Care of water and miscellaneous works	%	3.0%		4,064		21,786		25,850
		Total N°6.4 ---------- ---------->>				**139,534**		**747,985**		**887,519**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.5		**Access Adit P16B**								
6.5.01		Excavation and supports								
	1	Excavation	m^3	8,100.8	7.96	64,483	34.22	277,210	42.18	341,693
	2	Rock bolts, 26.5 mm diameter	m	755.0	2.83	2,137	31.18	23,542	34.01	25,679
6.5.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,207.0	12.81	15,461	90.50	109,231	103.31	124,693
	2	Concrete, invert	m^3	291.6	10.54	3,073	54.93	16,018	65.47	19,091
	3	Reinforcing steel	t	74.9	325.47	24,390	1,359.52	101,879	1,684.99	126,269
6.5.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	8.7	5.68	50	28.91	252	34.59	302
6.5.04		Sundries								
	1	Portland cement ASTM type I or II	t	269.7	5.16	1,392	252.60	68,137	257.76	69,529
	2	Portland cement ASTM type V (sulfate resistant)	t	269.7	6.06	1,635	296.70	80,033	302.76	81,668
	3	Care of water and miscellaneous works	%	3.0%		3,379		20,289		23,668
		Total N°6.5 ---------- ---------->>				**115,999**		**696,591**		**812,590**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.6		**Access Adit P1B**								
6.6.01		Excavation and supports								
	1	Excavation	m^3	7,200.5	15.64	112,616	68.78	495,253	84.42	607,869
	2	Rock bolts, 22 mm diameter	m	353.0	1.71	604	24.13	8,518	25.84	9,122
	3	Steel ribs	kg	10,430.0	0.13	1,356	2.94	30,664	3.07	32,020
6.6.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,066.7	18.93	20,193	116.92	124,719	135.85	144,912
	2	Concrete, invert	m^3	944.0	9.53	8,996	52.00	49,088	61.53	58,084
	3	Reinforcing steel	t	80.4	325.47	26,177	1,359.52	109,344	1,684.99	135,521
6.6.03		Sundries								
	1	Portland cement ASTM type I or II	t	361.9	5.16	1,868	252.60	91,423	257.76	93,290
	2	Portland cement ASTM type V (sulfate resistant)	t	361.9	6.06	2,193	296.70	107,384	302.76	109,577
	3	Care of water and miscellaneous works	%	3.0%		5,220		30,492		35,712
		Total N°6.6 ---------- ---------->>				**179,223**		**1,046,884**		**1,226,107**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.7		**Access Adit P21**								
6.7.01		Excavation and supports								
	1	Excavation	m^3	8,260.8	13.20	109,043	60.27	497,880	73.47	606,922
	2	Rock bolts, 22 mm diameter	m	8,775.0	1.71	15,005	24.13	211,741	25.84	226,746
	3	Steel ribs	kg	253,220.0	0.13	32,919	2.94	744,467	3.07	777,385
6.7.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	718.3	20.55	14,762	118.22	84,922	138.77	99,684
	2	Concrete, invert	m^3	795.6	10.16	8,083	53.15	42,286	63.31	50,369
	3	Reinforcing steel	t	60.6	325.47	19,710	1,359.52	82,329	1,684.99	102,039
6.7.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	300.0	4.04	1,212	18.36	5,508	22.40	6,720
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	893.0	5.32	4,751	22.59	20,173	27.91	24,924
	3	Contact and cons. grouting (excluding injected materials)	t	86.0	39.94	3,435	121.05	10,410	160.99	13,845
6.7.04		Sundries								
	1	Portland cement ASTM type I or II	t	315.5	5.16	1,628	252.60	79,698	257.76	81,326
	2	Portland cement ASTM type V (sulfate resistant)	t	315.5	6.06	1,912	296.70	93,611	302.76	95,523
	3	Care of water and miscellaneous works	%	3.0%		6,374		56,191		62,565
		Total N°6.7 ---------- ---------->>				**218,833**		**1,929,216**		**2,148,048**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.8		**Access Adit P23**								
6.8.01		Excavation and supports								
	1	Excavation	m^3	16,339.7	12.29	200,814	54.80	895,414	67.09	1,096,228
	2	Rock bolts, 22 mm diameter	m	4,172.5	1.71	7,135	24.13	100,682	25.84	107,817
	3	Steel ribs	kg	50,440.0	0.13	6,557	2.94	148,294	3.07	154,851
6.8.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,720.6	19.04	32,760	114.21	196,506	133.25	229,265
	2	Concrete, invert	m^3	1,330.0	9.43	12,542	50.60	67,297	60.03	79,839
	3	Reinforcing steel	t	122.0	325.47	39,714	1,359.52	165,891	1,684.99	205,605
6.8.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	451.2	4.04	1,823	18.36	8,284	22.40	10,107
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1,368.0	5.32	7,278	22.59	30,903	27.91	38,181
	3	Contact and cons. grouting (excluding injected materials)	t	132.8	39.94	5,304	121.05	16,075	160.99	21,379
6.8.04		Sundries								
	1	Portland cement ASTM type I or II	t	615.5	5.16	3,176	252.60	155,475	257.76	158,651
	2	Portland cement ASTM type V (sulfate resistant)	t	615.5	6.06	3,730	296.70	182,618	302.76	186,348
	3	Care of water and miscellaneous works	%	3.0%		9,625		59,023		68,648
		Total N°6.8 ---------- ---------->>				**330,458**		**2,026,461**		**2,356,919**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.9		**Access Adit P25 & P25'**								
6.9.01		Excavation and supports								
	1	Excavation	m^3	33,998.7	8.04	273,349	36.83	1,252,171	44.87	1,525,520
	2	Rock bolts, 22 mm diameter	m	7,734.1	1.71	13,225	24.13	186,624	25.84	199,849
	3	Rock bolts, 26.5 mm diameter	m	1,142.1	2.83	3,232	31.18	35,609	34.01	38,841
6.9.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	26,626.2	13.28	353,596	91.26	2,429,907	104.54	2,783,503
	2	Concrete, invert	m^3	1,094.8	9.82	10,751	60.98	66,761	70.80	77,512
	3	Reinforcing steel	t	378.9	325.47	123,328	1,359.52	515,152	1,684.99	638,480
6.9.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	421.1	4.04	1,701	18.36	7,730	22.40	9,432
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2,222.5	5.32	11,824	22.59	50,206	27.91	62,030
	3	Contact and cons. grouting (excluding injected materials)	t	198.8	39.94	7,940	121.05	24,065	160.99	32,005
6.9.04		Sundries								
	1	Portland cement ASTM type I or II	t	5,089.2	5.16	26,260	252.60	1,285,527	257.76	1,311,787
	2	Portland cement ASTM type V (sulfate resistant)	t	5,089.2	6.06	30,840	296.70	1,509,960	302.76	1,540,800
	3	Care of water and miscellaneous works	%	3.0%		25,681		220,911		246,593
		Total N°6.9 ---------- ---------->>				**881,728**		**7,584,624**		**8,466,352**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.10		**Access Adit P25A**								
6.10.01		Excavation and supports								
	1	Excavation	m^3	12,044.5	7.48	90,092	34.79	419,026	42.27	509,119
	2	Rock bolts, 22 mm diameter	m	2,967.0	1.71	5,074	24.13	71,593	25.84	76,666
6.10.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	873.5	12.13	10,595	86.50	75,557	98.63	86,153
	2	Concrete, invert	m^3	157.3	10.04	1,580	64.87	10,207	74.91	11,787
	3	Reinforcing steel	t	41.2	325.47	13,420	1,359.52	56,058	1,684.99	69,478
6.1.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	285.0	4.04	1,151	18.36	5,233	22.40	6,384
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1,620.0	5.32	8,618	22.59	36,596	27.91	45,214
	3	Contact and cons. grouting (excluding injected materials)	t	144.0	39.94	5,751	121.05	17,431	160.99	23,183
6.10.04		Sundries								
	1	Portland cement ASTM type I or II	t	257.6	5.16	1,329	252.60	65,057	257.76	66,386
	2	Portland cement ASTM type V (sulfate resistant)	t	257.6	6.06	1,561	296.70	76,415	302.76	77,976
	3	Care of water and miscellaneous works	%	3.0%		4,175		24,995		29,170
		Total N°6.10 ---------- ---------->>				**143,348**		**858,169**		**1,001,517**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.11		**Access Adit P28**								
6.11.01		Excavation and supports								
	1	Excavation	m^3	10,697.5	10.35	110,719	46.38	496,150	56.73	606,870
	2	Rock bolts, 22 mm diameter	m	1,151.5	1.71	1,969	24.13	27,785	25.84	29,754
	3	Steel ribs	kg	70,300.0	0.13	9,139	2.94	206,682	3.07	215,821
6.11.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,356.3	16.70	22,651	101.96	138,292	118.66	160,943
	2	Concrete, invert	m^3	304.3	16.07	4,891	75.91	23,103	91.98	27,994
	3	Reinforcing steel	t	66.4	325.47	21,620	1,359.52	90,310	1,684.99	111,930
6.11.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	290.0	4.04	1,172	18.36	5,324	22.40	6,496
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	860.0	5.32	4,575	22.59	19,427	27.91	24,003
	3	Contact and cons. grouting (excluding injected materials)	t	84.0	39.94	3,355	121.05	10,168	160.99	13,523
6.11.04		Sundries								
	1	Portland cement ASTM type I or II	t	340.9	5.16	1,759	252.60	86,117	257.76	87,877
	2	Portland cement ASTM type V (sulfate resistant)	t	340.9	6.06	2,066	296.70	101,152	302.76	103,218
	3	Care of water and miscellaneous works	%	3.0%		5,517		36,135		41,653
		Total N°6.11 ---------- ---------->>				**189,434**		**1,240,648**		**1,430,082**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.12		**Access Adit P3**								
6.12.01		Excavation and supports								
	1	Excavation	m^3	12,194.4	11.16	136,089	46.47	566,673	57.63	702,762
	2	Rock bolts, 22 mm diameter	m	1,729.6	1.71	2,958	24.13	41,734	25.84	44,692
	3	Rock bolts, 26.5 mm diameter	m	1,026.4	2.83	2,905	31.18	32,004	34.01	34,909
6.12.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,574.3	15.39	24,229	91.76	144,462	107.15	168,691
	2	Concrete, invert	m^3	395.3	14.49	5,728	67.11	26,530	81.60	32,258
	3	Reinforcing steel	t	160.6	325.47	52,260	1,359.52	218,294	1,684.99	270,554
6.12.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	490.0	4.04	1,980	18.36	8,996	22.40	10,976
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	1,885.0	5.32	10,028	22.59	42,582	27.91	52,610
	3	Contact and cons. grouting (excluding injected materials)	t	175.0	39.94	6,990	121.05	21,184	160.99	28,173
6.12.04		Sundries								
	1	Portland cement ASTM type I or II	t	442.0	5.16	2,281	252.60	111,659	257.76	113,940
	2	Portland cement ASTM type V (sulfate resistant)	t	442.0	6.06	2,679	296.70	131,153	302.76	133,832
	3	Care of water and miscellaneous works	%	3.0%		7,444		40,358		47,802
		Total N°6.12 ---------- ---------->>				**255,569**		**1,385,629**		**1,641,199**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.13		**Access Adit P35**								
6.13.01		Excavation and supports								
	1	Excavation	m^3	10,964.0	9.43	103,391	43.57	477,701	53.00	581,092
	2	Rock bolts, 22 mm diameter	m	3,612.8	1.71	6,178	24.13	87,177	25.84	93,355
	3	Steel ribs	kg	5,130.0	0.13	667	2.94	15,082	3.07	15,749
6.13.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	236.9	15.02	3,558	95.20	22,553	110.22	26,111
	2	Concrete, invert	m^3	367.1	9.95	3,653	53.94	19,802	63.89	23,455
	3	Reinforcing steel	t	22.7	325.47	7,389	1,359.52	30,865	1,684.99	38,254
6.13.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	56.6	4.04	228	18.36	1,038	22.40	1,267
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	343.9	5.32	1,829	22.59	7,768	27.91	9,597
	3	Contact and cons. grouting (excluding injected materials)	t	30.3	39.94	1,210	121.05	3,667	160.99	4,876
6.13.04		Sundries								
	1	Portland cement ASTM type I or II	t	123.9	5.16	639	252.60	31,289	257.76	31,928
	2	Portland cement ASTM type V (sulfate resistant)	t	123.9	6.06	751	296.70	36,752	302.76	37,502
	3	Care of water and miscellaneous works	%	3.0%		3,885		22,011		25,896
		Total N°6.13 ---------- ---------->>				**133,378**		**755,705**		**889,083**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.14		**Access Adit P37'**								
6.14.01		Excavation and supports								
	1	Excavation	m^3	24,400.0	13.21	322,324	56.29	1,373,476	69.50	1,695,800
	2	Shotcrete	m^3	433.0	14.59	6,317	103.39	44,766	117.98	51,083
	3	Rock bolts, 22 mm diameter	m	2,350.0	1.71	4,019	24.13	56,706	25.84	60,724
6.14.02		Concrete works								
	1	Concrete, invert	m^3	470.0	11.69	5,494	59.80	28,106	71.49	33,600
	2	Reinforcing steel	t	11.8	325.47	3,824	1,359.52	15,974	1,684.99	19,799
6.14.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	2,820.0	5.68	16,018	28.91	81,526	34.59	97,544
6.14.04		Sundries								
	1	Portland cement ASTM type I or II	t	84.6	5.16	437	252.60	21,370	257.76	21,806
	2	Portland cement ASTM type V (sulfate resistant)	t	84.6	6.06	513	296.70	25,101	302.76	25,613
	3	Care of water and miscellaneous	%	3.0%		10,768		49,411		60,179
		Total N°6.14---------- ---------->>				**369,713**		**1,696,436**		**2,066,149**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.15		**Access Adit P40**								
6.15.01		Excavation and supports								
	1	Excavation	m^3	4,974.8	17.71	88,104	83.30	414,402	101.01	502,505
	2	Rock bolts, 22 mm diameter	m	7,603.7	1.71	13,002	24.13	183,477	25.84	196,479
	3	Steel ribs	kg	78,128.2	0.13	10,157	2.94	229,697	3.07	239,854
6.15.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	694.9	20.22	14,050	114.12	79,296	134.34	93,346
	2	Concrete, invert	m^3	224.3	14.19	3,183	70.86	15,894	85.05	19,077
	3	Reinforcing steel	t	36.8	325.47	11,966	1,359.52	49,984	1,684.99	61,950
6.15.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	557.4	5.68	3,166	28.91	16,114	34.59	19,280
	2	Percussion contact grouting holes, holes, 40-48 mm diameter	m	285.0	4.04	1,151	18.36	5,233	22.40	6,384
	3	Rotary consolidation grout holes, 40-48 mm min. diameter	m	880.0	5.32	4,682	22.59	19,879	27.91	24,561
	4	Contact and cons. grouting (excluding injected materials)	t	85.0	39.94	3,395	121.05	10,289	160.99	13,684
6.15.04		Sundries								
	1	Portland cement ASTM type I or II	t	207.9	5.16	1,073	252.60	52,527	257.76	53,600
	2	Portland cement ASTM type V (sulfate resistant)	t	207.9	6.06	1,260	296.70	61,698	302.76	62,958
	3	Care of water and miscellaneous works	%	3.0%		4,656		34,155		38,810
		Total N°6.15 ---------- ---------->>				**159,844**		**1,172,645**		**1,332,489**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
6.16		**Access Adit P80**								
6.16.01		Excavation and supports:								
	1	Excavation	m^3	24,166.6	9.33	225,475	41.34	999,048	50.67	1,224,523
	2	Rock bolts, 22 mm diameter	m	9,520.6	1.71	16,280	24.13	229,731	25.84	246,012
6.16.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	1,444.3	15.59	22,516	97.23	140,428	112.82	162,944
	2	Concrete, invert	m^3	839.4	11.70	9,821	61.82	51,893	73.52	61,714
	3	Reinforcing steel	t	91.3	325.47	29,731	1,359.52	124,189	1,684.99	153,921
6.16.03		Drilling and grouting:								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	130.0	4.04	525	18.36	2,387	22.40	2,912
	2	Contact pressure grouting (excluding injected materials)	t	4.0	39.94	160	121.05	484	160.99	644
6.16.04		Sundries:								
	1	Portland cement ASTM type I or II	t	413.1	5.16	2,131	252.60	104,341	257.76	106,472
	2	Portland cement ASTM type V (sulfate resistant)	t	413.1	6.06	2,503	296.70	122,557	302.76	125,060
	3	Care of water and miscellaneous works	%	3.0%		9,274		53,252		62,526
		Total N°6.16 ---------- ---------->>				**318,417**		**1,828,310**		**2,146,727**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7		**DIVERSION TUNNELS & AUXILIARY TUNNEL**								
7.1		**Diversion Tunnel Level I - Pressure Stretch**								
7.1.01		Excavation and supports								
	1	Excavation	m^3	76,060.4	6.62	503,520	31.12	2,366,999	37.74	2,870,519
	2	Rock bolts, 32 mm diameter	m	7,769.1	3.02	23,463	39.12	303,927	42.14	327,390
7.1.02		Concrete works								
	1	Concrete, arch	m^3	14,166.8	7.98	113,051	63.45	898,884	71.43	1,011,935
	2	Concrete, sidewalls	m^3	2,562.3	21.43	54,911	96.98	248,496	118.41	303,407
	3	Concrete, invert	m^3	3,518.2	5.58	19,631	46.94	165,143	52.52	184,775
	4	Reinforcing steel	t	435.0	325.47	141,581	1,359.52	591,400	1,684.99	732,981
7.1.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	2,400.0	4.04	9,696	18.36	44,064	22.40	53,760
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	8,965.0	5.32	47,694	22.59	202,519	27.91	250,213
	3	Drain holes, 75 mm diameter	m	3,249.3	5.68	18,456	28.91	93,937	34.59	112,393
	4	Contact & consolidation cement grouting, excluding materials	t	774.0	42.60	32,972	124.85	96,634	167.45	129,606
7.1.04		Sundries								
	1	Portland cement ASTM type I or II	t	4,031.5	5.16	20,803	252.60	1,018,362	257.76	1,039,165
	2	Portland cement ASTM type V (sulfate resistant)	t	4,031.5	6.06	24,431	296.70	1,196,152	302.76	1,220,583
	3	Steel linings	t	2,212.5	770.00	1,703,625	5,230.00	11,571,375	6,000.00	13,275,000
	4	Care of water and miscellaneous works	%	3.0%		81,415		563,937		645,352
		Total N°7.1 ---------- ---------->>				**2,795,249**		**19,361,830**		**22,157,079**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.2		**Diversion Tunnel Level I - Free Flow stretch, Left Bank**								
7.2.01		Excavation and supports								
	1	Excavation	m^3	139,518.0	6.18	862,221	31.73	4,426,906	37.91	5,289,127
	2	Rock bolts, 26.5 mm diameter	m	2,794.0	2.83	7,907	31.18	87,117	34.01	95,024
	3	Rock bolts, 32 mm diameter	m	18,336.0	3.02	55,375	39.12	717,305	42.14	772,680
7.2.02		Concrete works								
	1	Concrete, arch	m^3	22,110.2	8.15	180,198	71.03	1,570,489	79.18	1,750,687
	2	Concrete, sidewalls	m^3	6,601.0	15.17	100,137	73.97	488,274	89.14	588,410
	3	Concrete, invert	m^3	5,752.9	5.57	32,044	41.50	238,745	47.07	270,788
	4	Reinforcing steel	t	907.1	325.47	295,234	1,359.52	1,233,221	1,684.99	1,528,454
7.2.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	4,000.0	4.04	16,160	18.36	73,440	22.40	89,600
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	43,020.0	5.32	228,866	22.59	971,822	27.91	1,200,688
	3	Drain holes, 75 mm diameter	m	3,412.0	5.68	19,380	28.91	98,641	34.59	118,021
	4	Contact & consolidation cement grouting, excluding materials	t	3,592.0	42.60	153,019	124.85	448,461	167.45	601,480
7.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	7,999.5	5.16	41,278	252.60	2,020,682	257.76	2,061,960
	2	Portland cement ASTM type V (sulfate resistant)	t	7,999.5	6.06	48,477	296.70	2,373,461	302.76	2,421,938
	3	Steel linings	t	2,212.5	770.00	1,703,625	5,230.00	11,571,375	6,000.00	13,275,000
	4	Care of water and miscellaneous works	%	3.0%		112,318		789,598		901,916
		Total N°7.2 ---------- ---------->>				**3,856,238**		**27,109,536**		**30,965,774**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.3		**Diversion Tunnel Level I - Free Flow Stretch, Right Bank**								
7.3.01		Excavation and supports								
	1	Excavation	m^3	83,391.0	6.70	558,719	35.23	2,937,864	41.93	3,496,583
	2	Rock bolts, 26.5 mm diameter	m	17,231.0	2.83	48,764	31.18	537,263	34.01	586,026
7.3.02		Concrete works								
	1	Concrete, arch	m^3	8,549.6	8.98	76,775	75.18	642,756	84.16	719,531
	2	Concrete, sidewalls	m^3	7,161.6	11.37	81,427	54.63	391,238	66.00	472,666
	3	Concrete, invert	m^3	2,936.3	5.61	16,472	41.85	122,882	47.46	139,355
	4	Reinforcing steel	t	745.9	325.47	242,767	1,359.52	1,014,061	1,684.99	1,256,828
7.3.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	2,230.0	4.04	9,009	18.36	40,943	22.40	49,952
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	11,770.0	5.32	62,616	22.59	265,884	27.91	328,501
	3	Drain holes, 75 mm diameter	m	164.0	5.68	932	28.91	4,741	34.59	5,673
	4	Contact & consolidation cement grouting, excluding materials	t	1,003.0	42.60	42,728	124.85	125,225	167.45	167,952
7.3.04		Sundries								
	1	Portland cement ASTM type I or II	t	3,858.0	5.16	19,907	252.60	974,539	257.76	994,447
	2	Portland cement ASTM type V (sulfate resistant)	t	3,858.0	6.06	23,380	296.70	1,144,679	302.76	1,168,058
	3	Care of water and miscellaneous works	%	3.0%		35,505		246,062		281,567
		Total N°7.3 ---------- ---------->>				**1,219,002**		**8,448,137**		**9,667,139**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.4		**Diversion Tunnel Level II - Pressure Stretch**								
7.4.01		Excavation and supports								
	1	Excavation	m^3	66,172.5	6.62	438,062	31.12	2,059,289	37.74	2,497,352
	2	Rock bolts, 32 mm diameter	m	6,759.1	3.02	20,413	39.12	264,417	42.14	284,829
7.4.02		Concrete works								
	1	Concrete, arch	m^3	12,325.1	7.98	98,354	63.45	782,029	71.43	880,383
	2	Concrete, sidewalls	m^3	2,229.2	21.43	47,773	96.98	216,192	118.41	263,964
	3	Concrete, invert	m^3	3,060.8	5.58	17,079	46.94	143,675	52.52	160,754
	4	Reinforcing steel	t	378.5	325.47	123,176	1,359.52	514,518	1,684.99	637,694
7.4.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	2,088.0	4.04	8,436	18.36	38,336	22.40	46,771
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	7,799.6	5.32	41,494	22.59	176,192	27.91	217,685
	3	Drain holes, 75 mm diameter	m	2,826.9	5.68	16,057	28.91	81,725	34.59	97,782
	4	Contact & consolidation cement grouting, excluding materials	t	673.4	42.60	28,686	124.85	84,071	167.45	112,757
7.4.04		Sundries								
	1	Portland cement ASTM type I or II	t	3,507.4	5.16	18,098	252.60	885,975	257.76	904,073
	2	Portland cement ASTM type V (sulfate resistant)	t	3,507.4	6.06	21,255	296.70	1,040,652	302.76	1,061,907
	3	Steel linings	t	2,208.0	770.00	1,700,160	5,230.00	11,547,840	6,000.00	13,248,000
	4	Care of water and miscellaneous works	%	3.0%		77,371		535,047		612,419
		Total N°7.4 ---------- ---------->>				**2,656,413**		**18,369,958**		**21,026,371**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.5		**Diversion Tunnel Level II - Free Flow Stretch, Left Bank**								
7.5.01		Excavation and supports								
	1	Excavation	m^3	126,961.4	6.18	784,621	31.73	4,028,484	37.91	4,813,105
	2	Rock bolts, 26.5 mm diameter	m	2,174.9	2.83	6,155	31.18	67,813	34.01	73,968
	3	Rock bolts, 32 mm diameter	m	17,085.0	3.02	51,597	39.12	668,365	42.14	719,962
7.5.02		Concrete works								
	1	Concrete, arch	m^3	20,120.3	8.15	163,980	71.03	1,429,145	79.18	1,593,125
	2	Concrete, sidewalls	m^3	6,006.9	15.17	91,124	73.97	444,329	89.14	535,454
	3	Concrete, invert	m^3	5,235.1	5.57	29,160	41.50	217,258	47.07	246,417
	4	Reinforcing steel	t	825.5	325.47	268,663	1,359.52	1,122,231	1,684.99	1,390,894
7.5.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	3,640.0	4.04	14,706	18.36	66,830	22.40	81,536
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	39,148.2	5.32	208,268	22.59	884,358	27.91	1,092,626
	3	Rotary consolidation grout holes, 40-48 mm dia. (Fault 35 treat.)	m	59,723.9	5.32	317,731	22.59	1,349,163	27.91	1,666,894
	4	Drain holes, 75 mm diameter	m	2,216.8	5.68	12,591	28.91	64,088	34.59	76,679
	5	Contact & consolidation cement grouting, excluding materials	t	3,268.7	42.60	139,247	124.85	408,100	167.45	547,347
	6	Consolid. cement grouting, excluding materials (Fault 35 treat.)	t	11,944.8	42.60	508,848	124.85	1,491,306	167.45	2,000,153
7.5.04		Sundries								
	1	Portland cement ASTM type I or II	t	7,279.6	5.16	37,563	252.60	1,838,821	257.76	1,876,383
	2	Portland cement ASTM type V (sulfate resistant)	t	7,279.6	6.06	44,114	296.70	2,159,850	302.76	2,203,964
	3	Portland cement ASTM type I or II (Fault 35 treatment)	t	11,944.8	5.16	61,635	252.60	3,017,251	257.76	3,078,886
	4	Steel linings	t	1,472.0	770.00	1,133,440	5,230.00	7,698,560	6,000.00	8,832,000
	5	Care of water and miscellaneous works	%	3.0%		116,203		808,679		924,882
		Total N°7.5 ---------- ---------->>				**3,989,647**		**27,764,630**		**31,754,277**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.6		**Diversion Tunnel Level II - Free Flow Stretch, Right Bank**								
7.6.01		Excavation and supports								
	1	Excavation	m^3	98,401.3	6.70	659,289	35.23	3,466,679	41.93	4,125,968
7.6.02		Concrete works								
	1	Concrete, arch	m^3	10,088.5	8.98	90,595	75.18	758,452	84.16	849,046
	2	Concrete, sidewalls	m^3	8,450.7	11.37	96,084	54.63	461,661	66.00	557,745
	3	Concrete, invert	m^3	3,464.8	5.61	19,437	41.85	145,001	47.46	164,439
	4	Reinforcing steel	t	880.2	325.47	286,465	1,359.52	1,196,592	1,684.99	1,483,057
7.6.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	2,631.4	4.04	10,631	18.36	48,313	22.40	58,943
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	13,888.6	5.32	73,887	22.59	313,743	27.91	387,631
	3	Drain holes, 75 mm diameter	m	193.5	5.68	1,099	28.91	5,595	34.59	6,694
	4	Contact & consolidation cement grouting, excluding materials	t	1,183.5	42.60	50,419	124.85	147,765	167.45	198,184
7.6.04		Sundries								
	1	Portland cement ASTM type I or II	t	4,552.5	5.16	23,491	252.60	1,149,956	257.76	1,173,447
	2	Portland cement ASTM type V (sulfate resistant)	t	4,552.5	6.06	27,588	296.70	1,350,721	302.76	1,378,309
	3	Care of water and miscellaneous works	%	3.0%		40,170		271,334		311,504
		Total N°7.6---------- -------->>				**1,379,155**		**9,315,813**		**10,694,967**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.7		**Auxiliary Tunnel of Diversion Tunnel Level 1**								
7.7.01		Excavation and supports:								
	1	Excavation	m^3	16,788.0	7.52	126,246	37.36	627,199	44.88	753,445
	2	Rock bolts, 32 mm diameter	m	5,668.2	3.02	17,118	39.12	221,739	42.14	238,856
7.7.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	2,328.4	9.91	23,075	78.35	182,432	88.26	205,507
	2	Concrete, invert	m^3	1,531.3	5.55	8,499	41.40	63,397	46.95	71,896
	3	Reinforcing steel	t	162.8	325.47	52,973	1,359.52	221,273	1,684.99	274,246
7.7.03		Drilling and grouting:								
	1	Drain holes, 75 mm diameter	m	790.0	5.68	4,487	28.91	22,839	34.59	27,326
	2	Percussion contact grouting holes, 40-48 mm dia.	m	645.0	4.04	2,606	18.36	11,842	22.40	14,448
	3	Rotary consolidation grout holes, 40-48 mm min. diameter	m	5,690.0	5.32	30,271	22.59	128,537	27.91	158,808
	4	Contact & consolidation cement grouting, excluding materials	t	487.0	42.60	20,746	124.85	60,802	167.45	81,548
7.7.04		Sundries:								
	1	Portland cement ASTM type I or II	t	938.3	5.16	4,841	252.60	237,004	257.76	241,845
	2	Portland cement ASTM type V (sulfate resistant)	t	938.3	6.06	5,686	296.70	278,381	302.76	284,067
	3	Care of water and miscellaneous	%	3.0%		8,896		61,663		70,560
		Total N°7.7 ---------- ---------->>				**305,444**		**2,117,108**		**2,422,552**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.8		**Diversion Tunnel Maintenance Gate Chamber**								
7.8.01		Excavation and supports								
	1	Excavation	m^3	35,385.2	7.48	264,681	34.67	1,226,803	42.15	1,491,484
	2	Rock bolts, 26.5 mm diameter	m	3,685.0	2.83	10,429	31.18	114,898	34.01	125,327
	3	Rock bolts, 32 mm diameter	m	55.0	3.02	166	39.12	2,152	42.14	2,318
	4	Rock bolts, 36 mm diameter	m	330.0	3.82	1,261	49.51	16,339	53.33	17,600
	5	Rock bolts, 50 mm diameter	m	970.0	7.37	7,152	95.51	92,643	102.88	99,794
7.8.02		Concrete works								
	1	Concrete, arch	m^3	1,800.4	11.43	20,579	136.13	245,091	147.56	265,670
	2	Concrete, sidewalls	m^3	1,840.0	26.92	49,533	93.11	171,322	120.03	220,855
	3	Concrete, below operation level	m^3	14,600.0	6.85	100,010	41.07	599,622	47.92	699,632
	4	Reinforcing steel	t	145.6	325.47	47,388	1,399.52	203,770	1,724.99	251,159
7.8.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	250.0	5.68	1,420	28.91	7,228	34.59	8,648
7.8.04		Sundries								
	1	Portland cement ASTM type I or II	t	2,918.3	5.16	15,058	252.60	737,156	257.76	752,215
	2	Portland cement ASTM type V (sulfate resistant)	t	2,918.3	6.06	17,685	296.70	865,852	302.76	883,537
	3	Care of water and miscellaneous	%	3%		16,061		128,486		144,547
		Total N°7.8 ---------- -------->>				**551,423**		**4,411,363**		**4,962,785**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.9		**Diversion Tunnel Emergency and Sector Gate Chamber**								
7.9.01		Excavation and supports								
	1	Excavation	m^3	26,705.5	7.65	204,297	34.78	928,816	42.43	1,133,113
	2	Rock bolts, 32 mm diameter	m	55.0	3.02	166	39.12	2,152	42.14	2,318
	3	Rock bolts, 36 mm diameter	m	389.0	3.82	1,487	49.51	19,260	53.33	20,747
	4	Rock bolts, 50 mm diameter	m	3,285.0	7.37	24,220	95.51	313,743	102.88	337,964
7.9.02		Concrete works								
	1	Concrete, arch	m^3	1,859.0	15.08	28,034	149.98	278,813	165.06	306,847
	2	Concrete, sidewalls	m^3	1,880.0	23.88	44,894	82.89	155,833	106.77	200,728
	3	Reinforcing steel	t	149.0	325.47	48,495	1,399.52	208,528	1,724.99	257,024
		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	250.0	5.68	1,420	28.91	7,228	34.59	8,648
	2	Percussion contact grouting holes, 40-48 mm dia.	m	100.0	4.04	404	18.36	1,836	22.40	2,239
	3	Rotary consolidation grout holes, 40-48 mm min. diameter	m	882.0	5.32	4,692	22.59	19,923	27.91	24,615
	4	Contact & consolidation cement grouting, excluding materials	t	75.5	42.60	3,216	124.85	9,424	167.45	12,640
7.9.03		Sundries								
	1	Portland cement ASTM type I or II	t	710.8	5.16	3,668	252.60	179,539	257.76	183,206
	2	Portland cement ASTM type V (sulfate resistant)	t	710.8	6.06	4,307	296.70	210,883	302.76	215,190
	3	Care of water and miscellaneous	%	3.0%		11,079		70,079		81,158
		Total N°7.9 ---------- -------->>				**380,379**		**2,406,057**		**2,786,436**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
7.10		**Diversion Tunnel - Downstream Gate & Vent. Chamber**								
7.10.01		Excavation and supports:								
	1	Excavation, upper part	m^3	5,628.5	12.58	70,806	55.60	312,943	68.18	383,749
	2	Excavation, mid part	m^3	5,772.8	11.90	68,696	52.70	304,227	64.60	372,923
	3	Excavation, lower part	m^3	320.0	24.00	7,680	95.00	30,400	119.00	38,080
	4	Rock bolts, 22 mm diameter	m	1,600.0	1.71	2,736	24.13	38,608	25.84	41,344
	5	Steel Ribs	kg	20,315.0	0.13	2,641	2.94	59,726	3.07	62,367
7.10.02		Concrete works:								
	1	Concrete, arch and wall lining	m^3	3,517.0	38.59	135,721	120.61	424,185	159.20	559,906
	2	Reinforcing steel	t	255.0	325.47	82,995	1,399.52	356,878	1,724.99	439,872
7.10.03		Sundries:								
	1	Portland cement ASTM type I or II	t	633.1	5.16	3,267	252.60	159,911	257.76	163,178
	2	Portland cement ASTM type V (sulfate resistant)	t	633.1	6.06	3,836	296.70	187,829	302.76	191,665
	3	Care of water and miscellaneous works	%	3.0%		11,351		56,241		67,593
		Total N°7.10 ---------- ---------->>				**389,730**		**1,930,948**		**2,320,677**
7.11		**Diversion Tunnel Level III - Pressure Stretch**								
7.11.01		Excavation and supports:								
	1	Excavation	m^3	63,830	7.34	468,712	40.42	2,580,312	47.77	3,049,024
	2	Shotcrete	m^3	5,778	14.59	84,301	103.39	597,387	117.98	681,688
	3	Steel Ribs	kg	79,450.0	0.13	10,329	2.94	233,583	3.07	243,912
7.11.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	12,181.0	10.15	123,637	64.95	791,156	75.10	914,793
	2	Reinforcing steel	t	182.7	325.47	59,467	1,359.52	248,398	1,684.99	307,865
7.11.03		Sundries:								
	1	Portland cement ASTM type I or II	t		5.16		252.60		257.76	
	2	Portland cement ASTM type V (sulfate resistant)	t	5,359.6	6.06	32,479	296.70	1,590,205	302.76	1,622,685
	3	Care of water and miscellaneous works	%	3.0%		23,368		181,231		204,599
		Total N°7.11 ---------- ---------->>				**802,292**		**6,222,273**		**7,024,565**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8		**POWER FACILITIES**								
8.1		**Stage 1 Power Tunnel - From Intake to Gate chamber**								
8.1.01		Excavation and supports								
	1	Excavation	m^3	21,923.6	7.80	171,004	32.64	715,586	40.44	886,591
	2	Rock bolts, 26.5 mm diameter	m	1,591.0	2.83	4,503	31.18	49,607	34.01	54,110
8.1.02		Concrete works								
	1	Concrete, full ring lining	m^3	6,763.4	11.30	76,426	79.87	540,189	91.17	616,615
	2	Reinforcing steel	t	424.0	325.47	137,990	1,359.52	576,396	1,684.99	714,386
	3	Percussion contact grout holes, 40-48 mm min. diameter	m	709.2	4.04	2,865	18.36	13,021	22.40	15,886
	4	Rotary consolidation grout holes, 40-48 mm min. diameter	m	7,091.8	8.99	63,755	27.90	197,861	36.89	261,617
	5	Contact & consolidation cement grouting, excluding materials	t	378.0	42.60	16,105	124.85	47,198	167.45	63,303
8.1.03		Sundries								
	1	Portland cement ASTM type I or II	t	1,406.4	5.16	7,257	252.60	355,263	257.76	362,520
	2	Portland cement ASTM type V (sulfate resistant)	t	1,406.4	6.06	8,523	296.70	417,286	302.76	425,809
	3	Care of water and miscellaneous works	%	3.0%		14,653		87,372		102,025
		Total N°8.1 ---------- ---------->>				**503,080**		**2,999,781**		**3,502,861**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.2		**Power Tunnel Stage 1 - Gate Chamber**								
8.2.01		Excavation and supports								
	1	Excavation, chamber	m^3	6,283.0	10.50	65,972	48.50	304,726	59.00	370,697
	2	Excavation, bifurcations	m^3	10,232.0	8.20	83,902	34.30	350,958	42.50	434,860
	3	Rock bolts, 25 mm diameter	m	1,941.0	1.71	3,319	24.13	46,836	25.84	50,155
	4	Rock bolts, 36 mm diameter	m	720.0	2.83	2,038	31.18	22,450	34.01	24,487
	5	Rock bolts, 40 mm diameter	m	1,088.0	3.02	3,286	39.12	42,563	42.14	45,848
8.2.02		Concrete works								
	1	Concrete, chamber arch	m^3	357.0	15.10	5,391	150.00	53,550	165.10	58,941
	2	Concrete, chamber sidewalls	m^3	175.0	23.90	4,183	82.90	14,508	106.80	18,690
	3	Concrete, bifurcations	m^3	5,582.0	7.60	42,423	45.20	252,306	52.80	294,730
	4	Reinforcing steel, chamber	t	14.7	325.47	4,788	1,399.52	20,590	1,724.99	25,378
	5	Reinforcing steel, bifurcations	t	29.5	325.47	9,611	1,399.52	41,328	1,724.99	50,939
8.2.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	124.00	5.68	704	28.91	3,585	34.59	4,289
8.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,100.5	5.16	5,679	252.60	277,991	257.76	283,670
	2	Portland cement ASTM type V (sulfate resistant)	t	1,100.5	6.06	6,669	296.70	326,524	302.76	333,193
	3	Care of water and miscellaneous	%	3.0%		7,139		52,737		59,876
		Total N°8.2 ---------- -------->>				**245,103**		**1,810,651**		**2,055,754**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.3		**Power Tunnel Stage 1 - Erection Chamber & Penstocks**								
8.3.01		Excavation and supports								
	1	Excavation, erection chamber	m^3	14,300.0	10.50	150,150	48.50	693,550	59.00	843,700
	2	Excavation, penstocks	m^3	7,913	11.60	91,791	53.30	421,763	64.90	513,554
	3	Rock bolts, 32 mm diameter	m	80.0	3.02	242	39.12	3,130	42.14	3,371
	4	Rock bolts, 36 mm diameter	m	1,924.0	3.82	7,354	49.51	95,260	53.33	102,614
	5	Rock bolts, 50 mm diameter	m	2,566.0	7.37	18,919	95.51	245,071	102.88	263,991
	6	Steel Ribs	kg	45,000.0	0.13	5,850	2.94	132,300	3.07	138,150
8.3.02		Concrete works								
	1	Concrete, arch of erection chamber	m^3	80.0	15.10	1,208	150.00	12,000	165.10	13,208
	2	Concrete, sidewalls of erection chamber	m^3	770.0	23.90	18,403	82.90	63,833	106.80	82,236
	3	Concrete, penstocks	m^3	6,837.1	5.99	40,954	40.60	277,586	46.59	318,540
	4	Reinforcing steel	t	55.0	325.47	17,901	1,399.52	76,974	1,724.99	94,874
8.3.03		Sundries								
	1	Portland cement ASTM type I or II	t	1,212.8	5.16	6,258	252.60	306,341	257.76	312,599
	2	Portland cement ASTM type V (sulfate resistant)	t	1,212.8	6.06	7,349	296.70	359,823	302.76	367,172
	3	Care of water and miscellaneous	%	3.0%		10,991		80,629		91,620
		Total No. 8.3 ----------->>				**377,370**		**2,768,259**		**3,145,629**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.4		**Powerhouse, Stage 1 down to Elevations 966.5 - 958.2 masl**								
8.4.01		Excavation and supports:								
	1	Excavation	m^3	180,110	5.42	976,196	29.14	5,248,405	34.56	6,224,602
	2	Grouted anchor bars, 36 mm diameter, lateral walls	m	21,980	2.05	45,079	22.48	494,202	24.54	539,281
	3	Rock bolts, 36 mm diameter, arch	m	8,096	3.82	30,954	49.53	400,962	53.35	431,915
8.4.02		Concrete Works								
	1	Concrete, arch and arch shoulders	m^3	7,190.0	12.93	92,967	126.70	910,973	139.63	1,003,940
	2	Concrete, sidewalls and beams	m^3	4,040.0	29.97	121,079	101.89	411,636	131.86	532,714
	3	Reinforcing steel	t	898.4	325.47	292,402	1,359.52	1,221,393	1,684.99	1,513,795
8.4.03		Drilling and grouting:								
	1	Percussion contact grout holes, 40-48 mm diameter	m	1,689.0	4.04	6,824	18.36	31,010	22.40	37,834
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	11,265.0	8.99	101,272	37.90	426,944	46.89	528,216
	3	Drain Holes 75 mm diameter, arch	m	760.0	5.68	4,317	28.91	21,972	34.59	26,288
	4	Drain Holes 75 mm diameter, lateral walls	m	2,640.0	5.68	14,995	28.91	76,322	34.59	91,318
	5	Contact pressure grouting excluding injected materials	t	172.3	39.94	6,880	121.05	20,853	160.99	27,733
	6	Consolidation pressure grouting excluding injected materials	t	788.6	45.26	35,690	127.52	100,556	172.78	136,246
8.4.04		Sundries:								
	1	Portland cement ASTM type I or II	t	2,501.8	5.16	12,909	252.60	631,957	257.76	644,866
	2	Portland cement ASTM type V (sulfate resistant)	t	2,501.8	6.06	15,161	296.70	742,286	302.76	757,447
	3	Tendons, 70 t capacity, PHA 7K7 15 mm L=13.3 (14 pcs)	ea	14.0	267.78	3,749	1,232.87	17,260	1,500.65	21,009
	4	Tendons, 70 t capacity, PHA 7K7 15 mm L=13.8, (5 pcs)	ea	50.0	274.25	13,713	1,260.11	63,006	1,534.36	76,718
	5	Tendons, 70 t capacity, PHA 7K7 15 mm L=14,8, (5 pcs)	ea	50.0	285.93	14,297	1,307.81	65,391	1,593.74	79,687
	6	Tendons, 70 t capacity, PHA 7K7 15 mm L=15.8, (66 pcs)	ea	66.0	301.08	19,871	1,369.80	90,407	1,670.88	110,278
	7	Tendons, 70 t capacity, PHA 7K7 15 mm L=18.8, (214 pcs)	ea	214.0	346.89	74,234	1,557.97	333,406	1,904.86	407,640
	8	Tendons, 70 t capacity, PHA 7K7 15 mm L=20.3, (14 pcs)	ea	14.0	374.57	5,244	1,682.27	23,552	2,056.84	28,796
	9	Tendons, 70 t capacity, PHA 7K7 15 mm L=21.8, (318 pcs)	ea	318.0	402.25	127,916	1,806.58	574,492	2,208.83	702,408
	10	Care of water and miscellaneous	%	3.5%		70,551		416,744		487,296
		Total N°8.4 ---------- -------->>				**2,086,299**		**12,323,727**		**14,410,026**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.5		**Transformer Hall**								
8.5.01		Excavation and supports								
	1	Excavation	m^3	127,880.4	6.48	828,665	30.25	3,868,382	36.73	4,697,047
	2	Rock bolts, 36 mm diameter	m	12,048.0	8.20	98,809	38.29	461,260	46.49	560,068
	3	Tendons, 70 t capacity, PHA 7K7 15 mm L=17	ea	200.0	319.40	63,880	1,445.07	289,014	1,764.47	352,894
	4	Tendons, 70 t capacity, PHA 7K7 15 mm L=19	ea	80.0	350.58	28,046	1,574.54	125,963	1,925.12	154,010
8.5.02		Concrete works								
	1	Concrete, arch and arch shoulders	m^3	3,262.0	15.16	49,452	145.39	474,262	160.55	523,714
	2	Concrete, sidewalls and beams	m^3	4,778.0	32.45	155,046	108.38	517,840	140.83	672,886
	3	Reinforcing steel	t	644.0	325.47	209,603	1,399.52	901,291	1,724.99	1,110,894
8.5.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	998.0	5.68	5,669	28.91	28,852	34.59	34,521
	2	Percussion contact grout holes, 40-48 mm diameter	m	1,266.8	4.04	5,118	18.36	23,258	22.40	28,375
	3	Rotary consolidation grout holes, 40-48 mm min. diameter	m	8,448.8	8.99	75,954	37.90	320,208	46.89	396,162
	4	Contact & consolidation cement grouting, excluding materials	t	283.5	42.60	12,078	124.85	35,399	167.45	47,477
8.5.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,589.0	5.16	8,199	252.60	401,373	257.76	409,572
	2	Portland cement ASTM type V (sulfate resistant)	t	1,589.0	6.06	9,629	296.70	471,446	302.76	481,075
	3	Care of water and miscellaneous	%	3.5%		54,255		277,149		331,404
		Total N°8.5 ---------- -------->>				**1,604,403**		**8,195,695**		**9,800,098**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.6		**Bus Duct Galleries (Units 5 & 6)**								
8.6.01		Excavation and supports								
	1	Excavation	m^3	9,994.0	9.10	90,945	44.59	445,632	53.69	536,578
	2	Rock bolts, 26.5 mm diameter	m	3,927.0	2.83	11,113	31.18	122,444	34.01	133,557
	3	Rock bolts, 32 mm diameter	m	1,399.0	3.02	4,225	39.12	54,729	42.14	58,954
8.6.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	3,408.0	13.00	44,304	105.00	357,840	118.00	402,144
	2	Concrete, invert	m^3	1,586.0	6.10	9,675	46.00	72,956	52.10	82,631
	3	Reinforcing steel	t	336.0	325.47	109,358	1,359.52	456,799	1,684.99	566,157
8.6.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	145.0	4.04	586	18.36	2,662	22.40	3,248
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	995.0	5.32	5,293	22.59	22,477	27.91	27,770
	3	Contact and cons. grouting (excluding injected materials)	t	87.0	42.60	3,706	124.85	10,862	167.45	14,568
8.6.04		Sundries								
	1	Portland cement ASTM type I or II	t	942.4	5.16	4,863	252.60	238,055	257.76	242,918
	2	Portland cement ASTM type V (sulfate resistant)	t	942.4	6.06	5,711	296.70	279,616	302.76	285,327
	3	Care of water and miscellaneous	%	3.0%		8,693		61,922		70,616
		Total N°8.6 ---------- ---------->>				**298,473**		**2,125,995**		**2,424,468**
8.7		**Bus Duct Galleries (Units 3 & 4) - partial**								
8.7.01		Excavation and supports								
	1	Excavation	m^3	6,246.3	9.10	56,841	44.59	278,520	53.69	335,361
	2	Steel Ribs	kg	50,000.0	0.13	6,500	2.94	147,000	3.07	153,500
8.7.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	1,704.0	13.00	22,152	105.00	178,920	118.00	201,072
	2	Concrete, invert	m^3	793.0	6.10	4,837	46.00	36,478	52.10	41,315
	3	Reinforcing steel	t	168.0	325.47	54,679	1,359.52	228,399	1,684.99	283,078
8.7.04		Sundries								
	1	Portland cement ASTM type I or II	t	449.5	5.16	2,319	252.60	113,534	257.76	115,853
	2	Portland cement ASTM type V (sulfate resistant)	t	449.5	6.06	2,724	296.70	133,355	302.76	136,079
	3	Care of water and miscellaneous	%	3.0%		4,502		33,486		37,988
		Total N°8.7 ---------- ---------->>				**154,554**		**1,149,692**		**1,304,246**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.8		**Bus Duct Galleries (Units 1 & 2) - partial**								
8.8.01		Excavation and supports								
	1	Excavation	m^3	2,920.0	9.10	26,572	44.59	130,203	53.69	156,775
8.8.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	426.0	13.00	5,538	105.00	44,730	118.00	50,268
	2	Concrete, invert	m^3	198.3	6.10	1,209	46.00	9,120	52.10	10,329
	3	Reinforcing steel	t	33.6	325.47	10,936	1,359.52	45,680	1,684.99	56,616
8.8.04		Sundries								
	1	Portland cement ASTM type I or II	t	112.4	5.16	580	252.60	28,383	257.76	28,963
	2	Portland cement ASTM type V (sulfate resistant)	t	112.4	6.06	681	296.70	33,339	302.76	34,020
	3	Care of water and miscellaneous	%	3.0%		1,365		8,744		10,109
		Total N°8.8 ---------- ---------->>				**46,881**		**300,198**		**347,079**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.9		**Main Draft Tubes Collector of Units 4-5-6**								
		(Upstream Stretch - Sections 1 and 2)								
8.9.01		Excavation and supports								
	1	Excavation	m^3	12,427.0	7.27	90,344	34.80	432,460	42.07	522,804
	2	Rock bolts, 32 mm diameter	m	4,200.0	3.02	12,684	39.12	164,304	42.14	176,988
	3	Steel ribs	kg	47,000.0	0.13	6,110	2.94	138,180	3.07	144,290
8.9.02		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
8.9.03		Drilling and grouting								
	1	Percussion contact grouting holes, holes, 40-48 mm diameter	m	495.0	4.04	2,000	18.36	9,088	22.40	11,088
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	3,850.0	5.32	20,482	22.59	86,972	27.91	107,454
	3	Contact and cons. grouting (excluding injected materials)	t	335.0	42.60	14,271	124.85	41,825	167.45	56,096
8.9.04		Sundries								
	1	Portland cement ASTM type I or II	t	568.7	5.16	2,935	252.60	143,659	257.76	146,593
	2	Portland cement ASTM type V (sulfate resistant)	t	568.7	6.06	3,446	296.70	168,739	302.76	172,186
	3	Care of water and miscellaneous	%	3.0%		6,782		48,377		55,160
		Total N°8.9 ---------- ---------->>				**232,853**		**1,660,957**		**1,893,810**
8.10		**Main Draft Tubes Collector of Units 4-5-6**								
		(Downstream Stretch - Sections 3 and 4)								
8.10.01		Excavation and supports:								
	1	Excavation	m^3	18,867.6	6.61	124,715	31.63	596,782	38.24	721,497
	2	Rock bolts, 32 mm diameter	m	8,460.0	3.02	25,549	39.12	330,955	42.14	356,504
	3	Steel ribs	kg	43,200.0	0.13	5,616	2.94	127,008	3.07	132,624
8.10.02		Sundries:								
	1	Care of water and miscellaneous	%	3.0%		4,676		31,642		36,319
		Total N°8.10 ---------- ---------->>				**160,556**		**1,086,388**		**1,246,944**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.11		**Cable Tunnel 1**								
8.11.01		Excavation and supports								
	1	Excavation	m^3	29,611.8	11.18	331,060	52.59	1,557,286	63.77	1,888,346
	2	Rock bolts, 25 mm diameter	m	6,575.0	1.71	11,243	24.13	158,655	25.84	169,898
8.11.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	8,941.6	11.53	103,097	93.81	838,810	105.34	941,907
	2	Concrete, invert	m^3	5,890.5	6.40	37,699	4.64	27,332	11.04	65,031
	3	Reinforcing steel	t	723.2	325.47	235,380	1,359.52	983,205	1,684.99	1,218,585
8.11.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	2,318.00	5.68	13,166	28.91	67,013	34.59	80,180
	2	Percussion contact grouting holes, holes, 40-48 mm diameter	m	770.0	4.04	3,111	18.36	14,137	22.40	17,248
	3	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2,225.0	5.32	11,837	22.59	50,263	27.91	62,100
	4	Contact and cons. grouting (excluding injected materials)	t	216.0	42.60	9,202	124.85	26,968	167.45	36,169
8.11.04		Sundries								
	1	Portland cement ASTM type I or II	t	2,777.8	5.16	14,333	252.60	701,667	257.76	716,000
	2	Portland cement ASTM type V (sulfate resistant)	t	2,777.8	6.06	16,833	296.70	824,167	302.76	841,001
	3	Care of water and miscellaneous	%	3.0%		23,609		157,485		181,094
		Total N°8.11 ---------- ---------->>				**810,570**		**5,406,988**		**6,217,558**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.12		**Cable tunnel 2**								
8.12.01		Excavation and supports								
	1	Excavation	m^3	22,976.6	9.35	214,831	47.13	1,082,885	56.48	1,297,716
	2	Rock bolts, 25 mm diameter	m	7,840.0	1.71	13,406	24.13	189,179	25.84	202,586
8.12.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	5,609.7	12.13	68,046	97.22	545,376	109.35	613,422
	2	Concrete, invert	m^3	2,878.3	6.84	19,687	42.93	123,564	49.77	143,252
	3	Reinforcing steel	t	320.6	325.47	104,342	1,359.52	435,849	1,684.99	540,191
8.12.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	3,200.00	5.68	18,176	28.91	92,512	34.59	110,688
	2	Percussion contact grouting holes, holes, 40-48 mm diameter	m	985.0	4.04	3,979	18.36	18,085	22.40	22,064
	3	Rotary consolidation grout holes, 40-48 mm min. diameter	m	4,168.0	5.32	22,174	22.59	94,155	27.91	116,329
	4	Contact and cons. grouting (excluding injected materials)	t	384.0	42.60	16,358	124.85	47,942	167.45	64,301
8.12.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,527.8	5.16	7,884	252.60	385,932	257.76	393,816
	2	Portland cement ASTM type V (sulfate resistant)	t	1,527.8	6.06	9,259	296.70	453,310	302.76	462,568
	3	Care of water and miscellaneous	%	3.0%		14,944		104,064		119,008
		Total N°8.12 ---------- ---------->>				**513,087**		**3,572,854**		**4,085,941**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
8.13		**Cable tunnel 1 & 2 (Common Stretch)**								
8.13.01		Excavation and supports								
	1	Excavation	m^3	7,797.2	9.53	74,308	48.15	375,436	57.68	449,744
	2	Rock bolts, 25 mm diameter	m	459.0	1.71	785	24.13	11,076	25.84	11,861
8.13.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	2,034.5	11.17	22,726	95.90	195,110	107.07	217,835
	2	Concrete, invert	m^3	1,098.0	6.68	7,334	42.41	46,565	49.09	53,899
	3	Reinforcing steel	t	156.6	325.47	50,969	1,359.52	212,901	1,684.99	263,869
8.13.03		Sundries								
	1	Portland cement ASTM type I or II	t	563.8	5.16	2,909	252.60	142,428	257.76	145,337
	2	Portland cement ASTM type V (sulfate resistant)	t	563.8	6.06	3,417	296.70	167,293	302.76	170,710
	3	Care of water and miscellaneous	%	3.0%		4,873		34,524		39,398
		Total N°8.13 ---------- ---------->>				**167,321**		**1,185,332**		**1,352,653**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9		**GROUTING GALLERIES**								
9.1		**Dam Curtain Grouting Gallery, Joint Left - Right**								
9.1.01		Excavation and supports								
	1	Excavation	m^3	12,957.0	8.00	103,656	38.80	502,730	46.80	606,386
9.1.02		Concrete works								
	1	Concrete lining	m^3	12,048.8	6.86	82,655	48.05	578,946	54.91	661,600
	2	Reinforcing steel	t	667.6	325.47	217,288	1,359.52	907,634	1,684.99	1,124,922
9.1.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	525.0	4.04	2,121	18.36	9,639	22.40	11,760
	2	Rotary consolidation grout holes, 40-48 mm min. diameter	m	2,665.0	5.32	14,178	22.59	60,202	27.91	74,380
	3	Contact and cons. grouting (excluding injected materials)	t	241.0	42.60	10,267	124.85	30,089	167.45	40,355
9.1.04		Sundries								
	1	Portland cement ASTM type I or II	t	2,289.3	5.16	11,813	252.60	578,274	257.76	590,087
	2	Portland cement ASTM type V (sulfate resistant)	t	2,289.3	6.06	13,873	296.70	679,231	302.76	693,104
	3	Care of water and miscellaneous	%	3.0%		13,675		100,402		114,078
		Total N°9.1 ---------- ---------->>				**469,525**		**3,447,147**		**3,916,672**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9.2		**Dam Curtain Grouting Gallery Left Bank, Active Stretch**								
9.2.01		Excavation and supports								
	1	Excavation	m^3	13,813.1	9.39	129,705	41.62	574,903	51.01	704,609
9.2.02		Concrete works:								
	1	Concrete lining	m^3	10,085.7	7.38	74,433	49.78	502,068	57.16	576,501
	2	Reinforcing steel	t	517.7	325.47	168,496	1,359.52	703,824	1,684.99	872,320
9.2.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	1,000.0	4.04	4,040	18.36	18,360	22.40	22,400
	2	Contact pressure grouting (excluding injected materials)	t	30.0	39.94	1,198	121.05	3,632	160.99	4,830
9.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,830.4	5.16	9,445	252.60	462,367	257.76	471,812
	2	Portland cement ASTM type V (sulfate resistant)	t	1,830.4	6.06	11,092	296.70	543,089	302.76	554,182
	3	Steel linings	t	1,220.0	770.00	939,400	5,230.00	6,380,600	6,000.00	7,320,000
	4	Care of water and miscellaneous	%	3.0%		40,134		275,665		315,800
		Total N°9.2 ---------- ---------->>				**1,377,944**		**9,464,509**		**10,842,453**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9.3		**Dam Curtain Grouting Gallery Left Bank, Passive Stretch**								
9.3.01		Excavation and supports								
	1	Excavation	m^3	13,911.4	9.38	130,489	41.53	577,740	50.91	708,229
9.3.02		Concrete works								
	1	Concrete lining	m^3	10,157.5	7.38	74,962	49.78	505,639	57.16	580,601
	2	Reinforcing steel	t	711.0	325.47	231,417	1,359.52	966,650	1,684.99	1,198,066
9.3.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	1,050.0	4.04	4,242	18.36	19,278	22.40	23,520
	2	Contact pressure grouting (excluding injected materials)	t	30.0	39.94	1,198	121.05	3,632	160.99	4,830
9.3.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,843.3	5.16	9,512	252.60	465,629	257.76	475,140
	2	Portland cement ASTM type V (sulfate resistant)	t	1,843.3	6.06	11,171	296.70	546,920	302.76	558,091
	3	Steel linings (to be assembled)	t	3,417.7	616.00	2,105,303	4,184.00	14,299,657	4,800.00	16,404,960
	4	Care of water and miscellaneous	%	3.0%		77,049		521,554		598,603
		Total N°9.3 ---------- ---------->>				**2,645,342**		**17,906,698**		**20,552,040**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9.4		**Combined Saline & Dam Curtain Grouting Gallery,**								
		Right Bank								
9.4.01		Excavation and supports								
	1	Excavation	m^3	22,567.5	9.68	218,454	45.78	1,033,141	55.46	1,251,595
9.4.02		Concrete works								
	1	Concrete lining	m^3	16,690.6	7.71	128,685	49.55	827,020	57.26	955,705
	2	Reinforcing steel	t	745.2	325.47	242,553	1,359.52	1,013,169	1,684.99	1,255,722
9.4.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	1,600.0	4.04	6,464	18.36	29,376	22.40	35,840
	2	Contact pressure grouting (excluding injected materials)	t	49.0	39.94	1,957	121.05	5,931	160.99	7,889
9.4.04		Sundries								
	1	Portland cement ASTM type I or II	t	3,028.8	5.16	15,629	252.60	765,078	257.76	780,707
	2	Portland cement ASTM type V (sulfate resistant)	t	3,028.8	6.06	18,355	296.70	898,649	302.76	917,003
	3	Steel linings	t	1,800.0	770.00	1,386,000	5,230.00	9,414,000	6,000.00	10,800,000
	4	Care of water and miscellaneous	%	3.0%		60,543		419,591		480,134
		Total N°9.4 ---------- ---------->>				**2,078,639**		**14,405,955**		**16,484,594**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9.5		**Dam Grouting Gallery 1**								
9.5.01		Excavation and supports								
	1	Excavation	m^3	8,173.1	15.45	126,275	73.23	598,518	88.68	724,793
	2	Rock bolts, 22 mm diameter	m	1,131.7	1.71	1,935	24.13	27,307	25.84	29,242
	3	Steel ribs	kg	68,432.0	0.13	8,896	2.94	201,190	3.07	210,086
9.5.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,179.2	15.15	17,865	102.78	121,202	117.93	139,067
	2	Concrete, invert	m^3	230.7	13.66	3,151	69.69	16,076	83.35	19,227
	3	Reinforcing steel	t	95.3	325.47	31,007	1,359.52	129,518	1,684.99	160,525
9.5.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	500.0	5.68	2,840	28.91	14,455	34.59	17,295
	2	Contact pressure grouting (excluding injected materials)	t	15.0	39.94	599	121.05	1,816	160.99	2,415
9.5.04		Sundries								
	1	Portland cement ASTM type I or II	t	261	5.16	1,348	252.60	66,001	257.76	67,349
	2	Portland cement ASTM type V (sulfate resistant)	t	261	6.06	1,583	296.70	77,523	302.76	79,107
	3	Care of water and miscellaneous	%	3.0%		5,865		37,608		43,473
		Total N°9.5 ---------- ---------->>				**201,365**		**1,291,214**		**1,492,579**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9.6		**Dam Grouting Gallery 2**								
9.6.01		Excavation and supports								
	1	Excavation	m^3	4,452.5	19.92	88,694	92.99	414,039	112.91	502,733
9.6.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,290.0	13.73	17,711	97.64	125,953	111.37	143,664
	2	Reinforcing steel	t	105.7	325.47	34,399	1,359.52	143,690	1,684.99	178,089
9.6.03		Sundries								
	1	Portland cement ASTM type I or II	t	232.2	5.16	1,198	252.60	58,652	257.76	59,851
	2	Portland cement ASTM type V (sulfate resistant)	t	232.2	6.06	1,407	296.70	68,892	302.76	70,299
	3	Care of water and miscellaneous	%	3.0%		4,302		24,337		28,639
		Total N°9.6 ---------- ---------->>				**147,712**		**835,563**		**983,275**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
9.7		**Dam Grouting Gallery 3**								
9.7.01		Excavation and supports								
	1	Excavation	m^3	2,040.0	15.50	31,619	73.30	149,529	88.80	181,148
	2	Steel ribs	kg	20,092.8	0.13	2,612	2.94	59,073	3.07	61,685
9.7.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	275.6	15.20	4,189	102.80	28,329	118.00	32,518
	2	Concrete, invert	m^3	65.8	13.70	901	69.70	4,583	83.40	5,484
	3	Reinforcing steel	t	13.7	325.47	4,444	1,359.52	18,562	1,684.99	23,006
9.7.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	135.0	5.68	767	28.91	3,903	34.59	4,670
	2	Contact pressure grouting (excluding injected materials)	t	4.0	39.94	160	121.05	484	160.99	644
9.7.04		Sundries								
	1	Portland cement ASTM type I or II	t	63.4	5.16	327	252.60	16,025	257.76	16,352
	2	Portland cement ASTM type V (sulfate resistant)	t	63.4	6.06	384	296.70	18,822	302.76	19,207
	3	Care of water and miscellaneous	%	3.0%		1,362		8,979		10,341
		Total N°9.7 ---------- ---------->>				**46,765**		**308,289**		**355,054**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
10		**DRAINAGE GALLERIES**								
10.1		**Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers**								
10.1.01		Excavation and supports								
	1	Excavation, cross section area 31.94 m2	m^3	14,900.0	11.93	177,757	50.97	759,454	62.90	937,211
	2	Excavation, cross section area 72.02 m2	m^3	3,310.5	8.50	28,140	39.53	130,865	48.03	159,005
10.1.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	2,623.9	16.10	42,245	100.10	262,653	116.20	304,898
	2	Concrete, invert	m^3	848.2	13.56	11,501	66.21	56,158	79.77	67,659
	3	Reinforcing steel	t	138.9	325.47	45,202	1,359.52	188,815	1,684.99	234,017
		Drilling and grouting:								
	1	Rotary consolidation grout holes, 40-48 mm min. diameter	m	48,000	5.32	255,360	22.59	1,084,320	27.91	1,339,680
	2	Drain holes, 76 mm diameter	m	4,670	5.68	26,526	28.91	135,010	34.59	161,535
	3	Contact & consolidation cement grouting, excluding materials	t	3,690	42.60	157,194	124.85	460,697	167.45	617,891
	4	Cement grouting between concrete and steel lining	m^2		2.85		8.55		11.40	
10.1.03		Sundries								
	1	Portland cement ASTM type I or II	t	2,470.0	5.16	12,745	252.60	623,916	257.76	636,661
	2	Portland cement ASTM type V (sulfate resistant)	t	2,470.0	6.06	14,968	296.70	732,842	302.76	747,810
	3	Care of water and miscellaneous	%	3.0%		23,149		133,042		156,191
		Total N°10.1 ---------- ---------->>				**794,787**		**4,567,770**		**5,362,557**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
10.2		**Drainage Gallery 3 of Stage 1 Power Tunnel Gate**								
		Chambers								
10.2.01		Excavation and supports								
	1	Excavation	m^3	2,222.2	15.99	35,533	65.90	146,443	81.89	181,975
	2	Rock bolts, 22 mm diameter	m	781.1	1.71	1,336	24.13	18,847	25.84	20,183
10.2.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	443.6	15.71	6,968	95.10	42,183	110.81	49,151
	2	Concrete, invert	m^3	135.1	16.85	2,277	74.85	10,113	91.70	12,390
	3	Reinforcing steel	t	31.5	325.47	10,239	1,359.52	42,770	1,684.99	53,009
10.2.03		Drilling and grouting								
	1	Drain holes, 50-76 mm diameter	m	1,716.0	5.68	9,747	28.91	49,610	34.59	59,356
	2	Percussion contact grouting holes, 40-48 mm dia.	m	307.0	5.68	1,744	28.91	8,875	34.59	10,619
	3	Rotary impermeabilization grout holes, 40-48 mm min. diameter	m	1,300.0	5.32	6,916	22.59	29,367	27.91	36,283
	4	Contact pressure grouting (excluding injected materials)	t	165.0	42.60	7,029	124.85	20,600	167.45	27,629
10.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	186.7	5.16	963	252.60	47,150	257.76	48,114
	2	Portland cement ASTM type V (sulfate resistant)	t	186.7	6.06	1,131	296.70	55,382	302.76	56,513
	3	Care of water and miscellaneous	%	3.0%		2,516		14,140		16,657
		Total N°10.2 ---------- ---------->>				**86,399**		**485,480**		**571,879**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
10.3		**Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber**								
10.3.01		Excavation and supports								
	1	Excavation	m^3	1,767.4	15.99	28,261	65.90	116,471	81.89	144,732
	2	Rock bolts, 22 mm diameter	m	511.0	1.71	874	24.13	12,330	25.84	13,204
10.3.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	369.1	15.71	5,798	95.10	35,097	110.81	40,895
	2	Concrete, invert	m^3	105.0	16.85	1,769	74.85	7,860	91.70	9,629
	3	Reinforcing steel	t	26.7	325.47	8,701	1,359.52	36,344	1,684.99	45,045
10.3.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	1,124.0	5.68	6,384	28.91	32,495	34.59	38,879
	2	Percussion contact grouting holes, 40-48 mm dia.	m	243.0	5.68	1,380	28.91	7,025	34.59	8,405
	3	Rotary impermeabilization grout holes, 40-48 mm min. diameter	m	800.0	5.32	4,256	22.59	18,072	27.91	22,328
	4	Contact pressure grouting (excluding injected materials)	t	47.0	42.60	2,002	124.85	5,868	167.45	7,870
10.3.04		Sundries								
	1	Portland cement ASTM type I or II	t	108.8	5.16	562	252.60	27,491	257.76	28,053
	2	Portland cement ASTM type V (sulfate resistant)	t	108.8	6.06	660	296.70	32,290	302.76	32,950
	3	Care of water and miscellaneous	%	3.0%		1,819		9,940		11,760
		Total N°10.3 ---------- ---------->>				**62,466**		**341,285**		**403,750**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
10.4		**Powerhouse Drainage Gallery, Low Level (DT1)**								
10.4.01		Excavation and supports								
	1	Excavation	m^3	19,873.0	14.28	283,786	64.48	1,281,410	78.76	1,565,196
	2	Rock bolts, 22 mm diameter	m	9,956.6	1.71	17,026	24.13	240,252	25.84	257,278
	3	Rock bolts, 26.5 mm diameter	m	1,816.9	2.83	5,142	31.18	56,652	34.01	61,794
10.5.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	2,834.8	17.52	49,665	108.42	307,346	125.94	357,011
	2	Concrete, invert	m^3	1,150.7	15.32	17,628	67.17	77,290	82.49	94,918
	3	Reinforcing steel	t	82.5	325.47	26,858	1,359.52	112,188	1,684.99	139,046
10.6.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	14,843.0	5.68	84,308	28.91	429,111	34.59	513,419
	2	Percussion contact grouting holes, 40-48 mm dia.	m	2,517.0	4.04	10,169	18.36	46,212	22.40	56,381
	3	Contact pressure grouting (excluding injected materials)	t	76.0	42.60	3,238	124.85	9,489	167.45	12,726
10.7.04		Sundries								
	1	Portland cement ASTM type I or II	t	755.4	5.16	3,898	252.60	190,809	257.76	194,706
	2	Portland cement ASTM type V (sulfate resistant)	t	755.4	6.06	4,578	296.70	224,121	302.76	228,698
	3	Care of water and miscellaneous	%	3.0%		15,189		89,246		104,435
		Total N°10.4 ---------- ---------->>				**521,484**		**3,064,126**		**3,585,610**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
10.8		**Drainage Gallery, Powerhouse Mid Level (DT2)**								
10.8.01		Excavation and supports								
	1	Excavation	m^3	14,667.0	13.21	193,751	56.29	825,605	69.50	1,019,355
	2	Rock bolts, 22 mm diameter	m	3,834.6	1.71	6,557	24.13	92,530	25.84	99,087
10.8.03		Concrete works								
	1	Concrete, arch and sidewalls	m^3	3,335.7	10.64	35,492	97.47	325,131	108.11	360,622
	2	Concrete, invert	m^3	1,076.7	11.69	12,587	59.80	64,389	71.49	76,976
	3	Reinforcing steel	t	32.9	325.47	10,722	1,359.52	44,785	1,684.99	55,507
10.8.04		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	10,625.9	5.68	60,355	28.91	307,193	34.59	367,548
	2	Percussion contact grouting holes, 40-48 mm dia.	m	1,756.0	4.04	7,094	18.36	32,240	22.40	39,334
	3	Contact pressure grouting (excluding injected materials)	t	53.0	39.94	2,117	121.05	6,416	160.99	8,532
10.8.05		Sundries								
	1	Portland cement ASTM type I or II	t	820.7	5.16	4,235	252.60	207,318	257.76	211,553
	2	Portland cement ASTM type V (sulfate resistant)	t	820.7	6.06	4,974	296.70	243,513	302.76	248,487
	3	Care of water and miscellaneous	%	3.0%		10,136		64,474		74,610
		Total N°10.8 ---------- ---------->>				**348,020**		**2,213,593**		**2,561,613**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
10.9		**Drainage Gallery, Powerhouse Mid Level (DT3)**								
10.9.01		Excavation and supports								
	1	Excavation	m^3	24,445.1	13.21	322,920	56.29	1,376,015	69.50	1,698,934
	2	Rock bolts, 22 mm diameter	m	8,400.7	1.71	14,365	24.13	202,709	25.84	217,074
10.9.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	5,007.3	10.64	53,278	97.47	488,066	108.11	541,344
	2	Concrete, invert	m^3	1,673.0	11.69	19,557	59.80	100,043	71.49	119,600
	3	Reinforcing steel	t	76.1	325.47	24,759	1,359.52	103,422	1,684.99	128,181
10.9.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	12,684.0	5.68	72,045	28.91	366,694	34.59	438,740
	2	Percussion contact grouting holes, 40-48 mm dia.	m	2,992.0	4.04	12,088	18.36	54,933	22.40	67,021
	3	Contact pressure grouting (excluding injected materials)	t	91.0	39.94	3,635	121.05	11,016	160.99	14,650
10.9.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,248.0	5.16	6,439	252.60	315,233	257.76	321,673
	2	Portland cement ASTM type V (sulfate resistant)	t	1,248.0	6.06	7,563	296.70	370,268	302.76	377,831
	3	Care of water and miscellaneous	%	3.0%		16,099		101,652		117,751
		Total N°10.9---------- ---------->>				**552,748**		**3,490,050**		**4,042,798**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
11		**MISCELLANEOUS UNDERGROUND WORKS**								
11.1		**Explosive Warehouse T5A**								
11.1.01		Excavation and supports								
	1	Excavation	m^3	1,583.7	24.75	39,196	104.00	164,704	128.75	203,900
11.1.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	275.5	19.71	5,430	100.88	27,790	120.59	33,220
	2	Concrete, invert	m^3	40.3	24.53	989	83.20	3,355	107.73	4,344
	3	Reinforcing steel	t	12.6	325.47	4,111	1,359.52	17,173	1,684.99	21,285
11.1.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	120.0	4.04	485	18.36	2,203	22.40	2,688
	2	Contact pressure grouting (excluding injected materials)	t	4.0	39.94	160	121.05	484	160.99	644
11.1.04		Sundries								
	1	Portland cement ASTM type I or II	t	58.8	5.16	304	252.60	14,864	257.76	15,167
	2	Portland cement ASTM type V (sulfate resistant)	t	58.8	6.06	357	296.70	17,459	302.76	17,815
	3	Care of water and miscellaneous	%	3.0%		1,531		7,441		8,972
		Total N°11.1 ---------- ---------->>				**52,562**		**255,472**		**308,034**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
11.2		**Explosive Warehouse T4**								
11.2.01		Excavation and supports								
	1	Excavation	m^3	1,583.7	22.80	36,108	95.17	150,720	117.97	186,828
11.2.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	275.5	20.66	5,691	105.48	29,057	126.14	34,749
	2	Concrete, invert	m^3	40.3	21.52	868	88.62	3,573	110.14	4,441
	3	Reinforcing steel	t	12.6	325.47	4,111	1,359.52	17,173	1,684.99	21,285
11.2.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	120.0	4.04	485	18.36	2,203	22.40	2,688
	2	Contact pressure grouting (excluding injected materials)	t	4.0	39.94	160	121.05	484	160.99	644
11.2.04		Sundries								
	1	Portland cement ASTM type I or II	t	58.8	5.16	304	252.60	14,864	257.76	15,167
	2	Portland cement ASTM type V (sulfate resistant)	t	58.8	6.06	357	296.70	17,459	302.76	17,815
	3	Care of water and miscellaneous	%	3.0%		1,442		7,066		8,508
		Total N°11.2 ---------- ---------->>				**49,526**		**242,599**		**292,125**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
11.3		**Conveyor Line 7A**								
11.3.01		Excavation and supports								
	1	Excavation	m^3	21,673.8	8.80	190,730	37.45	811,686	46.25	1,002,415
	2	Rock bolts, 22 mm diameter	m	337.4	1.71	577	24.13	8,142	25.84	8,719
11.3.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	3,641.4	14.49	52,763	96.90	352,847	111.39	405,610
	2	Concrete, invert	m^3	1,346.4	11.75	15,820	67.34	90,667	79.09	106,487
	3	Reinforcing steel	t	199.5	325.47	64,935	1,359.52	271,238	1,684.99	336,173
11.3.03		Drilling and grouting		4,323.9						
	1	Percussion contact grouting holes, 40-48 mm dia.	m	800.0	4.04	3,232	18.36	14,688	22.40	17,920
	2	Rotary impermeabilization grout holes, 40-48 mm min. diameter	m	3,510.0	5.32	18,673	22.59	79,291	27.91	97,964
	3	Contact and cons. grouting (excluding injected materials)	t	322.0	42.60	13,717	124.85	40,202	167.45	53,919
11.3.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,058.8	5.16	5,463	252.60	267,452	257.76	272,915
	2	Portland cement ASTM type V (sulfate resistant)	t	1,058.8	6.06	6,416	296.70	314,145	302.76	320,561
	3	Care of water and miscellaneous	%	3.0%		11,170		67,511		78,681
		Total N°11.3 ---------- ---------->>				**383,497**		**2,317,869**		**2,701,365**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
11.4		**Conveyor Line 8A**								
11.4.01		Excavation and supports								
	1	Excavation	m^3	9,341.3	9.30	86,875	39.30	367,115	48.60	453,990
11.4.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,181.9	14.50	17,138	96.90	114,526	111.40	131,664
	2	Concrete, invert	m^3	411.5	11.80	4,856	67.40	27,737	79.20	32,593
	3	Reinforcing steel	t	63.7	325.47	20,744	1,359.52	86,652	1,684.99	107,396
11.4.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	364.0	4.04	1,471	18.36	6,683	22.40	8,154
	2	Rotary impermeabilization grout holes, 40-48 mm min. diameter	m	1,537.0	5.32	8,177	22.59	34,721	27.91	42,898
	3	Contact and cons. grouting (excluding injected materials)	t	142.0	42.60	6,049	124.85	17,729	167.45	23,778
11.4.04		Sundries								
	1	Portland cement ASTM type I or II	t	357.8	5.16	1,846	252.60	90,384	257.76	92,231
	2	Portland cement ASTM type V (sulfate resistant)	t	357.8	6.06	2,168	296.70	106,164	302.76	108,333
	3	Care of water and miscellaneous	%	3.0%		4,480		25,551		30,031
		Total N°11.4 ---------- ---------->>				**153,804**		**877,262**		**1,031,066**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
11.5		**Cross Slit nº1**								
11.5.01		Excavation and supports								
	1	Excavation	m^3	5,050.6	7.88	39,799	35.33	178,438	43.21	218,237
	2	Rock bolts, 26.5 mm diameter	m	406.4	2.83	1,150	31.18	12,670	34.01	13,820
11.5.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	652.5	9.51	6,205	77.82	50,776	87.33	56,981
	2	Concrete, invert	m^3	200.9	7.34	1,474	51.25	10,295	58.59	11,770
	3	Reinforcing steel	t	40.5	325.47	13,166	1,359.52	54,997	1,684.99	68,163
11.5.03		Sundries								
	1	Portland cement ASTM type I or II	t	153.6	5.16	793	252.60	38,801	257.76	39,593
	2	Portland cement ASTM type V (sulfate resistant)	t	153.6	6.06	931	296.70	45,575	302.76	46,505
	3	Care of water and miscellaneous	%	3.0%		1,906		11,747		13,652
		Total N°11.5 ---------- ---------->>				**65,424**		**403,297**		**468,721**
11.6		**Ventilation Gallery Parallel to Transportation Tunnel T3**								
11.6.01		Excavation and supports:								
	1	Excavation	m^3	11,922.1	15.84	188,846	67.09	799,854	82.93	988,700
	2	Rock bolts, 22 mm diameter	m	2,831.6	1.71	4,842	24.13	68,327	25.84	73,169
11.6.02		Concrete works:								
	1	Concrete, arch and sidewalls	m^3	5,446.6	12.11	65,958	85.84	467,537	97.95	533,496
	2	Reinforcing steel	t	40.1	325.47	13,040	1,359.52	54,467	1,684.99	67,507
11.6.03		Sundries:								
	1	Portland cement ASTM type I or II	t	980.4	5.16	5,059	252.60	247,647	257.76	252,705
	2	Portland cement ASTM type V (sulfate resistant)	t	980.4	6.06	5,941	296.70	290,882	302.76	296,823
	3	Care of water and miscellaneous	%	3.0%		8,511		57,861		66,372
		Total N°11.6 ---------- ---------->>				**292,197**		**1,986,576**		**2,278,772**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12		**REMAINING TUNNELS, ADITS AND GALLERIES**								
12.1		**Cross Section Area of Tunnels Ranging From 15 to 20 m2**								
12.1.01		Excavation and supports								
	1	Excavation	m^3	1,263.3	19.22	24,281	78.11	98,678	97.33	122,960
	2	Rock bolts, 22 mm diameter	m	184.9	1.71	316	24.13	4,461	25.84	4,778
12.1.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	160.7	18.37	2,952	105.64	16,975	124.01	19,927
	2	Concrete, invert	m^3	113.4	13.26	1,504	64.27	7,288	77.53	8,792
	3	Reinforcing steel	t	4.0	325.47	1,297	1,359.52	5,417	1,684.99	6,713
12.1.03		Sundries								
	1	Portland cement ASTM type I or II	t	49.3	5.16	255	252.60	12,462	257.76	12,717
	2	Portland cement ASTM type V (sulfate resistant)	t	49.3	6.06	299	296.70	14,638	302.76	14,937
	3	Care of water and miscellaneous	%	3.0%		927		4,798		5,725
		Total N°12.1 ---------- ---------->>				**31,830**		**164,718**		**196,548**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.2		**Cross Section Area of Tunnels Ranging From 20 to 30 m2**								
12.2.01		Excavation and supports								
	1	Excavation	m^3	16,404.7	5.19	85,140	62.57	1,026,441	67.76	1,111,581
	2	Rock bolts, 22 mm diameter	m	2,171.1	1.71	3,713	24.13	52,389	25.84	56,102
	3	Steel ribs	kg	50,400.0	0.13	6,552	2.94	148,176	3.07	154,728
12.2.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	3,175.4	17.25	54,775	104.83	332,875	122.08	387,650
	2	Concrete, invert	m^3	630.8	13.13	8,282	64.56	40,723	77.69	49,005
	3	Reinforcing steel	t	150.1	325.47	48,847	1,359.52	204,040	1,684.99	252,888
		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	619.0	5.68	3,516	28.91	17,895	34.59	21,411
	2	Percussion contact grouting holes, 40-48 mm dia.	m	957.0	4.04	3,866	18.36	17,571	22.40	21,437
	3	Contact pressure grouting (excluding injected materials)	t	29.0	39.94	1,158	121.05	3,510	160.99	4,669
12.2.03		Sundries								
	1	Portland cement ASTM type I or II	t	699.6	5.16	3,610	252.60	176,721	257.76	180,331
	2	Portland cement ASTM type V (sulfate resistant)	t	699.6	6.06	4,240	296.70	207,574	302.76	211,813
	3	Care of water and miscellaneous	%	3.0%		6,711		66,837		73,548
		Total N°12.2 ---------- ---------->>				**230,411**		**2,294,752**		**2,525,163**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.3		**Cross Section Area of Tunnels Ranging From 30 to 40 m2**								
12.3.01		Excavation and supports								
	1	Excavation	m^3	64,654.9	12.58	813,359	55.57	3,592,875	68.15	4,406,235
	2	Rock bolts, 22 mm diameter	m	19,614.8	1.71	33,541	24.13	473,306	25.84	506,847
	3	Rock bolts, 26.5 mm diameter	m	360.0	2.83	1,019	31.18	11,225	34.01	12,244
	4	Steel ribs	kg	177,447.0	0.13	23,068	2.94	521,694	3.07	544,762
12.3.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	7,135.3	15.62	111,453	100.45	716,740	116.07	828,193
	2	Concrete, invert	m^3	2,760.9	12.59	34,760	63.48	175,264	76.07	210,025
	3	Reinforcing steel	t	437.3	325.47	142,318	1,359.52	594,475	1,684.99	736,793
12.3.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	45.0	5.68	256	28.91	1,301	34.59	1,557
	2	Percussion contact grouting holes, 40-48 mm dia.	m	4,757.0	4.04	19,218	18.36	87,339	22.40	106,557
	3	Contact pressure grouting (excluding injected materials)	t	144.0	39.94	5,751	121.05	17,431	160.99	23,183
12.3.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,853.3	5.16	9,563	252.60	468,149	257.76	477,712
	2	Portland cement ASTM type V (sulfate resistant)	t	1,853.3	6.06	11,231	296.70	549,880	302.76	561,112
	3	Care of water and miscellaneous	%	3.0%		36,166		216,290		252,457
		Total N°12.3 ---------- ---------->>				**1,241,704**		**7,425,970**		**8,667,675**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.4		**Cross Section Area of Tunnels Ranging From 40 to 50 m2**								
12.4.01		Excavation and supports								
	1	Excavation	m^3	19,419.8	10.69	207,598	48.12	934,481	58.81	1,142,079
	2	Rock bolts, 22 mm diameter	m	2,709.0	1.71	4,632	24.13	65,369	25.84	70,002
	3	Rock bolts, 26.5 mm diameter	m	3,493.5	2.83	9,887	31.18	108,927	34.01	118,813
	4	Steel ribs	kg	5,301.0	0.13	689	2.94	15,585	3.07	16,274
12.4.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,956.0	15.04	29,419	100.31	196,209	115.35	225,628
	2	Concrete, invert	m^3	1,876.9	12.27	23,030	63.03	118,303	75.30	141,333
	3	Reinforcing steel	t	185.8	325.47	60,477	1,359.52	252,617	1,684.99	313,094
12.4.03		Drilling and grouting								
	1	Drain holes, 75 mm diameter	m	731.0	5.68	4,152	28.91	21,133	34.59	25,285
	2	Percussion contact grouting holes, 40-48 mm dia.	m	691.0	4.04	2,792	18.36	12,687	22.40	15,478
	3	Contact pressure grouting (excluding injected materials)	t	21.0	39.94	839	121.05	2,542	160.99	3,381
12.4.04		Sundries								
	1	Portland cement ASTM type I or II	t	700.4	5.16	3,614	252.60	176,929	257.76	180,544
	2	Portland cement ASTM type V (sulfate resistant)	t	700.4	6.06	4,245	296.70	207,818	302.76	212,063
	3	Care of water and miscellaneous	%	3.0%		10,541		63,378		73,919
		Total N°12.4 ---------- ---------->>				**361,914**		**2,175,980**		**2,537,894**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.5		**Cross Section Area of Tunnels Ranging From 50 to 60 m2**								
12.5.01		Excavation and supports								
	1	Excavation	m^3	14,545.6	9.04	131,492	42.60	619,643	51.64	751,136
	2	Rock bolts, 22 mm diameter	m	2,604.3	1.71	4,453	24.13	62,841	25.84	67,294
	3	Rock bolts, 26.5 mm diameter	m	269.7	2.83	763	31.18	8,408	34.01	9,171
12.5.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	2,894.9	13.66	39,545	99.16	287,063	112.82	326,607
	2	Concrete, invert and mat	m^3	2,815.5	11.33	31,900	62.15	174,983	73.48	206,883
	3	Reinforcing steel	t	236.4	325.47	76,933	1,359.52	321,358	1,684.99	398,292
12.5.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	41.0	4.04	166	18.36	753	22.40	918
	2	Contact pressure grouting (excluding injected materials)	t	1.0	39.94	40	121.05	121	160.99	161
12.5.04		Sundries								
	1	Portland cement ASTM type I or II	t	1,028.4	5.16	5,306	252.60	259,769	257.76	265,075
	2	Portland cement ASTM type V (sulfate resistant)	t	1,028.4	6.06	6,232	296.70	305,120	302.76	311,352
	3	Care of water and miscellaneous	%	3.0%		8,905		61,202		70,107
		Total N°12.5 ---------- ---------->>				**305,736**		**2,101,261**		**2,406,997**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.6		**Cross Section Area of Tunnels Ranging From 60 to 70 m2**								
12.6.01		Excavation and supports								
	1	Excavation	m^3	4,236.0	8.46	35,837	39.53	167,449	47.99	203,286
	2	Rock bolts, 22 mm diameter	m	1,365.4	1.71	2,335	24.13	32,948	25.84	35,283
	3	Steel ribs	kg	3,627.0	0.13	472	2.94	10,663	3.07	11,135
12.6.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	266.0	11.81	3,141	97.93	26,049	109.74	29,191
	2	Concrete, invert	m^3	187.0	10.94	2,046	61.29	11,461	72.23	13,507
	3	Reinforcing steel	t	18.0	325.47	5,858	1,359.52	24,471	1,684.99	30,330
12.6.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	187.0	4.04	755	18.36	3,433	22.40	4,189
	2	Contact pressure grouting (excluding injected materials)	t	6.0	39.94	240	121.05	726	160.99	966
12.6.04		Sundries								
	1	Portland cement ASTM type I or II	t	84.5	5.16	436	252.60	21,355	257.76	21,791
	2	Portland cement ASTM type V (sulfate resistant)	t	84.5	6.06	512	296.70	25,083	302.76	25,595
	3	Care of water and miscellaneous	%	3.0%		1,549		9,709		11,258
		Total N°12.6 ---------- ---------->>				**53,181**		**333,349**		**386,530**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.7		**Cross Section Area of Tunnels Ranging From 70 to 80 m2**								
12.7.01		Excavation and supports								
	1	Excavation	m^3	7,547.9	8.25	62,270	37.94	286,368	46.19	348,638
	2	Rock bolts, 22 mm diameter	m	7,193.3	1.71	12,301	24.13	173,575	25.84	185,875
12.7.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	703.2	11.39	8,010	89.06	62,631	100.45	70,641
	2	Concrete, invert	m^3	209.5	10.71	2,243	60.91	12,759	71.62	15,003
	3	Reinforcing steel	t	36.5	325.47	11,883	1,359.52	49,634	1,684.99	61,517
12.7.03		Drilling and grouting								
	1	Percussion contact grouting holes, 40-48 mm dia.	m	261.0	4.04	1,054	18.36	4,792	22.40	5,846
	2	Contact pressure grouting (excluding injected materials)	t	8.0	39.94	320	121.05	968	160.99	1,288
12.7.04		Sundries								
	1	Portland cement ASTM type I or II	t	168.3	5.16	868	252.60	42,510	257.76	43,378
	2	Portland cement ASTM type V (sulfate resistant)	t	168.3	6.06	1,020	296.70	49,932	302.76	50,951
	3	Care of water and miscellaneous	%	3.0%		2,999		20,495		23,494
		Total N°12.7 ---------- ---------->>				**102,968**		**703,664**		**806,632**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
12.8		**Cross Section Area of Tunnels Ranging From 80 to 90 m2**								
12.8.01		Excavation and supports								
	1	Excavation	m^3	8,675.7	8.15	70,707	37.29	323,516	45.44	394,223
	2	Rock bolts, 26.5 mm diameter	m	613.9	2.83	1,737	31.18	19,142	34.01	20,879
12.8.02		Concrete works								
	1	Concrete, arch and sidewalls	m^3	1,258.7	11.21	14,110	87.71	110,404	98.92	124,514
	2	Concrete, invert	m^3	342.3	10.24	3,505	61.12	20,921	71.36	24,427
	3	Reinforcing steel	t	81.8	325.47	26,609	1,359.52	111,150	1,684.99	137,759
12.8.03		Sundries								
	1	Portland cement ASTM type I or II	t	288.2	5.16	1,487	252.60	72,796	257.76	74,283
	2	Portland cement ASTM type V (sulfate resistant)	t	288.2	6.06	1,746	296.70	85,505	302.76	87,251
	3	Care of water and miscellaneous	%	3.0%		3,597		22,303		25,900
		Total N°12.8 ---------- ---------->>				**123,500**		**765,738**		**889,237**
13		**MAINTENANCE OF MAIN TRANSPORTATION TUNNELS**								
		DURING THE CONSTRUCTION OF UNDERGROUND WORKS								
13.01		Care of transit lanes	l.s.	1		525,800		1,779,600		2,305,400
13.02		Care of water inflows	l.s.	1		334,500		1,292,500		1,627,000
13.03		Ventilation	l.s.	1		593,700		6,964,800		7,558,500
13.04		Lighting	l.s.	1		338,500		1,668,400		2,006,900
		Total N°13 ---------- ---------->>				**1,792,500**		**11,705,300**		**13,497,800**

ITEM		Description of Works	Unit	Quantity (1)	Local Curr. (US$ equiv.) Price (2)	Local Curr. (US$ equiv.) Amount (1 x 2)	Foreign Curren. (US$) Price (3)	Foreign Curren. (US$) Amount (1 x 3)	Total (US$ equivalent) Price (2+3)	Total (US$ equivalent) Amount (1 x (2+3))
14		**SALT WEDGE TOP PROTECTION**								
14.01		Ionakhsh fault treatment (grouting) - Left Bank								
	1	Rotary drilling grout holes, Ø 48 mm, 45 m max. depth	m	77,400.0	11.00	851,400	62.50	4,837,500	73.50	5,688,900
	2	Cement pressure grouting (excluding injected materials)	t	1,204.0	36.20	43,585	102.00	122,808	138.20	166,393
	3	Portland cement ASTM Type V (sulfate resistant)	t	1,204.0	6.06	7,296	296.70	357,227	302.76	364,523
	4	Bentonite	t	24.1	8.93	215	437.33	10,531	446.26	10,746
	5	Superplasticizer admixture	kg	3,612.0	0.05	181	2.41	8,705	2.46	8,886
		Total N°14.1 ---------- ---------->>				**902,677**		**5,336,771**		**6,239,447**
14.03		Miscellanea								
	1	Cement grouting curtain of upper cofferdam	l.s.	1		19,415		58,245		77,660
	2	Sealing key at portal P-5	l.s.	1		121,710		365,125		486,835
		Total N°14.3 ---------- ---------->>				**141,125**		**423,370**		**564,495**

PART – VII

PERMANENT EQUIPMENT – PRICED BILL OF QUANTITY

(Electromechanical and Hydromechanical Equipment)

ITEM		EXISTING E&M COSTS Description of Works	Unit	n°	unit qty	Quantity	Total (US$ equivalent) Unit Price	Cost	Subtotal II level	Subtota l I level
1		**UNITS**								
1.1		**UNIT 1**								
1.1.1		**Hydraulic Turbine and Governor**								
		Hydraulic Turbines and Governors - unit 1	MW	1	615	615.0	38,025	**23,385,375**		
1.1.2		**Generator and Excitation Equipment**								
		Generator and Excitation Equipment - unit 1	MW	1	615.0	615.0	23,400	**14,391,000**		
		Total N°1.1 ---------- -------->>							**37,776,375**	
1.2		**UNIT 2**								
1.2.1		**Hydraulic Turbine and Governor**								
		Hydraulic Turbines and Governors - unit 2	MW	1	615	615.0	38,025	**23,385,375**		
1.2.2		**Generator and Excitation Equipment**								
		Generator and Excitation Equipment - unit 2	MW							
		Total N°1.2 ---------- -------->>							**23,385,375**	
1.3		**BALANCE OF PLANT**								
		UNITS 1 & 2								
1.3.1		BOP of units 1 and 2, excluding the two below items	MW	2	615	1,230.0	4,095	**5,036,850**		
1.3.2		Overhead traveling cranes of 550 t capacity						**15,678,010**		
1.3.3		CATS cabinets (Complex of auxiliaries transformers)						**7,771,832**		
		Total N°1.3 ---------- -------->>							**28,486,692**	
		Total N°1 ---------- ------>>								**89,648,442**

		TOTAL AMOUNT OF EXISTING E&M EQUIPMENT	**89,648,442**

ITEM		EXISTING HSS EQUIPMENT COST 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	147	882.0	6,500	**5,733,000**	4,550	**4,013,100**		
1.1.2		**Auxiliary items**										
		Auxiliary items	t	1	830.0	830.0	6,500	**5,395,000**	4,550	**3,776,500**		
1.1.3		**Cranes**										
		cranes	t	2	206.5	413.0	10,400	**4,295,200**	3,900	**1,610,700**		
		Total N°1.1 ---------- -------->>									**24,823,500**	
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	308	1,848.0	6,500	**12,012,000**	4,550	**8,408,400**		
1.2.2		**Slide gates**										
		Slide gates with embedded parts and drive	t	6	140.0	840.0	6,500	**5,460,000**	4,550	**3,822,000**		
1.2.3		**Cranes**										
		cranes	t	2	106.0	212.0	10,400	**2,204,800**	3,900	**826,800**		
1.2.4		**Auxiliary items**										
		Auxiliary items	t	1	104.0	104.0	6,500	**676,000**	4,550	**473,200**		
		Total N°1.2 ---------- -------->>									**33,883,200**	

ITEM		EXISTING HSS EQUIPMENT COST 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	6,500	**1,170,000**				
1.3.2		**Sectional gates**										
		Sectional gate at draft tube with embedded parts	t	6	82.0	492.0	6,500	**3,198,000**				
1.3.3		**Cranes**										
		cranes	t	1	118.0	118.0	10,400	**1,227,200**				
1.3.4		**Auxiliary items**										
		Auxiliary items	t	1	45.0	45.0	6,500	**292,500**				
		Total N°1.3 ---------- -------->>									**5,887,700**	
1.4		**TEMPORARY POWER INTAKE**										
1.4.1		**Trash Racks**										
		Trash Racks and embedded parts	t	1	426	426.0	3,250	**1,384,500**				
		Total N°1.4 ---------- -------->>									**1,384,500**	

ITEM		EXISTING HSS EQUIPMENT COST 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	6,500	**2,821,000**				
		Slide gates with embedded parts - installed	t	2	53	106.0			4,550	**482,300**		
1.5.2		**Slide gates**										
		Slide gates with embedded parts	t	2	205.0	410.0	6,500	**2,665,000**				
1.5.3		**Cranes**										
		cranes - supplied and transported	t	1	85.0	85.0	10,400	**884,000**				
		cranes - installed	t	1	35.0	35.0			3,900	**136,500**		
1.5.4		**Steel Lining**										
		Steel Lining	t	2	285.0	570.0	3,250	**1,852,500**	3,250	**1,852,500**		
1.5.5		**Auxiliary items**										
		Auxiliary items	t	1	215.0	215.0	6,500	**1,397,500**	4,550	**978,250**		
		Total N°1.5 ---------->>									**13,069,550**	
1.6		**PENSTOCK**										
1.6.1		**Steel Lining**										
		Steel Lining - supplied and transported	t	1	2100	2,100.0	3,250	**6,825,000**				
		Steel Lining - installed	t	1	1500	1,500.0			3,250	**4,875,000**		
		Total N°1.6 ---------->>									**11,700,000**	
		Total N°1 ---------->>										**90,748,450**

		TOTAL AMOUNT OF EXISTING HSS EQUIPMENT										**90,748,450**

PART – VIII

TEAS CONSULTANT-CLIENT BoQ COMPARISON

(Civil Works)

Item	Unit	TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount USD
		Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
GENERAL PROJECT COSTS									
Mobilization and Demobilization									
Mobilization and demobilization	l.s.	1		13,200,000	1		13,500,000		300,000
Total No. 1.1				**13,200,000**			**13,500,000**		300,000
Camp Areas Preparation									
Excavation and fills									
Common excavation	m3	360,000	2.10	756,000	360,000	2.10	756,000		
General excavation, rock	m3	674,250	8.55	5,764,838	674,250	12.12	8,171,910		2,407,073
Fill compaction	m3	360,000	1.09	392,400	360,000	1.09	392,400		
Trench and foundation excavation	m3	34,000	5.36	182,240	34,000	5.36	182,240		
Concrete works									
Concrete, retaining walls	m3	21,000	52.37	1,099,770	21,000	52.37	1,099,770		
Portland cement, ASTM I or II type	t	6,510	257.76	1,678,018	9,240	257.76	2,381,702	2,730	703,685
Formwork	m2	23,000	23.84	548,320	23,000	23.84	548,320		
Sundries									
Subgrade preparation	m2	50,000	0.12	6,000	50,000	0.12	6,000		
Base course with classified granular material	m3	12,000	22.47	269,640	12,000	22.47	269,640		
Surface course with classified granular material	m3	7,000	23.34	163,380	7,000	23.34	163,380		
Drainage system	l.s.	1	250,000.00	250,000	1	250,000.00	250,000		
Miscellaneous works	%	0		1,111,061			1,422,136		311,076
Total No. 1.2				**12,221,666**			**15,643,499**		3,421,833
Construction Yard Areas Preparation									
Excavation and fills									
Cut and fills excavation (Common excavation)	m3	520,000	2.10	1,092,000	520,000	2.10	1,092,000		
Fill compaction	m3	520,000	1.09	566,800	520,000	1.09	566,800		
Paving:									
Subgrade preparation	m2	210,000	0.12	25,200	210,000	0.12	25,200		
Base course with classified granular material	m3	31,000	22.47	696,570	31,000	22.47	696,570		
Surface course with classified granular material	m3	10,300	23.34	240,402	10,300	23.34	240,402		
Concrete paving	m3	10,000	61.43	614,300	30,000	61.43	1,842,900	20,000	1,228,600
Portland cement, ASTM I or II type	t	3,500	257.76	902,160	350	257.76	90,216	-3,150	-811,944
Reinforcing steel	t	50	1,550.80	77,540	50	1,550.80	77,540		
Sundries									
Drainage system	l.s.	1	200,000.00	200,000			200,000		
Miscellaneous works	%	0		441,497			483,163		41,666
Total No. 1.3				**4,856,469**			**5,314,791**		458,322
Camps, buildings and appurtenant facilities									
Construction	l.s.	1	45,182,904	45,182,904	1	45,182,904.29	45,182,904		
Maintenance	l.s.	1	8,613,000	8,613,000	1	8,613,000.00	8,613,000		
Total No. 1.4				**53,795,904**			**53,795,904**		0

Item	Unit	TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount USD
		Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
Roads Construction									
Excavation									
General excavation, common and rippable	m3	1,100,000	2.25	2,475,000	1,100,000	2.25	2,475,000		
General excavation, rock	m3	490,000	8.55	4,189,500	490,000	11.40	5,586,000		1,396,500
Trench and foundation excavation, common	m3	41,000	5.36	219,760	41,000	5.36	219,760		
Trench and foundation excavation, rock	m3	37,000	21.73	804,010	37,000	21.73	804,010		
Fills and backfills									
Fills, random material	m3	130,000	1.82	236,600	130,000	1.82	236,600		
Backfill, random material	m3	25,000	2.09	52,250	25,000	2.09	52,250		
Concrete works, excluding main bridges and pavements									
Concrete, lean and backfills	m3	4,800	40.68	195,264	4,800	40.68	195,264		
Concrete foundation	m3	35,100	46.60	1,635,660	35,100	46.60	1,635,660		
Concrete, culverts and small bridges	m3	5,400	56.48	304,992	5,400	56.48	304,992		
Concrete, retaining walls	m3	8,400	51.74	434,616	8,400	51.74	434,616		
Concrete, side safety walls (cast-in situ concrete)	m3	2,000	52.10	104,200	2,000	52.10	104,200		
Concrete, side safety walls (precast concrete)	m3	1,500	60.30	90,450	1,500	60.30	90,450		
Portland cement, ASTM I or II type	t	18,206	257.76	4,692,766	20,872	257.76	5,380,039	2,666	687,273
Formworks, flat surface	m2	22,000	26.83	590,260	22,000	26.83	590,260		
Formworks, curved surface	m2	4,500	37.44	168,480	4,500	37.44	168,480		
Scaffoldings for slab & arch concrete, 20 N/m2 load t	m3	21,000	5.56	116,760	21,000	5.56	116,760		
Reinforcing steel	t	717	1,550.80	1,111,924	717	1,550.80	1,111,924		
Concrete works, main bridges									
Concrete, lean and backfills	m3	200	40.68	8,136	200	40.68	8,136		
Concrete, foundations and mats	m3	5,400	46.60	251,640	5,400	46.60	251,640		
Concrete, retaining walls	m3	3,000	52.37	157,110	3,000	52.37	157,110		
Concrete, beams and slabs	m3	3,900	66.48	259,272	3,900	66.48	259,272		
Portland cement, ASTM I or II type	t	3,295	257.76	849,293	4,561	257.76	1,175,708	1,266	326,414
Formworks, wall surface	m2	4,300	23.84	102,512	4,300	23.84	102,512		
Formworks, slab surface	m2	3,600	22.04	79,344	3,600	22.04	79,344		
Scaffoldings for slab & arch concrete, 20 N/m^2 load t	m3	10,000	7.35	73,500	10,000	7.35	73,500		
Reinforcing steel, deformed type	t	770	1,550.80	1,194,116	770	1,550.80	1,194,116		
Reinforcing steel, high tensile type	kg	52,000	4.52	235,040	52,000	4.52	235,040		
Strengthening grouting (bridge H (Ж)	m				1,576	160.99	253,769	1,576	253,769
Paving works									
Subgrade preparation	m2	120,000	0.12	14,400	120,000	0.12	14,400		
Sub-base with selected alluvial material	m3	36,000	6.19	222,840	36,000	6.19	222,840		
Base course with classified granular material	m3	24,000	22.47	539,280	24,000	22.47	539,280		

Item	Unit	TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount USD
		Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
Surface course with classified granular material	m3	42,000	23.34	980,280	42,000	23.34	980,280		
Concrete, lean	m3	3,500	40.68	142,380	3,500	40.68	142,380		
Concrete paving	m3	4,400	61.43	270,292	4,400	61.43	270,292		
Portland cement, ASTM I or II type	t	2,720	257.76	700,978	2,883	257.76	743,047	163	42,069
Asphalt paving, base course	m3	14,100	136.00	1,917,600	14,100	136.00	1,917,600		
Asphalt paving, binder 60 mm thick	m2	94,000	10.50	987,000	94,000	10.50	987,000		
Asphalt paving, wearing course 40 mm thick	m2	94,000	7.80	733,200	94,000	7.80	733,200		
Formworks for expansion/contraction joints	m2	150	18.38	2,757	150	18.38	2,757		
Reinforcing steel	t	277	1,550.80	428,951	277	1,550.80	428,951		
Sundries									
Structural steel, suspension bridge	kg	799,000	7.00	5,593,000	799,000	7.00	5,593,000		
Structural steel, Obi Shur bridge	kg	498,000	5.50	2,739,000	498,000	5.50	2,739,000		
Guardrails and miscellaneous steel works	kg	44,000	5.20	228,800	44,000	5.20	228,800		
Steel cables of suspension bridge	kg	30,000	14.00	420,000	30,000	14.00	420,000		
Tendons for suspension bridge cable anchoring	m	1,000	190.00	190,000	1,000	190.00	190,000		
Miscellaneous works	%	0		1,837,161			1,972,462		135,301
Total No. 1.5				**38,580,374**			**41,421,700**		2,841,326
Road Maintenance									
Maintenance of pavings									
Maintenance of concrete pavings	m2/year	140,800	4.32	608,256	140,800	4.32	608,256		
Maintenance of asphalt pavings	m2/year	752,000	1.50	1,128,000	752,000	1.50	1,128,000		
Maintenance of base course with gravel surfacing	m2/year	3,360,000	1.51	5,073,600	3,360,000	1.51	5,073,600		
Removal of landslides and rock falls from roadbed Rc	m3	88,000	1.39	122,320	88,000	1.39	122,320		
Removal of landslides and rock falls from roadbed Rc	m3	240,000	1.39	333,600	240,000	1.39	333,600		
Sundries									
Miscellaneous works	%	0		581,262			581,262		
Road Shulashak to Ilok base	m			4,132,500	9,500	435.00	4,132,500	9,500	
Gurghurda bridge				3,010,250			3,010,250		
Total No. 1.6				**14,989,788**			**14,989,788**		0

General Project Costs	**7,321,481**

Description of Works	Unit	TEAS			CLIENT			DIFFERENCES			
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	ΔQty	Δamount	Δ Qty	Δamount TEAS UNIT PRICE
		Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	Q2-Q1	P1*(Q2-Q1)
REMOVAL OF UNSUITABLE MATERIALS FROM BORROW											
AREAS AND QUARRIES											
Removal of overburden from borrow areas											
Overburden of borrow area N°15	m3	5,675,000.00	2.44	13,847,000.00	7,219,700.00	2.44	17,616,068.00	1,544,700.00	3,769,068.00	1,544,700.00	3,769,068.00
Overburden of borrow area N°15a	m3	1,089,000.00	2.24	2,439,360.00	1,089,000.00	2.24	2,439,360.00				
Overburden of Lybiadora borrow area	m3	828,000.00	2.29	1,896,120.00	828,000.00	2.29	1,896,120.00				
Overburden of borrow area N°17b	m3	173,000.00	2.44	422,120.00	173,000.00	2.44	422,120.00				
Removal of overburden from quarries											
Overburden of quarry N°26a	m3	770,000.00	2.68	2,063,600.00	770,000.00	2.68	2,063,600.00				
Overburden of quarry N°2a	m3			0.00	1,723,200.00	2.68	4,618,176.00	1,723,200.00	4,618,176.00	0.00	
Removal of unsuitable materials from borrow areas											
Unsuitable material of borrow area N°15	m3	218,200.00	2.62	571,684.00	218,200.00	2.62	571,684.00				
Total No. 1				**21,239,884**			**29,627,128**		**8,387,244**		
STOCKPILING OF DAM FILL MATERIALS											
Preparation of stockpiling areas											
Cut-and-fill earthmoving for LG1 areas	m3	2,800.00	1.75	4,900	2,800	2	4,900				
Cut-and-fill earthmoving for LG2 areas	m3	14,000.00	1.75	24,500	14,000	2	24,500				
Cut-and-fill earthmoving for LL3 area	m3	20,000.00	1.75	35,000	20,000	2	35,000				
Alluvial material of borrow area 15 stockpiled in LG1 areas				**64,400**			**64,400**				
Material stockpiled in area LG1(a)	m3	12,010,000.00	5.85	70,258,500	12,010,000	10	120,100,000		49,841,500		
Material stockpiled in area LG1(b)	m3	1,900,000.00	5.40	10,260,000	1,900,000	11	19,950,000		9,690,000		
Material stockpiled in area LG1(c)	m3	430,000.00	5.22	2,244,600	430,000	10	4,300,000		2,055,400		
Material stockpiled in area LG1(d)	m3	290,000.00	5.65	1,638,500	290,000	11	3,190,000		1,551,500		
Alluvial material of borrow area 15 stockpiled in LG2 areas				**84,401,600**			**147,540,000**		**63,138,400**		
Material stockpiled in area LG2(a)	m3	5,820,000.00	6.85	39,867,000	5,820,000	11	64,020,000		24,153,000		
Material stockpiled in area LG2(b)	m3	1,050,000.00	6.52	6,846,000	1,050,000	11	11,550,000		4,704,000		
Material stockpiled in area LG2(c)	m3	620,000.00	7.20	4,464,000	620,000	11	6,944,000		2,480,000		
Processed alluvial material of Lyabidora borrow area				**51,177,000**			**82,514,000**		**31,337,000**		
Material stockpiled in area LG2(d)	m3	1,940,000.00	4.88	9,467,200	1,940,000	5	9,467,200				
Material stockpiled in area LG2(e)	m3	2,090,000.00	4.45	9,300,500	2,090,000	4	9,300,500				
Loam material of 17b borrow area stockpiled in LL3 area	m3	2,500,000.00	2.49	6,225,000	2,500,000	2	6,225,000				
Blasted rock of 26a quarry stockpiled in LR4 area	m3	475,000.00	5.89	2,797,750	475,000	11	5,320,000		2,522,250		
Stockpiling of boulders > 700 mm in 15 borrow area	m3	1,106,000.00	3.64	4,025,840	1,106,000	4	4,025,840				
Total No. 2				**31,816,290**			**34,338,540**		**2,522,250**		
Cleaning of upper construction cofferdam											
Common excavation	m3				795,310	4	2,815,397	795,310	2,815,397		
General excavation, rock	m3				435,500	12	5,278,260	435,500	5,278,260		
Pabble embankment (from Quarry №15 material)	m3				169,200	12	2,088,008	169,200	2,088,008		
Rock embankment (from Quarry №26 material)	m3				15,560	8	128,360	15,560	128,360		
Concrete block erection	ps				2,267	284	644,315	2,267	644,315		
Channel concrete slab (screen)	m3				280	226	63,182	280	63,182		
Maintanance of the excisted retaining walls	m3										
Total No. 3				8,317,541			**11,017,523**		**2,699,981**		

Removal and Stockpiling	**108,084,875**		

		TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	Δ Qty	Δamount
Description of Works	**unit**	**Q1**	**P1**	**A1**	**Q2**	**P2**	**A2**	**Q2-Q1**	**A2-A1**
SURFACE WORKS									
Creek Obi-Shur									
Rock excavation (streightened channel of Creek Obi-Shur)	m3				204,410.00	12.12	2,477,449.20	204,410.00	2,477,449.20
General excavation, rock	m3				213,040.00	12.12	2,582,044.80	213,040.00	2,582,044.80
Dam. Concrete, foundation and mat	m3				27,530.00	225.65	6,212,164.15	27,530.00	6,212,164.15
Concrete, above foundation	m3				94,102.70	225.65	21,234,341.41	94,102.70	21,234,341.41
Bank protection works									
Concrete laying (Bank protection works)	m3				16,524.00	225.65	3,728,652.39	16,524.00	3,728,652.39
Portland cement, ASTM I or II type	t				60,788.95	257.76	15,668,959.75	60,788.95	15,668,959.75
Steel reinforcement	t				3,050.00	1,550.80	4,729,940.00	3,050.00	4,729,940.00
Total No. 3							**56,633,552**	0.00	**56,633,552**
BIO 4200									
Excavation and support structures								0.00	0.00
Common excavation	m3				403,586.00	4.86	1,961,427.96	403,586.00	1,961,427.96
Rock excavation	m3				30,400.00	12.12	368,448.00	30,400.00	368,448.00
Concrete works	m3				548.00	107.07	58,674.36	548.00	58,674.36
Steel reinforcement	t				4.20	1,684.99	7,076.96	4.20	7,076.96
Sundries								0.00	0.00
Portland cement, ASTM I or II type	t				199.97	257.76	51,543.03	199.97	51,543.03
Portland cement of type V (sulphate-resistant)	t				199.97	302.76	60,541.46	199.97	60,541.46
Care of water and miscellaneous	%				0.03		75,231.35	0.03	75,231.35
Total N°8.11				**0**			**2,582,943**	**0.00**	**2,582,943**
Gas Insulated Switchgear (GIS)-500 kV								0.00	0.00
Common excavation	m3	484,280.00	4.87	2,358,443.60	484,280.00	4.86	2,353,600.80	0.00	-4,842.80
Rock excavation	m3	85,350.00	10.03	856,060.50	85,350.00	12.12	1,034,442.00	0.00	178,381.50
Total No. 3				**3,214,504**			**3,388,043**	**0.00**	**173,539**
Bank protection works at outlet portals of tunnels 4-6 tailrace chanal								0.00	0.00
Excavation				40,880.00	7,300.00	5.60	40,880.00	7,300.00	0.00
Concrete block laying	шт			709,968.93	1,249.00	568.43	709,968.93	1,249.00	0.00
Concrete laying	m3			1,689,609.70	7,450.00	226.79	1,689,609.70	7,450.00	0.00
Total				**2,440,459**			**2,440,459**	**0.00**	**0**

		TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	Δ Qty	Δamount
Description of Works	**unit**	**Q1**	**P1**	**A1**	**Q2**	**P2**	**A2**	**Q2-Q1**	**A2-A1**
Bank protection works at Inlet portals DT-1 and DT -2									
Excavation	m3			14,000	2,500.00	5.60	14,000	2,500.00	0
Concrete block laying	ps			471,797	830.00	568.43	471,797	830.00	0
Retard Устройства струеноправляющих щпоры (river Protection)								0.00	0.00
Excavation	m3			75,600.00	13,500.00	5.60	75,600.00	13,500.00	0.00
Concrete block erection (4m3)	ps			1,201,660.79	2,114.00	568.43	1,201,660.79	2,114.00	0.00
Channel concrete slab (screen)	m3			63,182.20	280.00	225.65	63,182.20	280.00	0.00
Total No. 3				**1,826,240**			**1,826,240**	**0.00**	**0**
Stage-1 и Stage-2 - Intakes									
(Including Stabilization works)								0.00	0.00
Excavation and support structures								0.00	0.00
Common excavation	m3	4,000.00	3.54	14,160.00	4,000.00	3.54	14,160.00	0.00	0.00
Rock excavation	m3	3,900.00	7.75	30,225.00	3,900.00	7.75	30,225.00	0.00	0.00
Concrete works for water intakes								0.00	0.00
Concrete, foundation and mat	m3	3,626.00	40.28	146,055.28	3,626.00	40.28	146,055.28	0.00	0.00
Concrete, above foundation	m3	30,868.00	45.74	1,411,902.32	30,868.00	45.74	1,411,902.32	0.00	0.00
Reinforcing steel	t	1,256.00	1,550.80	1,947,804.80	1,256.00	1,550.80	1,947,804.80	0.00	0.00
Formwork Stage - 1:								0.00	0.00
a) Formworks, flat type for walls (modular use)	m2	5,766.00	18.38	105,979.08	5,766.00	18.38	105,979.08	0.00	0.00
b) Formworks, flat type for walls (non-modular use)	m2	100.00	23.84	2,384.00	100.00	23.84	2,384.00	0.00	0.00
c) Flat type for supporting poles and pillar columns	m2	713.00	31.91	22,751.83	713.00	31.91	22,751.83	0.00	0.00
d) Flat type for mats	m2	210.00	22.04	4,628.40	210.00	22.04	4,628.40	0.00	0.00
e) Flat type for mixed structures	m2	100.00	26.83	2,683.00	100.00	26.83	2,683.00	0.00	0.00
f) Curved type for other structures	m2	372.00	37.44	13,927.68	372.00	37.44	13,927.68	0.00	0.00
Formwork Stage-2:								0.00	0.00
a) Formworks, flat type for walls (modular use)	m2	4,017.00	18.38	73,832.46	4,017.00	18.38	73,832.46	0.00	0.00
b) Formworks, flat type for walls (non-modular use)	m2	100.00	23.84	2,384.00	100.00	23.84	2,384.00	0.00	0.00
c) Flat type for supporting poles and pillar columns	m2	496.00	31.91	15,827.36	496.00	31.91	15,827.36	0.00	0.00
d) Flat type for mats	m2	210.00	22.04	4,628.40	210.00	22.04	4,628.40	0.00	0.00
e) Flat type for mixed structures	m2	100.00	26.83	2,683.00	100.00	26.83	2,683.00	0.00	0.00
f) Curved type for other structures	m2	260.00	37.44	9,734.40	260.00	37.44	9,734.40	0.00	0.00
Scaffolding for slab type formworks, max. load	m3	8,232.00	11.17	91,951.44	8,232.00	11.17	91,951.44	0.00	0.00

		TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	Δ Qty	Δamount
Description of Works	**unit**	**Q1**	**P1**	**A1**	**Q2**	**P2**	**A2**	**Q2-Q1**	**A2-A1**
Concrete works for dam abutment stabilization								0.00	0.00
Concrete, cast-in-situ	m3	8,000.00	57.29	458,320.00	8,000.00	57.29	458,320.00	0.00	0.00
Concrete, precast blocks	m3	500.00	89.55	44,775.00	500.00	89.55	44,775.00	0.00	0.00
Formworks	m2	5,000.00	23.84	119,200.00	5,000.00	23.84	119,200.00	0.00	0.00
Grouted abhor bars, 50 mm diameter, length 20 m	ps	2,200.00	946.40	2,082,080.00	2,200.00	946.40	2,082,080.00	0.00	0.00
Sundries									
Reinforcing grouting RW-1234	rm				20,301.00	186.00	3,775,986.00	20,301.00	3,775,986.00
Erection of permanent flashbords	t				39.42	21,080.00	830,973.60	39.42	830,973.60
Portland cement, type I or II ASTM	t	15,427.80	257.76	3,976,669.73	18,509.19	257.76	4,770,928.81	3,081.39	794,259.09
Care of water and miscellaneous works	%	0.05		529,229.36			799,290.29	-0.05	270,060.93
Total No. 4.1				**11,113,817**			**16,785,096**	**0.00**	**5,671,280**
DT-1 and DT-2 - Outlet portals									
Excavation and support structures								0.00	0.00
Common excavation	m3	518.40	4.87	2,524.61	518.40	4.87	2,524.61	0.00	0.00
Rock excavation	m3	8,570.00	10.03	85,957.10	8,570.00	10.03	85,957.10	0.00	0.00
Concrete works									
Concrete, foundation and mat	m3	6,500.00	39.78	258,570.00	5,631.60	39.78	224,025.05	-868.40	-34,544.95
Concrete, above foundation	m3	60,000.00	45.40	2,724,000.00	56,969.30	45.40	2,586,406.22	-3,030.70	-137,593.78
Reinforcing steel	t	1,549.45	1,550.80	2,402,887.06	3,847.40	1,550.80	5,966,547.92	2,297.95	3,563,660.86
Formworks, flat type for walls (non-modular use)	m2	5,000.00	23.84	119,200.00	5,000.00	23.84	119,200.00	0.00	0.00
Formworks flat type for mats	m2	1,240.00	22.04	27,329.60	1,240.00	22.04	27,329.60	0.00	0.00
Formworks flat type for mixed structures	m2	3,000.00	26.83	80,490.00	3,000.00	26.83	80,490.00	0.00	0.00
Scaffolding for slab type formworks, max. load,50 KN/m2	m3	28,520.00	11.17	318,568.40	28,520.00	11.17	318,568.40	0.00	0.00
Sundries								0.00	0.00
Portland cement, ASTM I or II type	t	23,940.00	257.76	6,170,774.40	41,337.81	257.76	10,655,233.91	17,397.81	4,484,459.51
Installation of anchor wedge 1piece 20,94 m	n/m				23,340.00	13.08	305,217.18	23,340.00	305,217.18
Care of water and miscellaneous works	%	0.03		436,790.29			611,145.00	-0.03	174,354.71
Total No, 4,2				**12,627,091**			**20,982,645**	**0.00**	**8,355,554**

		TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	Δ Qty	Δamount
Description of Works	**unit**	**Q1**	**P1**	**A1**	**Q2**	**P2**	**A2**	**Q2-Q1**	**A2-A1**
Stage 1 Headrace Tunnel - Intake (Including Stabilization works)									
Excavation and supports									
Excavation, common	m3	6,217.10	3.68	22,878.93	6,217.10	3.68	22,878.93	0.00	0.00
Excavation, rock	m3	24,868.30	7.91	196,708.25	24,868.30	7.91	196,708.25	0.00	0.00
Rock bolts, 32 mm diameter	m	6,466.70	38.23	247,221.94	6,466.70	38.23	247,221.94	0.00	0.00
Grouted anchor bars, 50 mm diameter, length 15 m	шт	93.00	709.80	66,011.40	93.00	709.80	66,011.40	0.00	0.00
Grouted anchor bars, 50 mm diameter, length 20 m	шт	248.00	946.40	234,707.20	248.00	946.40	234,707.20	0.00	0.00
Concrete works for intake									
Concrete, intake	m3	2,282.00	51.32	117,112.24	2,282.00	51.32	117,112.24	0.00	0.00
Concrete, abutment stabilization	m3	3,400.00	57.29	194,786.00	3,400.00	57.29	194,786.00	0.00	0.00
Reinforcing steel	t	491.00	1,550.80	761,442.80	491.00	1,550.80	761,442.80	0.00	0.00
Formworks, flat type for mixed structures	m2	1,340.00	26.83	35,952.20	1,340.00	26.83	35,952.20	0.00	0.00
Anchor dowel installation diam. 36 L=9m to L=11m	m	152.00	401.52	61,031.04	1,518.00	73.47	111,527.46	1,366.00	50,496.42
Anchor dowel installation diam. 36 L=17,5m	m	382.00	702.66	268,416.12	6,685.00	73.47	491,146.95	6,303.00	222,730.83
Anchor dowel installation diam. 36 L=23,5m	m	118.00	943.58	111,342.44	2,773.00	73.47	203,732.31	2,655.00	92,389.87
Sundries									
Miscellaneous steel works	кг	5,800.00	5.50	31,900.00	5,800.00	5.50	31,900.00	0.00	0.00
Portland cement, type I or II ASTM	t	2,045.50	257.76	527,248.08	2,603.50	257.76	671,078.16	558.00	143,830.08
Installation of inspection equipment	шт				15.00	467.88	7,018.20	15.00	7,018.20
Trashrack	тн				426.00	4,895.28	2,085,390.00	426.00	2,085,390.00
Retaining walls RW-5-6 concrete laying	m3				32,488.50	57.29	1,861,266.17	32,488.50	1,861,266.17
Miscellaneous	%	0.03		86,302.76	0.03		220,196.41	0.00	133,893.65
Total No. 4.3				**2,963,061**			**7,560,077**	**0.00**	**4,597,015**

		TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	Δ Qty	Δamount
Description of Works	**unit**	**Q1**	**P1**	**A1**	**Q2**	**P2**	**A2**	**Q2-Q1**	**A2-A1**
Transportation Tunnel T3 - Portal									
Excavation and supports								0.00	0.00
Excavation, common	m3	8,800.00	5.39	47,432.00	8,800.00	5.39	47,432.00	0.00	0.00
Excavation, rock	m3	1,950.00	10.12	19,734.00	1,950.00	10.12	19,734.00	0.00	0.00
Rock bolts, 22 mm diameter	m	101.50	23.21	2,355.82	101.50	23.21	2,355.8	0.00	0.00
Rock bolts, 50 mm diameter	m	6,466.70	38.23	247,221.94	6,466.70	38.23	247,221.94	0.00	0.00
Concrete works								0.00	0.00
Concrete, foundation	m3	215.40	37.23	8,019.34	215.40	37.23	8,019.34	0.00	0.00
Concrete, above foundation	m3	718.00	39.33	28,238.94	718.00	39.33	28,238.94	0.00	0.00
Reinforcing steel	t	65.34	1,550.80	101,326.17	65.34	1,550.80	101,326.17	0.00	0.00
Formworks	m2	400.00	26.83	10,732.00	400.00	26.83	10,732.00	0.00	0.00
Sundries								0.00	0.00
Portland cement, type I or II ASTM	t	336.02	257.76	86,613.55	410.70	257.76	105,862.03	74.68	19,248.49
Miscellaneous works	%	0.02		11,033.48			11,418.44	-0.02	384.97
Total No. 4.4				**562,707**			**582,341**	**0.00**	**19,633**
Transportation Tunnel T4 and Cable Tunnel - Portals									
Excavation and supports									
Excavation, common	m3	30,680.00	4.86	149,104.80	30,680.00	4.86	149,104.80	0.00	0.00
Excavation, rock	m3	1,870.00	12.12	22,664.40	1,870.00	12.12	22,664.40	0.00	0.00
Concrete works									
Concrete, foundation	m3	165.00	40.42	6,669.30	165.00	40.42	6,669.30	0.00	0.00
Concrete, above foundation	m3	620.00	43.24	26,808.80	620.00	43.24	26,808.80	0.00	0.00
Reinforcing steel	t	54.91	1,550.80	85,154.43	54.91	1,550.80	85,154.43	0.00	0.00
Formworks	m2	510.00	26.83	13,683.30	510.00	26.83	13,683.30	0.00	0.00
Sundries									
Portland cement, type I or II ASTM	t	204.10	257.76	52,608.82	345.40	257.76	89,030.30	141.30	36,421.49
Miscellaneous works	%	0.02		7,133.88			7,862.31	-0.02	728.43
Total No. 4.5				**363,828**			**400,978**	**0.00**	**37,150**

		TEAS			CLIENT			DIFFERENCES	
		Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	Δ Qty	Δamount
Description of Works	**unit**	**Q1**	**P1**	**A1**	**Q2**	**P2**	**A2**	**Q2-Q1**	**A2-A1**
Transportation Tunnel 22 - Portals									
Excavation and supports								0.00	0.00
Excavation, common	m3	2,550.00	3.29	8,389.50	2,550.00	3.29	8,389.50	0.00	0.00
Excavation, rock	m3	5,050.00	7.69	38,834.50	5,050.00	7.69	38,834.50	0.00	0.00
Rock bolts, 22 mm diameter	m	475.00	23.21	11,024.75	475.00	23.21	11,024.75	0.00	0.00
Rock bolts, 26.5 mm diameter	m	255.00	29.89	7,621.95	255.00	29.89	7,621.95	0.00	0.00
Shotcrete	m3	82.50	108.83	8,978.48	82.50	108.83	8,978.48	0.00	0.00
Welded wire fabric	кг	3,040.00	2.43	7,387.20	3,040.00	2.43	7,387.20	0.00	0.00
Concrete works								0.00	0.00
Concrete	m3	185.00	46.55	8,611.75	3,252.00	46.55	151,380.60	3,067.00	142,768.85
Reinforcing steel	t	11.10	1,550.80	17,213.88	33.03	1,550.80	51,222.92	21.93	34,009.04
Formworks, flat type for miscellaneous structures	m2	105.00	26.83	2,817.15	211.00	26.83	5,661.13	106.00	2,843.98
Sundries									
Portland cement, type I or II ASTM	t	107.85	257.76	27,799.42	1,430.88	257.76	368,823.63	1,323.03	341,024.21
I-beem installation	t	30.00	3,070.00	92,100.00	30.00	3,085.00	92,550.00	0.00	450.00
Care of water and miscellaneous works	%	0.02		4,615.57	0.02		15,037.49	0.00	10,421.92
Total No. 4.6				**235,394**			**766,912**	**0.00**	**531,518**
Cable duct				**3,884,926**			**5,872,840**		**1,987,914**

Surface Works	**80,590,097**

		TEAS		
Item	**Unit**	**Qty**	**Price USD Eq.**	**Amount USD Eq.**
REMAINING TUNNELS, ADITS AND GALLERIES				
Cross Section Area of Tunnels Ranging From 15 to 20 m2				
Excavation and supports				
Excavation	m3	1,263.30	97.33	122,956.99
Rock bolts, 22 mm diameter	m	184.90	25.84	4,777.82
Concrete works				
Concrete, arch and sidewalls	m3	160.70	124.01	19,928.41
Concrete, invert	m3	113.40	77.53	8,791.90
Reinforcing steel	t	4.00	1,684.99	6,739.96
Sundries				
Portland cement ASTM type I or II	t	49.30	257.76	12,707.57
Portland cement ASTM type V (sulfate resistant)	t	49.30	302.76	14,926.07
Care of water and miscellaneous	%	0.03		5,724.86
Total N° 12.1				**196,553.57**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Cross Section Area of Tunnels Ranging From 20 to 30 m2				
Excavation and supports				
Excavation	m3	16,404.70	67.76	1,111,582.47
Rock bolts, 22 mm diameter	m	2,171.10	25.84	56,101.22
Steel ribs	кг	50,400.00	3.07	154,728.00
Concrete works				
Concrete, arch and sidewalls	m3	3,175.40	122.08	387,652.83
Concrete, invert	m3	630.80	77.69	49,006.85
Reinforcing steel	t	150.10	1,684.99	252,917.00
Drilling and grouting				
Drain holes, 75 mm diameter	m	619.00	34.59	21,411.21
Percussion contact grouting holes, 40-48 mm dia.	m	957.00	22.40	21,436.80
Contact pressure grouting (excluding injected materials)	t	29.00	160.99	4,668.71
Sundries				
Portland cement ASTM type I or II	t	699.60	257.76	180,328.90
Portland cement ASTM type V (sulfate resistant)	t	699.60	302.76	211,810.90
Care of water and miscellaneous	%	0.03		73,549.35
Total N° 12.2				**2,525,194.24**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Cross Section Area of Tunnels Ranging From 30 to 40 m2				
Excavation and supports				
Excavation	m3	64,654.90	68.15	4,406,231.44
Rock bolts, 22 mm diameter	m	19,614.80	25.84	506,846.43
Rock bolts, 26.5 mm diameter	m	360.00	34.01	12,243.60
Steel ribs	кг	177,447.00	3.07	544,762.29
Concrete works				
Concrete, arch and sidewalls	m3	7,135.30	116.07	828,194.27
Concrete, invert	m3	2,760.90	76.07	210,021.66
Reinforcing steel	t	437.30	1,684.99	736,846.13
Drilling and grouting				
Drain holes, 75 mm diameter	m	45.00	34.59	1,556.55
Percussion contact grouting holes, 40-48 mm dia.	m	4,757.00	22.40	106,556.80
Contact pressure grouting (excluding injected materials)	t	144.00	160.99	23,182.56
Sundries				
Portland cement ASTM type I or II	t	1,853.30	257.76	477,706.61
Portland cement ASTM type V (sulfate resistant)	t	1,853.30	302.76	561,105.11
Care of water and miscellaneous	%	0.03		252,457.60
Total N° 12.3				**8,667,711.05**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Cross Section Area of Tunnels Ranging From 40 to 50 m2				
Excavation and supports				
Excavation	m3	19,419.80	58.81	1,142,078.44
Rock bolts, 22 mm diameter	m	2,709.00	25.84	70,000.56
Rock bolts, 26.5 mm diameter	m	3,493.50	34.01	118,813.94
Steel ribs	кг	5,301.00	3.07	16,274.07
Concrete works				
Concrete, arch and sidewalls	m3	1,956.00	115.35	225,624.60
Concrete, invert	m3	1,876.90	75.30	141,330.57
Reinforcing steel	t	185.80	1,684.99	313,071.14
Drilling and grouting				
Drain holes, 75 mm diameter	m	731.00	34.59	25,285.29
Percussion contact grouting holes, 40-48 mm dia.	m	691.00	22.40	15,478.40
Contact pressure grouting (excluding injected materials)	t	21.00	160.99	3,380.79
Sundries				
Portland cement ASTM type I or II	t	700.40	257.76	180,535.10
Portland cement ASTM type V (sulfate resistant)	t	700.40	302.76	212,053.10
Care of water and miscellaneous	%	0.03		73,917.78
Total N° 12.4				**2,537,843.78**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Cross Section Area of Tunnels Ranging From 50 to 60 m2				
Excavation and supports				
Excavation	m3	14,545.60	51.64	751,134.78
Rock bolts, 22 mm diameter	m	2,604.30	25.84	67,295.11
Rock bolts, 26.5 mm diameter	m	269.70	34.01	9,172.50
Concrete works				
Concrete, arch and sidewalls	m3	2,894.90	112.82	326,602.62
Concrete, invert and mat	m3	2,815.50	73.48	206,882.94
Reinforcing steel	t	236.40	1,684.99	398,331.64
Drilling and grouting				
Percussion contact grouting holes, 40-48 mm dia.	m	41.00	22.40	918.40
Contact pressure grouting (excluding injected materials)	t	1.00	160.99	160.99
Sundries				
Portland cement ASTM type I or II	t	1,028.40	257.76	265,080.38
Portland cement ASTM type V (sulfate resistant)	t	1,028.40	302.76	311,358.38
Care of water and miscellaneous	%	0.03		70,108.13
Total N° 12.5				**2,407,045.88**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Cross Section Area of Tunnels Ranging From 60 to 70 m2				
Excavation and supports				
Excavation	m3	4,236.00	47.99	203,285.64
Rock bolts, 22 mm diameter	m	1,365.40	25.84	35,281.94
Steel ribs	кг	3,627.00	3.07	11,134.89
Concrete works				
Concrete, arch and sidewalls	m3	266.00	109.74	29,190.84
Concrete, invert	m3	187.00	72.23	13,507.01
Reinforcing steel	t	18.00	1,684.99	30,329.82
Drilling and grouting				
Percussion contact grouting holes, 40-48 mm dia.	m	187.00	22.40	4,188.80
Contact pressure grouting (excluding injected materials)	t	6.00	160.99	965.94
Sundries				
Portland cement ASTM type I or II	t	84.50	257.76	21,780.72
Portland cement ASTM type V (sulfate resistant)	t	84.50	302.76	25,583.22
Care of water and miscellaneous	%	0.03		11,257.46

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Total N° 12.6				**386,506.28**
Cross Section Area of Tunnels Ranging From 70 to 80 m2				
Excavation and supports				
Excavation	m3	7,547.90	46.19	348,637.50
Rock bolts, 22 mm diameter	m	7,193.30	25.84	185,874.87
Concrete works				
Concrete, arch and sidewalls	m3	703.20	100.45	70,636.44
Concrete, invert	m3	209.50	71.62	15,004.39
Reinforcing steel	t	36.50	1,684.99	61,502.14
Drilling and grouting				
Percussion contact grouting holes, 40-48 mm dia.	m	261.00	22.40	5,846.40
Contact pressure grouting (excluding injected materials)	t	8.00	160.99	1,287.92
Sundries				
Portland cement ASTM type I or II	t	168.30	257.76	43,381.01
Portland cement ASTM type V (sulfate resistant)	t	168.30	302.76	50,954.51
Care of water and miscellaneous	%	0.03		23,493.76
Total N° 12.7				**806,618.93**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Cross Section Area of Tunnels Ranging From 80 to 90 m2				
Excavation and supports				
Excavation	m3	8,675.70	45.44	394,223.81
Rock bolts, 26.5 mm diameter	m	613.90	34.01	20,878.74
Concrete works				
Concrete, arch and sidewalls	m3	1,258.70	98.92	124,510.60
Concrete, invert	m3	342.30	71.36	24,426.53
Reinforcing steel	t	81.80	1,684.99	137,832.18
Sundries				
Portland cement ASTM type I or II	t	288.20	257.76	74,286.43
Portland cement ASTM type V (sulfate resistant)	t	288.20	302.76	87,255.43
Care of water and miscellaneous	%	0.03		25,902.41
Total N° 12.8				**889,316.14**
Бетон		26,486.50		
Выемка		136,747.90		

Item	Unit	Qty (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))
Access Adit P37'								
Excavation and supports								
Excavation	m^3	24,400.0	13.21	322,324	56.29	1,373,476	69.50	1,695,800
Shotcrete	m^3	433.0	14.59	6,317	103.39	44,766	117.98	51,083
Rock bolts, 22 mm diameter	m	2,350.0	1.71	4,019	24.13	56,706	25.84	60,724
Concrete works				0		0	0.00	0
Concrete, invert	m^3	470.0	11.69	5,494	59.80	28,106	71.49	33,600
Reinforcing steel	t	11.8	325.47	3,824	1,359.52	15,974	1,684.99	19,799
Drilling and grouting				0		0	0.00	0
Drain holes, 75 mm diameter	m	2,820.0	5.68	16,018	28.91	81,526	34.59	97,544
Sundries				0		0	0.00	0
Portland cement ASTM type I or II	t	84.6	5.16	437	252.60	21,370	257.76	21,806
Portland cement ASTM type V (sulfate resistant)	t	84.6	6.06	513	296.70	25,101	302.76	25,613
Care of water and miscellaneous	%	3.0%		10,768		49,411		60,179
Total N°12.9				**369,713**		**1,696,436**		**2,066,149**
Exploratory Galleries	l.s.	1		563,358		2,655,832		3,219,190
Total N°12.10				**563,358**		**2,655,832**		**3,219,190**

Item	Unit	Qty	Price USD Eq.	Amount US Eq.
	Adits grouped in ranges			**23,702,129**
	CLIENT			
Item	**Unit**	**Qty**	**Price USD Eq.**	**Amount USD Eq.**
Access Adit P19				
Excavation and supports:				
Excavation	m3	3,630.00	91.45	331,963.50
Rock bolts, 22 mm diameter	m			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	191.00	107.15	20,465.65
Concrete, invert	m3			0.00
Reinforcing steel	t			0.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	42.02	257.76	10,831.08
Portland cement ASTM type V (sulfate resistant)	t	42.02	302.76	12,721.98
Care of water and miscellaneous works	%	0.03		11,279.47
Total N° 6.15				**387,261.67**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P17				
Excavation and supports:				
Excavation	m3	1,100.00	91.45	100,595.00
Rock bolts, 22 mm diameter	m			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	878.00	110.22	96,773.16
Concrete, invert	m3			0.00
Reinforcing steel	t			0.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	193.16	257.76	49,788.92
Portland cement ASTM type V (sulfate resistant)	t	193.16	302.76	58,481.12
Care of water and miscellaneous works	%	0.03		9,169.15
Total N° 6.15				**314,807.35**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P26				
Excavation and supports:				
Excavation	m3	1,980.00	101.01	199,999.80
Rock bolts, 22 mm diameter	m			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	833.00	134.34	111,905.22
Concrete, invert	m3			0.00
Reinforcing steel	t			0.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t		257.76	0.00
Portland cement ASTM type V (sulfate resistant)	t		302.76	0.00
Care of water and miscellaneous works	%	0.03		9,357.15
Total N° 6.15				**321,262.17**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P67				
Excavation and supports:				
Excavation	m3	10,600.00	77.82	824,892.00
Rock bolts, 22 mm diameter	m	979.60	25.84	25,312.86
Concrete works:				
Concrete, arch and sidewalls	m3	6,863.00	112.82	774,283.66
Concrete, invert	m3	308.00	73.52	22,644.16
Reinforcing steel	t	0.24	1,684.99	404.40
Steel ribs	kg	11,400.00	3.07	34,998.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	1,577.62	257.76	406,647.33
Portland cement ASTM type V (sulfate resistant)	t	1,577.62	302.76	477,640.23
Care of water and miscellaneous works	%	0.03		77,004.68
Total N° 6.15				**2,643,827.32**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P68				
Excavation and supports:				
Excavation	m3	9,360.00	91.45	855,972.00
Rock bolts, 22 mm diameter	m	1,065.00	25.84	27,519.60
Concrete works:				
Concrete, arch and sidewalls	m3	1,767.00	112.82	199,352.94
Concrete, invert	m3	0.00	73.52	0.00
Reinforcing steel	t	0.00	1,684.99	0.00
Steel ribs	kg	0.00	3.07	0.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	388.74	257.76	100,201.62
Portland cement ASTM type V (sulfate resistant)	t	388.74	302.76	117,694.92
Care of water and miscellaneous works	%	0.03		39,022.23
Total N° 6.15				**1,339,763.32**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P69				
Excavation and supports:				
Excavation	m3	3,760.00	77.82	292,603.20
Rock bolts, 22 mm diameter	m	496.00	25.84	12,816.64
Concrete works:				
Concrete, arch and sidewalls	m3	1,897.20	112.82	214,042.10
Concrete, invert	m3	200.80	73.52	14,762.82
Reinforcing steel	t	0.00	1,684.99	0.00
Steel ribs	kg	0.00	3.07	0.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	461.56	257.76	118,971.71
Portland cement ASTM type V (sulfate resistant)	t	461.56	302.76	139,741.91
Care of water and miscellaneous works	%	0.03		23,788.15
Total N° 6.15				**816,726.52**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P30				
Excavation and supports:				
Excavation	m3	2,080.00	77.82	161,865.60
Rock bolts, 22 mm diameter	m	0.00	25.84	0.00
Concrete works:				
Concrete, arch and sidewalls	m3	537.00	112.82	60,584.34
Concrete, invert	m3	0.00	73.52	0.00
Reinforcing steel	t	0.00	1,684.99	0.00
Steel ribs	kg	0.00	3.07	0.00
Drilling and grouting:				0.00
Percussion contact grouting holes, holes, 40-48 mm diameter	m			0.00
Contact pressure grouting (excluding injected materials)	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	0.00	257.76	0.00
Portland cement ASTM type V (sulfate resistant)	t	0.00	302.76	0.00
Care of water and miscellaneous works	%	0.03		6,673.50
Total N° 6.15				**229,123.44**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P1A				
Excavation and supports:				
Excavation	m3	16,640.00	91.45	1,521,728.00
Rock bolts, 22 mm diameter	m			0.00
Steel ribs	кг			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	3,635.00	112.82	410,100.70
Concrete, invert	m3	240.00	73.52	17,644.80
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	852.50	257.76	219,740.40
Portland cement ASTM type V (sulfate resistant)	t	852.50	302.76	258,102.90
Grouting	m2			
Portland cement ASTM type V (sulfate resistant)	t			
Care of water and miscellaneous works	%	0.03		72,819.50
Total N° 6,16				**2,500,136.30**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P1B				
Excavation and supports:				
Excavation	m3	12,530.00	77.82	975,084.60
Rock bolts, 22 mm diameter	m			0.00
Steel ribs	кг			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	9,440.00	112.82	1,065,020.80
Concrete, invert	m3	380.00	73.52	27,937.60
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	2,160.40	257.76	556,864.70
Portland cement ASTM type V (sulfate resistant)	t	2,160.40	302.76	654,082.70
Grouting	m2			0.00
Portland cement ASTM type V (sulfate resistant)	t			0.00
Care of water and miscellaneous works	%	0.03		98,369.71
Total N° 6,17				**3,377,360.12**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P1Г				
Excavation and supports:				
Excavation	m3	12,530.00	77.82	975,084.60
Rock bolts, 22 mm diameter	m			0.00
Steel ribs	кг			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	9,820.00	112.82	1,107,892.40
Concrete, invert	m3			0.00
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	2,160.40	257.76	556,864.70
Portland cement ASTM type V (sulfate resistant)	t	2,160.40	302.76	654,082.70
Grouting	m2			0.00
Portland cement ASTM type V (sulfate resistant)	t			0.00
Care of water and miscellaneous works	%	0.03		98,817.73
Total N° 6,18				**3,392,742.14**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 2				
Excavation and supports:				
Excavation	m3	3,523.00	77.82	274,159.86
Rock bolts, 22 mm diameter	m	990.00	25.84	25,581.60
Steel ribs	кг	10,700.00	3.07	32,849.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	392.00	112.82	44,225.44
Concrete, invert	m3	43.00	73.52	3,161.36
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	95.70	257.76	24,667.63
Portland cement ASTM type V (sulfate resistant)	t	95.70	302.76	28,974.13
Care of water and miscellaneous works	%	0.03		13,008.57
Total N° 6,19				**446,627.59**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 4				
Excavation and supports:				
Excavation	m3	7,790.00	77.82	606,217.80
Rock bolts, 22 mm diameter	m	75.00	25.84	1,938.00
Rock bolts, 25 mm diameter	m	200.00	25.84	5,168.00
Steel ribs	кг	8,520.00	3.07	26,156.40
Concrete works:				0.00
Concrete, arch and sidewalls	m3	3,081.00	112.82	347,598.42
Concrete, invert	m3	224.00	73.52	16,468.48
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	727.10	257.76	187,417.30
Portland cement ASTM type V (sulfate resistant)	t	727.10	302.76	220,136.80
Care of water and miscellaneous works	%	0.03		42,333.04
Total N° 6,20				**1,453,434.23**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 5 and 5A				
Excavation and supports:				
Excavation	m3	22,970.00	77.82	1,787,525.40
Rock bolts, 22 mm diameter	m	557.00	25.84	14,392.88
Rock bolts, 28 mm diameter	m	45.00	25.84	1,162.80
Steel ribs	кг	10,960.00	3.07	33,647.20
Concrete works:				0.00
Concrete, arch and sidewalls	m3	1,292.00	112.82	145,763.44
Concrete, invert	m3	271.00	73.52	19,923.92
Reinforcing steel	t	2.77	1,684.99	4,669.11
Sundries:				
Portland cement ASTM type I or II	t	343.86	257.76	88,633.35
Portland cement ASTM type V (sulfate resistant)	t	343.86	302.76	104,107.05
Care of water and miscellaneous works	%	0.03		65,994.75
Total N° 6,21				**2,265,819.91**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 29				
Excavation and supports:				
Excavation	m3	3,990.00	77.82	310,501.80
Rock bolts, 22 mm diameter	m			0.00
Steel ribs	кг	6,600.00	3.07	20,262.00
Concrete works:				
Concrete, arch and sidewalls	m3	873.00	112.82	98,491.86
Concrete, invert	m3			0.00
Reinforcing steel	t	25.60	1,684.99	43,135.74
Sundries:				
Portland cement ASTM type I or II	t	192.06	257.76	49,505.39
Portland cement ASTM type V (sulfate resistant)	t	192.06	302.76	58,148.09
Care of water and miscellaneous works	%			17,401.35
Total N° 6,22				**597,446.22**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 6				
Excavation and supports:				
Excavation	m3	2,420.00	77.82	188,324.40
Rock bolts, 22 mm diameter	m			0.00
Steel ribs	кг			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	901.00	112.82	101,650.82
Concrete, invert	m3			0.00
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	198.22	257.76	51,093.19
Portland cement ASTM type V (sulfate resistant)	t	198.22	302.76	60,013.09
Care of water and miscellaneous works	%	0.03		12,032.44
Total N° 6,23				**413,113.94**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 9				
Excavation and supports:				
Excavation	m3	22,600.00	77.82	1,758,732.00
Rock bolts, 22 mm diameter	m			
Steel ribs	кг	7,200.00	3.07	22,104.00
Concrete works:				
Concrete, arch and sidewalls	m3	11,131.00	112.82	1,255,799.42
Concrete, invert	m3			
Spray concrete	m2	7,295.80	139.00	1,014,116.20
Reinforcing steel	t	181.74	1,684.99	306,230.08
Sundries:				
Portland cement ASTM type I or II	t	2,448.82	257.76	631,207.84
Portland cement ASTM type V (sulfate resistant)	t	2,448.82	302.76	741,404.74
Grouting	m2	8,189.80	36.89	302,121.72
Portland cement ASTM type V (sulfate resistant)	t	306.80	302.76	92,886.77
Care of water and miscellaneous works	%	0.03		183,738.08
Total N° 6,24				**6,308,340.86**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P10				
Excavation and supports:				
Excavation	m3	5,850.00	77.82	455,247.00
Rock bolts, 22 mm diameter	m			
Steel ribs	кг	1,100.00	3.07	3,377.00
Concrete works:				
Concrete, arch and sidewalls	m3	902.00	112.82	101,763.64
Concrete, invert	m3			
Spray concrete	m2	113.00	139.00	15,707.00
Reinforcing steel	t	10.60	1,684.99	17,860.89
Sundries:				0.00
Portland cement ASTM type I or II	t	198.44	257.76	51,149.89
Portland cement ASTM type V (sulfate resistant)	t	198.44	302.76	60,079.69
Grouting	m2	264.00	36.89	9,738.96
Portland cement ASTM type V (sulfate resistant)	t	13.00	302.76	3,935.88
Care of water and miscellaneous works	%			21,565.80
Total N° 6,25				**740,425.76**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 10A				
Excavation and supports:				
Excavation	m3	6,350.00	77.82	494,157.00
Rock bolts, 22 mm diameter	m			0.00
Steel ribs	кг	7,200.00	3.07	22,104.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	2,308.00	112.82	260,388.56
Concrete, invert	t	12.90	1,684.99	21,736.37
Sundries:				0.00
Portland cement ASTM type I or II	t	507.76	257.76	130,880.22
Portland cement ASTM type V (sulfate resistant)	t	507.76	302.76	153,729.42
Grouting	m2	4,887.00	36.89	180,281.43
Portland cement ASTM type V (sulfate resistant)	t	120.00	302.76	36,331.20
Care of water and miscellaneous works	%	0.03		38,988.25
Total N° 6,26				**1,338,596.44**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 35A				
Excavation and supports:				
Excavation	m3	11,726.00	77.82	912,517.32
Rock bolts, 22 mm diameter	m	371.00	25.84	9,586.64
Steel ribs	кг	20,500.00	3.07	62,935.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	6,605.00	112.82	745,176.10
Concrete, invert	m3	263.00	73.52	19,335.76
Spray concrete	m2	483.20	139.00	67,164.80
Reinforcing steel	t			
Sundries:				
Portland cement ASTM type I or II	t	1,510.96	257.76	389,465.05
Portland cement ASTM type V (sulfate resistant)	t	1,510.96	302.76	457,458.25
Grouting	m2	3,689.00	257.76	950,876.64
Portland cement ASTM type V (sulfate resistant)	t	327.40	302.76	99,123.62
Care of water and miscellaneous works	%	0.03		111,409.18
Total N° 6,27				**3,825,048.36**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 34				
Excavation and supports:				
Excavation	m3	6,150.00	77.82	478,593.00
Rock bolts, 22 mm diameter	m	2,396.30	25.84	61,920.39
Steel ribs	кг	19,330.00	3.07	59,343.10
Concrete works:				
Concrete, arch and sidewalls	m3	2,528.00	112.82	285,208.96
Concrete, invert	m3	180.00	73.52	13,233.60
Spray concrete	m2			
Reinforcing steel	t	8.44	1,684.99	14,221.32
Sundries:				
Portland cement ASTM type I or II	t	595.76	257.76	153,563.10
Portland cement ASTM type V (sulfate resistant)	t	595.76	302.76	180,372.30
Grouting	m2	4,214.00	36.89	155,454.46
Portland cement ASTM type V (sulfate resistant)	t	185.00	302.76	56,010.60
Care of water and miscellaneous works	%	0.03		43,737.62
Total N° 6,28				**1,501,658.45**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 36				
Excavation and supports:				
Excavation	m3	3,570.00	77.82	277,817.40
Rock bolts, 22 mm diameter	m	28.00	25.84	723.52
Steel ribs	кг			0.00
Concrete works:				0.00
Concrete, arch and sidewalls	m3	1,634.00	112.82	184,347.88
Concrete, invert	m3			0.00
Spray concrete	m2			0.00
Reinforcing steel	t	1.30	1,684.99	2,190.49
Sundries:				
Portland cement ASTM type I or II	t	359.48	257.76	92,659.56
Portland cement ASTM type V (sulfate resistant)	t	359.48	302.76	108,836.16
Care of water and miscellaneous works	%	0.03		19,997.25
Total N° 6,29				**686,572.27**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 37				
Excavation and supports:				
Excavation	m3	2,530.00	77.82	196,884.60
Rock bolts, diameter 22 mm L=2m	m	382.00	25.84	9,870.88
Rock bolts, diameter 22 mm L=2,5m	m	3,805.00	25.84	98,321.20
Rock bolts, diameter 22 mm L=4m	m	3,308.00	25.84	85,478.72
Steel ribs	kg			0.00
Concrete works:				
Concrete, arch and sidewalls	m3	414.00	112.82	46,707.48
Concrete, invert	m3			
Spray concrete	m2	1,757.00	139.00	244,223.00
Reinforcing steel	t			0.00
Sundries:				0.00
Portland cement ASTM type I or II	t	91.08	257.76	23,476.78
Portland cement ASTM type V (sulfate resistant)	t	91.08	302.76	27,575.38
Grouting	m2	907.00	36.89	33,459.23
Portland cement ASTM type V (sulfate resistant)	t	34.50	302.76	10,445.22
Care of water and miscellaneous works	%	0.03		**23,293.27**
Total N° 6,30				**799,735.77**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 37'				
Excavation and supports:				
Excavation	m3	6,730.00	77.82	523,728.60
Rock bolts, diameter 22 mm L=1,9m	m	456.00	25.84	11,783.04
Steel ribs	kg	125,100.00	3.07	384,057.00
Concrete works:				
Concrete, arch and sidewalls	m3	951.00	112.82	107,291.82
Concrete, invert	m3			0.00
Spray concrete	m2	6,210.00	139.00	863,190.00
Reinforcing steel	t			0.00
Sundries:				
Portland cement ASTM type I or II	t	209.22	257.76	53,928.55
Portland cement ASTM type V (sulfate resistant)	t	209.22	302.76	63,343.45
Care of water and miscellaneous works	%			60,219.67
Total N° 6,31				**2,067,542.13**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P38				
Excavation and supports:				
Excavation	m3	3,350.00	77.82	260,697.00
Rock bolts, diameter 25 mm L=4m	m	128.00	25.84	3,307.52
Steel ribs	kg	7,985.00	3.07	24,513.95
Concrete works:				
Concrete, arch and sidewalls	m3	1,454.00	112.82	164,040.28
Concrete, invert	m3			0.00
Spray concrete	m2			0.00
Reinforcing steel	t	1.51	1,684.99	2,544.33
Sundries:				
Portland cement ASTM type I or II	t	319.88	257.76	82,452.27
Portland cement ASTM type V (sulfate resistant)	t	319.88	302.76	96,846.87
Care of water and miscellaneous works	%	0.03		19,032.07
Total N° 6,32				**653,434.29**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P 27				
Excavation and supports:				
Excavation	m3	2,690.00	77.82	209,335.80
Concrete works:				
Concrete, arch and sidewalls	m3	1,695.00	112.82	191,229.90
Concrete, invert	m3			0.00
Spray concrete	m2	1,053.00	139.00	146,367.00
Reinforcing steel	t	17.96	1,684.99	30,262.42
Sundries:				
Portland cement ASTM type I or II	t	305.10	257.76	78,642.58
Portland cement ASTM type V (sulfate resistant)	t	305.10	302.76	92,372.08
Care of water and miscellaneous works	%	0.03		22,446.29
Total N° 6,33				**770,656.07**
Access Adit P12				
Excavation and supports:				
Excavation	m3	5,010.00	77.82	389,878.20
Concrete works:	m3	3,786.00	112.82	427,136.52
Care of water and miscellaneous works		0.03		24,510.44
Total N°				**841,525.16**

Item	Unit	Qty	Price USD Eq.	Amount USD Eq.
Access Adit P14				
Excavation and supports:				
Excavation	m3	4,520.00	77.82	351,746.40
Concrete works:	m3	2,589.00	112.82	292,090.98
Concrete, arch and sidewalls		0.03		19,315.12
Total N°12.1				**663,152.50**
Exploratory galarries				
Excavation	m3	33,075.00	97.33	3,219,189.75
Total N° 12,1				**3,219,189.75**
Plaster wells (according to the exploratory excavations catalog)		3,246.60	65.40	212,327.64
Single well (according to the exploratory excavations catalogue)	m	6,056.70	65.40	396,108.18
Prospecting pits (according to the exploratory excavations catalogue)	m	230.00	65.40	15,042.00
Exploratory holes on salt plate (exploratory excavations catalogue)	m	1,286.50	65.40	84,137.10
Total N° 22				**707,614.92**
Liquidation activities P-1A,P-3, P-28', P-23 and collectors plugs DT-1				
Concrete works:				
Concrete plug	m3	6,536.00	100.45	656,541.20
Reinforcing steel	t	137.26	1,684.99	231,274.99
Sundries:				0.00
Portland cement ASTM type I or II	t	1,437.92	257.76	370,638.26
Portland cement ASTM type V (sulfate resistant)	t	1,437.92	302.76	435,344.66
Grouting	m2	1,820.00	36.89	67,139.80
Portland cement ASTM type V (sulfate resistant)	t	72.00	302.76	21,798.72
Care of water and miscellaneous works	%	0.03		53,482.13
Total N° 12,7				**1,836,219.75**

Single Adits - Client - Total - USD Eq.	**46,459,164.72**
Difference - USD Eq.	**22,757,036**

N°	Category	Item	TEAS	CLIENT		DIFFERENCIES		
			Amount Eq USD	Qty	Amount Eq USD	D Qty	Δ amount	Δ amount with TEAS UNIT PRICE
			A1	Q2	A2	Q2-Q1	A2-A1	Pi*(Q2-Q1)
314	TRANSPORTATION TUNNELS	Transportation Tunnel T1	1,992,846	56,164	4,370,682	19,273	2,377,836	1,041,133
329	TRANSPORTATION TUNNELS	Transportation Tunnel T2	2,856,603	77,947	6,064,277	23,296	3,207,674	1,217,687
351	TRANSPORTATION TUNNELS	Transportation Tunnel T3	7,837,485	192,476	14,978,482	30,276	7,140,998	1,462,956
366	TRANSPORTATION TUNNELS	Transportation Tunnel T3'	2,988,217	117,480	9,142,294	51,877	6,154,077	2,362,997
381	TRANSPORTATION TUNNELS	Transportation Tunnel T37	1,716,882	52,735	4,103,838	15,581	2,386,956	720,003
395	TRANSPORTATION TUNNELS	Transportation Tunnel T4	4,312,552	112,717	10,307,970		5,995,417	
414	TRANSPORTATION TUNNELS	Transportation Tunnel T5A	668,535	13,280	1,033,481		364,945	
427	TRANSPORTATION TUNNELS	Transportation Tunnel T6	408,719	14,000	1,089,480	2,759	680,761	100,321
442	TRANSPORTATION TUNNELS	Transportation Tunnel T7	822,696	23,050	1,793,751	2,651	971,055	106,911
459	TRANSPORTATION TUNNELS	Transportation Tunnel T7A	404,890	37,520	2,919,806	27,971	2,514,916	1,185,958
474	TRANSPORTATION TUNNELS	Transportation Tunnel T 22	2,076,208	83,113	6,467,854	26,386	4,391,645	965,728
493	TRANSPORTATION TUNNELS	Transportation Tunnel, Stretch from T3 to T37	263,096	5,681	442,111		179,015	
506	TRANSPORTATION TUNNELS	Transportation Tunnel T8	941,394	29,357	2,284,562	6,574	1,343,168	271,638
522	TRANSPORTATION TUNNELS	Transportation Tunnel t18	145,446	3,520	346,016		200,570	
526	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 A		4,330	4	4,330	4	
537	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 *		15,480	1,521,684	15,480	1,521,684	
1	**TRANSPORTATION TUNNELS**		**27,435,569**	**838,851**	**66,866,291**	**226,454**	**39,430,721**	**9,435,330**
550	ACCESS ADITS	Access Adits P1	1,365,782	49,576	3,858,004	17,311	2,492,223	732,770
566	ACCESS ADITS	Access Adit P11	858,676	20,440	1,590,625		731,949	
581	ACCESS ADITS	Access Adit P13	553,616	9,276	848,327		294,711	
593	ACCESS ADITS	Access Adit P16	500,889	7,206	500,889			
607	ACCESS ADITS	Access Adit P16B	341,693	8,101	630,404	0	288,711	-1
622	ACCESS ADITS	Access Adit P1B	607,869	13,305	1,123,208	6,104	515,339	515,339
638	ACCESS ADITS	Access Adit P21	606,922	12,590	1,151,356	4,329	544,433	318,065
654	ACCESS ADITS	Access Adit P23	1,096,230	22,467	2,054,607	6,127	958,377	411,081
671	ACCESS ADITS	Access Adit P25 & P25'	1,525,522	58,379	4,543,054	24,380	3,017,532	1,093,944
687	ACCESS ADITS	Access Adit P25A	509,121	12,045	937,303		428,182	
702	ACCESS ADITS	Access Adit P28-28*	606,869	17,603	1,609,794	6,906	1,002,925	391,749
718	ACCESS ADITS	Access Adit P3	702,763	17,299	1,581,994	5,105	879,230	294,178
734	ACCESS ADITS	Access Adit P35	581,092	10,964	1,002,658		421,566	
750	ACCESS ADITS	Access Adit P40	502,505	4,975	502,505			
771	ACCESS ADITS	Access Adit P80	1,224,522	24,167	1,880,645		656,123	
2	**ACCESS ADITS**		**11,584,070**	**288,392**	**23,815,372**	**70,262**	**12,231,302**	**3,757,125**

N°	Category	Item	TEAS	CLIENT		DIFFERENCIES		
			Amount Eq USD	Qty	Amount Eq USD	D Qty	Δ amount	Δ amount with TEAS UNIT PRICE
			A1	Q2	A2	Q2-Q1	A2-A1	Pi*(Q2-Q1)
1215	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	2,870,519	114,439	8,905,643	38,379	6,035,123	1,448,408
1238	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Lef	5,289,127	139,518	10,857,291		5,568,163	
1263	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Rig	3,496,585	83,391	6,489,488		2,992,903	
1284	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	2,497,350	76,173	5,927,744	10,000	3,430,394	377,400
1311	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Le	4,813,107	156,961	12,214,736	30,000	7,401,629	1,137,300
1336	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Ri	4,125,967	111,011	8,638,899	12,610	4,512,933	528,737
1356	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1	753,445	31,246	2,431,564	14,458	1,678,118	648,875
1375	DIVERSION TUNNELS & AUXILIARY TUNNEL	DT-3 given TT-1 TT-2	3,049,024	63,830	4,967,251		1,918,227	
1386	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	1,491,486	49,046	4,485,257	13,661	2,993,771	575,803
1405	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate C	1,133,114	30,194	2,761,241	3,489	1,628,127	148,017
1424	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Ch	383,751	5,629	514,726		130,975	
1425	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Ch	372,923	5,773	372,923			
1426	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Ch	38,080	320	38,080			
3	**DIVERSION TUNNELS & AUXILIARY TUNNEL**		**30,314,478**	**867,531**	**68,604,842**	**122,596**	**38,290,364**	**4,864,540**
1440	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate ch	886,590	32,200	2,505,804	10,276	1,619,214	415,578
1458	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	370,697	6,283	574,580		203,883	
1459	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	434,860	25,917	1,101,473	15,685	666,613	666,613
1479	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Pe	843,700	30,791	2,815,837	16,491	1,972,137	972,969
1480	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Pe	513,554	14,270	926,123	6,357	412,569	412,569
1502	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5	6,224,602	214,478	19,410,259	34,368	13,185,657	1,187,758
1553	POWER FACILITIES	Receiver hall		2,859	258,740	2,859	258,740	
1566	POWER FACILITIES	Transformer Hall	4,697,047	128,000	8,755,200	120	4,058,153	4,393
1599	POWER FACILITIES	Bus Duct Galleries (Units 5 & 6)	536,578	17,236	1,576,232	7,242	1,039,654	388,823
1615	POWER FACILITIES	Bus Duct Galleries (Units №3 and №4)	335,361	11,560	1,057,162	5,314	721,801	285,295
1625	POWER FACILITIES	Bus Duct Galleries (Units №1 and №2)	156,775	2,920	267,034		110,259	
1634	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-9	522,804	53,042	2,724,768	40,615	2,201,964	1,708,673
1650	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-9	721,497			-18,868	-721,497	-721,497
1660	POWER FACILITIES	Collectors 1-5		27,060	1,390,072	27,060	1,390,072	
1669	POWER FACILITIES	Cable Tunnel 1	1,888,344	36,764	3,362,068	7,152	1,473,723	456,096
1686	POWER FACILITIES	Cable tunnel 2	1,297,718	48,280	4,415,206	25,303	3,117,488	1,429,136
1702	POWER FACILITIES	Cable tunnel 1 & 2 (Common Stretch)	449,742	18,320	1,675,364	10,523	1,225,622	606,955
1715	POWER FACILITIES	Cable Galleries		176,990	860,171	176,990	860,171	
1716	POWER FACILITIES	Cable Galleries		9,070	109,928	9,070	109,928	
4	**POWER FACILITIES**		**19,879,870**	**856,040**	**53,786,021**	**376,558**	**33,906,151**	**7,813,361**

N°	Category	Item	TEAS	CLIENT		DIFFERENCIES		
			Amount Eq USD	Qty	Amount Eq USD	D Qty	Δ amount	Δ amount with TEAS UNIT PRICE
			A1	Q2	A2	Q2-Q1	A2-A1	Pi*(Q2-Q1)
1727	GROUTING GALLERIES	Dam Curtain Grouting Gallery, Joint Left - Right	606,388	12,957	1,008,314		401,926	
1743	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Active	704,606	13,813	1,074,935		370,329	
1758	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Passiv	708,229	13,911	1,082,585		374,356	
1780	GROUTING GALLERIES	Combined Saline & Dam Curtain Grouting Galle	1,251,594	22,568	1,756,203		504,609	
1796	GROUTING GALLERIES	Dam Grouting Gallery 1	724,791	8,173	724,791			
1815	GROUTING GALLERIES	Dam Grouting Gallery 2	502,732	4,771	538,694	319	35,962	35,962
1828	GROUTING GALLERIES	Dam Grouting Gallery 3	181,152	2,040	181,152			
5	**GROUTING GALLERIES**		**4,679,491**	**78,233**	**6,366,673**	**319**	**1,687,182**	**35,962**
1847	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate	937,210	20,650	1,298,898	5,750	361,688	361,688
1848	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate	159,003	5,807	278,901	2,496	119,897	119,897
1869	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Ga	181,976	2,440	199,812	218	17,836	17,836
1890	DRAINAGE GALLERIES	Drainage Gallery 4 of Stage 1 Power Tunnel Ga	144,732	2,074	169,840	307	25,107	25,107
1908	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	1,565,197	19,873	1,565,197			
1928	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)	1,019,357	14,667	1,019,357			
1947	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)	1,698,934	24,445	1,698,934			
6	**DRAINAGE GALLERIES**		**5,706,410**	**89,956**	**6,230,938**	**8,771**	**524,528**	**524,528**
1967	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T5A	203,901	1,584	203,901			
1982	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T4	186,829	4,296	506,799	2,712	319,970	319,970
1997	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B	1,002,415	56,041	4,140,309	34,367	3,137,894	1,589,481
2015	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 8A	453,987	17,797	1,314,842	8,456	860,855	410,947
2032	MISCELLANEOUS UNDERGROUND WORKS	Cross Slit n°1	218,237	5,051	373,138	0	154,902	0
2045	MISCELLANEOUS UNDERGROUND WORKS	Ventilation Gallery Parallel to Transportation Tur	988,700	11,922	988,700			
7	**MISCELLANEOUS UNDERGROUND WORKS**		**3,054,070**	**96,690**	**7,527,690**	**45,535**	**4,473,620**	**2,320,398**
	TOTAL AMOUNT		102,653,959	3,115,693	233,197,828	850,495	130,543,869	28,751,244

Pi: unit price of TEAS for each specific item

Grand Total **130,543,869**

N°	Category	Item	TEAS		CLIENT		DIFFERENCES	
			Qty	Amount USD Eq.	Qty	Amount USD Eq.	Δamount	Δamount TEAS UNIT PRICE
			Q1	A1	Q2	A2	A2-A1	P1*(Q2-Q1)
317	TRANSPORTATION TUNNELS	Transportation Tunnel T1	9,092.00	822,098.64	22,301.00	2,016,456.42	1,194,357.78	1,194,358
318	TRANSPORTATION TUNNELS	Transportation Tunnel T1	1,865.10	117,911.62	1,865.10	117,911.62		
324	TRANSPORTATION TUNNELS	Transportation Tunnel T1			8,220.00	1,142,580.00	1,142,580.00	
331	TRANSPORTATION TUNNELS	Transportation Tunnel T2	5,291.50	526,557.17	20,511.00	2,041,049.61	1,514,492.45	1,514,492
332	TRANSPORTATION TUNNELS	Transportation Tunnel T2	2,952.50	141,424.75	2,952.50	141,424.75		
347	TRANSPORTATION TUNNELS	Transportation Tunnel T2			2,755.00	382,945.00	382,945.00	
354	TRANSPORTATION TUNNELS	Transportation Tunnel T3	24,714.00	2,283,326.46	45,441.90	4,198,377.14	1,915,050.68	1,915,051
355	TRANSPORTATION TUNNELS	Transportation Tunnel T3	5,484.10	347,417.74	5,484.10	347,417.74		
369	TRANSPORTATION TUNNELS	Transportation Tunnel T3'	5,333.80	539,833.90	16,976.00	1,718,140.96	1,178,307.06	1,178,307
370	TRANSPORTATION TUNNELS	Transportation Tunnel T3'	2,041.40	150,124.56	2,041.40	150,124.56		
384	TRANSPORTATION TUNNELS	Transportation Tunnel T37	6,451.60	661,353.52	14,978.00	1,535,394.78	874,041.26	874,041
397	TRANSPORTATION TUNNELS	Transportation Tunnel T4	18,769.00	1,900,736.63	47,155.80	4,775,467.87	2,874,731.24	2,874,731
398	TRANSPORTATION TUNNELS	Transportation Tunnel T4	9,370.50	815,327.21	9,370.50	815,327.21		
399	TRANSPORTATION TUNNELS	Transportation Tunnel T4	2,175.40	189,455.59	2,175.40	189,455.59		
400	TRANSPORTATION TUNNELS	Transportation Tunnel T4	6,901.20	505,512.90	6,901.20	505,512.90		
417	TRANSPORTATION TUNNELS	Transportation Tunnel T5A	2,159.60	206,500.95	5,548.00	530,499.76	323,998.81	323,999
418	TRANSPORTATION TUNNELS	Transportation Tunnel T5A	809.00	45,692.32	809.00	45,692.32		
429	TRANSPORTATION TUNNELS	Transportation Tunnel T6	1,250.10	128,297.76	9,710.00	996,537.30	868,239.54	868,240
430	TRANSPORTATION TUNNELS	Transportation Tunnel T6	929.00	42,055.83	929.00	42,055.83		
446	TRANSPORTATION TUNNELS	Transportation Tunnel T7	3,400.87	291,726.29	10,798.00	926,252.44	634,526.15	634,526
447	TRANSPORTATION TUNNELS	Transportation Tunnel T7	455.00	32,896.50	455.00	32,896.50		
461	TRANSPORTATION TUNNELS	Transportation Tunnel T7A	1,709.10	146,606.60	8,632.00	740,452.96	593,846.36	593,846
462	TRANSPORTATION TUNNELS	Transportation Tunnel T7A	250.10	16,739.19	2,881.00	192,825.33	176,086.14	176,086
478	TRANSPORTATION TUNNELS	Transportation Tunnel T 22	4,238.30	420,396.98	11,647.50	1,155,315.53	734,918.55	734,919
479	TRANSPORTATION TUNNELS	Transportation Tunnel T 22	3,178.50	155,905.43	3,178.50	155,905.43		
496	TRANSPORTATION TUNNELS	Transportation Tunnel, Stretch from T3 to T37	656.00	67,246.56	656.00	67,246.56		
497	TRANSPORTATION TUNNELS	Transportation Tunnel, Stretch from T3 to T37	143.00	8,286.85	143.00	8,286.85		
509	TRANSPORTATION TUNNELS	Transportation Tunnel T8	1,422.00	134,848.26	10,826.00	1,026,629.58	891,781.32	891,781
510	TRANSPORTATION TUNNELS	Transportation Tunnel T8	522.00	34,154.46	1,400.00	91,602.00	57,447.54	57,448
517	TRANSPORTATION TUNNELS	Transportation Tunnel T8			2,413.00	262,606.79	262,606.79	
523	TRANSPORTATION TUNNELS	Transportation Tunnel t18	686.00	44,884.98	686.00	**179,995.80**	135,110.82	
529	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 A			2,330.00	**611,356.00**	611,356.00	
540	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 *			3,144.00	**824,937.03**	824,937.03	
1	**TRANSPORTATION TUNNELS**		122,251	10,777,320	285,315	27,968,680	17,191,361	13,831,825

N°	Category	Item	TEAS		CLIENT		DIFFERENCES	
			Qty	Amount USD Eq.	Qty	Amount USD Eq.	Δamount	Δamount TEAS UNIT PRICE
			Q1	A1	Q2	A2	A2-A1	P1*(Q2-Q1)
554	ACCESS ADITS	Access Adits P1	3,924	413,265	17,910	1,886,281	1,473,016	1,473,016
555	ACCESS ADITS	Access Adits P1	1,260	81,717	1,260	81,717		
569	ACCESS ADITS	Access Adit P11	2,834	262,051	2,834	262,051		
570	ACCESS ADITS	Access Adit P11	710	42,158	710	42,158		
583	ACCESS ADITS	Access Adit P13	1,377	154,382	1,377	154,382		
584	ACCESS ADITS	Access Adit P13	608	33,826	608	33,826		
597	ACCESS ADITS	Access Adit P16	1,113	127,370	1,113	127,370		
598	ACCESS ADITS	Access Adit P16	127	11,343	127	11,343		
610	ACCESS ADITS	Access Adit P16B	1,207	124,693	1,207	124,695	3	3
611	ACCESS ADITS	Access Adit P16B	292	19,091	292	19,091		
624	ACCESS ADITS	Access Adit P1B	1,067	144,912	1,067	144,912		
625	ACCESS ADITS	Access Adit P1B	944	58,084	944	58,084		
641	ACCESS ADITS	Access Adit P21	718	99,678	4,742	658,047	558,369	558,369
642	ACCESS ADITS	Access Adit P21	796	50,369	796	50,369		
658	ACCESS ADITS	Access Adit P23	1,721	229,270	9,303	1,239,625	1,010,355	1,010,355
659	ACCESS ADITS	Access Adit P23	1,330	79,840	1,330	79,840		
675	ACCESS ADITS	Access Adit P25 & P25'	26,626	2,783,503	26,626	2,783,503		
676	ACCESS ADITS	Access Adit P25 & P25'	1,095	77,512	1,095	77,512		
690	ACCESS ADITS	Access Adit P25A	874	86,153	5,948	586,622	500,468	500,468
691	ACCESS ADITS	Access Adit P25A	157	11,783	157	11,783		
705	ACCESS ADITS	Access Adit P28-28*	1,356	160,939	6,859	813,889	652,950	652,950
706	ACCESS ADITS	Access Adit P28-28*	304	27,990	442	40,655	12,666	12,666
722	ACCESS ADITS	Access Adit P3	1,574	168,686	6,801	728,695	560,009	560,009
723	ACCESS ADITS	Access Adit P3	395	32,256	395	32,256		
738	ACCESS ADITS	Access Adit P35	237	26,111	237	26,111		
739	ACCESS ADITS	Access Adit P35	367	23,454	367	23,454		
754	ACCESS ADITS	Access Adit P40	695	93,353	2,100	282,114	188,761	188,761
755	ACCESS ADITS	Access Adit P40	224	19,077	224	19,077		
774	ACCESS ADITS	Access Adit P80	1,444	162,946	1,444	162,946		
775	ACCESS ADITS	Access Adit P80	839	61,713	839	61,713		
2	**ACCESS ADITS**		56,214	5,667,525	99,152	10,624,122	4,956,597	4,956,597

N°	Category	Item	TEAS		CLIENT		DIFFERENCES	
			Qty	Amount USD Eq.	Qty	Amount USD Eq.	Δamount	Δamount TEAS UNIT PRICE
			Q1	A1	Q2	A2	A2-A1	P1*(Q2-Q1)
1218	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	14,167	1,011,935	77,457	3,264,038	2,252,103	4,520,819
1219	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	2,562	303,407	16,963	2,008,589	1,705,181	1,705,181
1220	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	3,518	184,775	32,057	1,683,634	1,498,859	1,498,859
1242	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank	22,110	1,750,686	36,822	2,915,566	1,164,880	1,164,880
1243	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank	6,601	588,413	15,040	1,340,638	752,225	752,225
1244	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank	5,753	270,789	31,368	1,476,492	1,205,703	1,205,703
1265	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	8,550	719,534	8,550	719,534		
1266	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	7,162	472,666	7,162	472,666		
1267	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	2,936	139,357	2,936	139,357		
1291	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	12,325	880,382	65,450	2,758,063	1,877,681	3,794,712
1292	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	2,229	263,960	14,366	1,701,078	1,437,118	1,437,118
1293	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	3,061	160,753	15,991	839,847	679,094	679,094
1315	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	20,120	1,593,125	20,120	1,593,125		
1316	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	6,007	535,455	6,007	535,455		
1317	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	5,235	246,416	5,235	246,416		
1338	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	10,089	849,048	10,089	849,048		
1339	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	8,451	557,746	8,451	557,746		
1340	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	3,465	164,439	3,465	164,439		
1360	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1	2,328	205,505	14,010	1,236,496	1,030,992	1,030,992
1361	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1	1,531	71,895	1,531	71,895		
1377	DIVERSION TUNNELS & AUXILIARY TUNNEL	DT-3 given TT-1 TT-2	12,181	914,793	12,181	1,025,153	110,360	
1392	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	1,800	265,667	6,549	966,429	700,762	700,762
1393	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	1,840	220,855	1,840	220,855		
1394	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	14,600	699,632	14,600	699,632		
1410	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Chamber	1,859	306,847	2,140	353,228	46,382	46,382
1411	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Chamber	1,880	200,728	2,477	264,437	63,710	63,710
1430	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Chamber	3,517	559,906	5,031	800,935	241,029	241,029
3	**DIVERSION TUNNELS & AUXILIARY TUNNEL**		185,877	14,138,714	437,887	28,904,793	14,766,079	18,841,465

N°	Category	Item	TEAS		CLIENT		DIFFERENCES	
			Qty	Amount USD Eq.	Qty	Amount USD Eq.	Δamount	Δamount TEAS UNIT PRICE
			Q1	A1	Q2	A2	A2-A1	P1*(Q2-Q1)
1443	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate chamber	6,763	616,619	14,498	1,321,746	705,127	705,127
1461	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	357	58,941	357	58,941		
1462	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	175	18,690	175	18,690		
1463	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	5,582	294,730	5,582	294,730		
1486	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks	80	13,208	80	13,208		
1487	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks	770	82,236	770	82,236		
1488	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks	6,837	318,540	11,320	527,399	208,858	208,858
1507	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	7,190	1,003,940	34,213	4,777,161	3,773,221	3,773,221
1508	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	4,040	532,714	16,617	2,191,118	1,658,403	1,658,403
1555	POWER FACILITIES	Receiver hall			1,500	158,010	158,010	
1571	POWER FACILITIES	Transformer Hall	3,262	523,714	17,983	2,887,171	2,363,457	2,363,457
1572	POWER FACILITIES	Transformer Hall	4,778	672,886	15,323	2,157,938	1,485,052	1,485,052
1603	POWER FACILITIES	Bus Duct Galleries (Units 5 & 6)		484,775	7,697	2,019,539	1,534,764	
1618	POWER FACILITIES	Bus Duct Galleries (Units №3 and №4)	2,497	242,387	4,394	1,152,898	910,510	
1627	POWER FACILITIES	Bus Duct Galleries (Units №1 and №2)	624	60,597	1,564	410,362	349,765	
1638	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-13	2,229	280,419	23,260	6,102,959	5,822,540	
1661	POWER FACILITIES	Collectors 1-6			8,793	926,255	926,255	
1672	POWER FACILITIES	Cable Tunnel 1	8,942	941,908	17,888	1,884,269	942,361	942,361
1673	POWER FACILITIES	Cable Tunnel 1	5,891	65,031	5,891	65,031		
1688	POWER FACILITIES	Cable tunnel 2	5,610	613,421	9,267	1,013,314	399,893	399,893
1689	POWER FACILITIES	Cable tunnel 2	2,878	143,253	2,878	143,252	-1	
1704	POWER FACILITIES	Cable tunnel 1 & 2 (Common Stretch)	2,035	217,834	9,226	987,828	769,994	769,994
1705	POWER FACILITIES	Cable tunnel 1 & 2 (Common Stretch)	1,098	53,901	1,098	53,901		
1717	POWER FACILITIES	Cable Galleries			15,126	1,619,541	1,619,541	
4	**POWER FACILITIES**		71,637	7,239,743	225,499	30,867,495	23,627,752	12,306,367

N°	Category	Item	TEAS		CLIENT		DIFFERENCES	
			Qty	Amount USD Eq.	Qty	Amount USD Eq.	Δamount	Δamount TEAS UNIT PRICE
			Q1	A1	Q2	A2	A2-A1	P1*(Q2-Q1)
1729	GROUTING GALLERIES	Dam Curtain Grouting Gallery, Joint Left - Right	12,049	661,600	12,049	661,600		
1745	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Active Stretch	10,086	576,499	14,272	815,788	239,289	239,289
1760	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Passive Stretch	10,158	580,603	14,272	815,788	235,185	235,185
1782	GROUTING GALLERIES	Combined Saline & Dam Curtain Grouting Gallery,	16,691	955,704	16,691	955,704		
1800	GROUTING GALLERIES	Dam Grouting Gallery 1	1,179	139,063	2,412	284,483	145,419	145,419
1801	GROUTING GALLERIES	Dam Grouting Gallery 1	231	19,229	231	19,229		
1817	GROUTING GALLERIES	Dam Grouting Gallery 2	1,290	143,667	3,060	340,792	197,125	197,125
1831	GROUTING GALLERIES	Dam Grouting Gallery 3	276	32,521	276	32,521		
1832	GROUTING GALLERIES	Dam Grouting Gallery 3	66	5,488	66	5,488		
5	**GROUTING GALLERIES**		52,024	3,114,372	63,328	3,931,391	817,018	817,018
1850	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	2,624	304,897	11,468	1,332,548	1,027,651	1,027,651
1851	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	848	67,661	5,471	436,445	368,784	368,784
1857	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers						
1872	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	444	49,155	2,328	257,955	208,799	208,799
1873	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	135	12,389	135	12,389		
1893	DRAINAGE GALLERIES	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	369	40,900	1,451	160,785	119,885	119,885
1894	DRAINAGE GALLERIES	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	105	9,629	105	9,629		
1912	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	2,835	357,015	2,835	357,015		
1913	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	1,151	94,921	1,151	94,921		
1931	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)	3,336	360,623	3,336	360,623		
1932	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)	1,077	76,973	1,077	76,973		
1950	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)	5,007	541,339	5,007	541,339		
1951	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)	1,673	119,603	1,673	119,603		
6	**DRAINAGE GALLERIES**		19,603	2,035,104	36,036	3,760,224	1,725,119	1,725,119
1969	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T5A	275	33,220	276	33,223	3	3
1970	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T5A	40	4,344	40	4,342	-2	-2
1984	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T4	276	34,752	2,423	305,599	270,848	270,848
1985	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T4	40	4,439	40	4,439		
2000	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B	3,641	405,610	15,885	1,769,386	1,363,775	1,363,775
2001	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B	1,346	106,487	1,346	106,487	-1	-1
2017	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 8A	1,182	131,664	11,346	1,263,891	1,132,227	1,132,227
2018	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 8A	412	32,593	6,055	479,594	447,001	447,001
2035	MISCELLANEOUS UNDERGROUND WORKS	Cross Slit n°1	652	56,981	653	56,983	2	2
2036	MISCELLANEOUS UNDERGROUND WORKS	Cross Slit n°1	201	11,770	201	11,771	1	1
2048	MISCELLANEOUS UNDERGROUND WORKS	Ventilation Gallery Parallel to Transportation Tunnel T3	5,447	533,494	5,447	533,494		
7	**MISCELLANEOUS UNDERGROUND WORKS**		13,513	1,355,353	43,711	4,569,207	3,213,855	3,213,855
	Total		**521,119**	**44,328,131**	**1,190,927**	**110,625,911**	**66,297,780**	**55,692,246**

N°	Category	Item	TEAS			CLIENT			DIFFERENCES		
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount	Δamount TEAS UNIT PRICE
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	P1*(Q2-Q1)
321	TRANSPORTATION TUNNELS	Transportation Tunnel T1	1,972.30	257.76	508,380.05	5,316.54	257.76	1,370,391.35	3,344.24	862,011.30	862,011.30
322	TRANSPORTATION TUNNELS	Transportation Tunnel T1	1,972.30	302.76	597,133.55	5,316.54	302.76	1,609,635.65	3,344.24	1,012,502.10	1,012,502.10
340	TRANSPORTATION TUNNELS	Transportation Tunnel T2	1,980.47	257.76	510,484.66	5,161.97	257.76	1,330,549.39	3,181.51	820,064.73	820,064.73
341	TRANSPORTATION TUNNELS	Transportation Tunnel T2	1,980.47	302.76	599,605.58	5,161.97	302.76	1,562,838.04	3,181.51	963,232.45	963,232.45
345	TRANSPORTATION TUNNELS	Transportation Tunnel T2				753.10	302.76	228,008.56	753.10	228,008.56	
358	TRANSPORTATION TUNNELS	Transportation Tunnel T3	7,328.65	257.76	1,889,033.80	11,203.72	257.76	2,887,870.87	3,875.07	998,837.07	998,837.07
359	TRANSPORTATION TUNNELS	Transportation Tunnel T3	7,328.65	302.76	2,218,823.22	11,203.72	302.76	3,392,038.27	3,875.07	1,173,215.05	1,173,215.05
361	TRANSPORTATION TUNNELS	Transportation Tunnel T3				2,950.00	302.76	893,142.00	2,950.00	893,142.00	
373	TRANSPORTATION TUNNELS	Transportation Tunnel T3'	2,153.43	257.76	555,069.33	4,183.83	257.76	1,078,424.02	2,030.40	523,354.69	523,354.69
374	TRANSPORTATION TUNNELS	Transportation Tunnel T3'	2,153.43	302.76	651,973.89	4,183.83	302.76	1,266,696.37	2,030.40	614,722.48	614,722.48
376	TRANSPORTATION TUNNELS	Transportation Tunnel T3'				2,755.80	302.76	834,346.01	2,755.80	834,346.01	
388	TRANSPORTATION TUNNELS	Transportation Tunnel T37				876.00	302.76	265,217.76	876.00	265,217.76	
389	TRANSPORTATION TUNNELS	Transportation Tunnel T37	1,573.57	257.76	405,604.18	3,295.16	257.76	849,360.44	1,721.59	443,756.27	443,756.27
390	TRANSPORTATION TUNNELS	Transportation Tunnel T37	1,573.57	302.76	476,414.96	3,295.16	302.76	997,642.64	1,721.59	521,227.68	521,227.68
404	TRANSPORTATION TUNNELS	Transportation Tunnel T4	3,769.98	257.76	971,749.95	10,852.86	257.76	2,797,433.19	7,082.88	1,825,683.24	1,825,683.24
405	TRANSPORTATION TUNNELS	Transportation Tunnel T4	3,769.98	302.76	1,141,399.03	10,852.86	302.76	3,285,811.89	7,082.88	2,144,412.86	2,144,412.86
406	TRANSPORTATION TUNNELS	Transportation Tunnel T4	4,476.42	257.76	1,153,840.91	3,579.77	257.76	922,721.52	-896.65	-231,119.39	-231,119.39
407	TRANSPORTATION TUNNELS	Transportation Tunnel T4	4,476.42	302.76	1,355,279.62	3,579.77	302.76	1,083,811.17	-896.65	-271,468.45	-271,468.45
409	TRANSPORTATION TUNNELS	Transportation Tunnel T4				3,227.00	302.76	977,006.52	3,227.00	977,006.52	
421	TRANSPORTATION TUNNELS	Transportation Tunnel T5A	534.30	257.76	137,733.00	1,398.54	257.76	360,487.67	864.24	222,754.67	222,766.50
422	TRANSPORTATION TUNNELS	Transportation Tunnel T5A	534.30	302.76	161,779.00	1,398.54	302.76	423,421.97	864.24	261,642.97	261,657.30
433	TRANSPORTATION TUNNELS	Transportation Tunnel T6	480.93	257.76	123,965.15	2,340.58	257.76	603,307.90	1,859.65	479,342.75	479,342.75
434	TRANSPORTATION TUNNELS	Transportation Tunnel T6	480.93	302.76	145,607.11	2,340.58	302.76	708,634.00	1,859.65	563,026.89	563,026.89
436	TRANSPORTATION TUNNELS	Transportation Tunnel T6				390.00	302.76	118,076.40	390.00	118,076.40	
451	TRANSPORTATION TUNNELS	Transportation Tunnel T7	969.30	257.76	249,846.10	2,475.66	257.76	638,126.12	1,506.36	388,280.02	388,280.02
452	TRANSPORTATION TUNNELS	Transportation Tunnel T7	969.30	302.76	293,464.49	2,475.66	302.76	749,530.82	1,506.36	456,066.33	456,066.33
454	TRANSPORTATION TUNNELS	Transportation Tunnel T7				552.00	302.76	167,123.52	552.00	167,123.52	
466	TRANSPORTATION TUNNELS	Transportation Tunnel T7A	481.66	257.76	124,151.73	2,072.34	257.76	534,166.36	1,590.68	410,014.63	410,014.63
467	TRANSPORTATION TUNNELS	Transportation Tunnel T7A	481.66	302.76	145,826.26	2,072.34	302.76	627,421.66	1,590.68	481,595.40	481,595.40
469	TRANSPORTATION TUNNELS	Transportation Tunnel T7A				178.90	302.76	54,163.76	178.90	54,163.76	
484	TRANSPORTATION TUNNELS	Transportation Tunnel T 22	1,581.71	257.76	407,701.18	3,261.72	257.76	840,740.95	1,680.01	433,039.77	433,039.77
485	TRANSPORTATION TUNNELS	Transportation Tunnel T 22	1,581.71	302.76	478,878.06	3,261.72	302.76	987,518.35	1,680.01	508,640.28	508,640.28
487	TRANSPORTATION TUNNELS	Transportation Tunnel T 22				261.60	302.76	79,202.02	261.60	79,202.02	
500	TRANSPORTATION TUNNELS	Transportation Tunnel, Stretch from T3 to T37	143.82	257.76	37,071.04	175.78	257.76	45,309.05	31.96	8,238.01	8,238.01
501	TRANSPORTATION TUNNELS	Transportation Tunnel, Stretch from T3 to T37	143.82	302.76	43,542.94	175.78	302.76	53,219.15	31.96	9,676.21	9,676.21
513	TRANSPORTATION TUNNELS	Transportation Tunnel T8	649.92	257.76	167,523.94	2,689.72	257.76	693,302.23	2,039.80	525,778.29	525,778.29
514	TRANSPORTATION TUNNELS	Transportation Tunnel T8	649.92	302.76	196,770.44	2,689.72	302.76	814,339.63	2,039.80	617,569.19	617,569.19
516	TRANSPORTATION TUNNELS	Transportation Tunnel T8				314.00	302.76	95,066.64	314.00	95,066.64	
532	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 A				512.60	257.76	132,127.78	512.60	132,127.78	
533	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 A				512.60	302.76	155,194.78	512.60	155,194.78	
543	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 *				565.92	257.76	145,871.54	565.92	145,871.54	
544	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 *				565.92	302.76	171,337.94	565.92	171,337.94	
1	TRANSPORTATION TUNNELS Totale		56,193		15,748,653	130,432		36,830,636	74,239	21,081,983	16,766,124

N°	Category	Item	TEAS			CLIENT			DIFFERENCES		
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount	Δamount TEAS UNIT PRICE
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	P1*(Q2-Q1)
558	ACCESS ADITS	Access Adits P1	1,044	258	269,132	4,217	258	1,087,072	3,173	817,940	817,940
559	ACCESS ADITS	Access Adits P1	1,044	303	316,117	4,217	303	1,276,854	3,173	960,737	960,737
561	ACCESS ADITS	Access Adits P1				182	303	55,102	182	55,102	
575	ACCESS ADITS	Access Adit P11	638	258	164,404	780	258	200,937	142	36,533	36,533
576	ACCESS ADITS	Access Adit P11	638	303	193,106	780	303	236,017	142	42,911	42,911
587	ACCESS ADITS	Access Adit P13	357	258	92,086	437	258	112,553	79	20,467	20,467
588	ACCESS ADITS	Access Adit P13	357	303	108,163	437	303	132,203	79	24,041	24,041
601	ACCESS ADITS	Access Adit P16	223	258	57,484	273	258	70,260	50	12,776	12,776
602	ACCESS ADITS	Access Adit P16	223	303	67,520	273	303	82,526	50	15,006	15,006
616	ACCESS ADITS	Access Adit P16B	270	258	69,529	330	258	84,981	60	15,452	15,452
617	ACCESS ADITS	Access Adit P16B	270	303	81,668	330	303	99,817	60	18,149	18,149
628	ACCESS ADITS	Access Adit P1B	362	258	93,290	362	258	93,283	0	-7	-7
629	ACCESS ADITS	Access Adit P1B	362	303	109,577	362	303	109,569	0	-8	-8
631	ACCESS ADITS	Access Adit P1B				15	303	4,541	15	4,541	
645	ACCESS ADITS	Access Adit P21	316	258	81,326	1,218	258	314,021	903	232,696	232,696
646	ACCESS ADITS	Access Adit P21	316	303	95,523	1,218	303	368,843	903	273,320	273,320
648	ACCESS ADITS	Access Adit P21				296	303	89,617	296	89,617	
662	ACCESS ADITS	Access Adit P23	615	258	158,651	2,339	258	602,968	1,724	444,317	444,317
663	ACCESS ADITS	Access Adit P23	615	303	186,348	2,339	303	708,234	1,724	521,886	521,886
666	ACCESS ADITS	Access Adit P23				115	303	34,817	115	34,817	
679	ACCESS ADITS	Access Adit P25 & P25'	5,089	258	1,311,787	6,099	258	1,571,980	1,009	260,193	260,193
680	ACCESS ADITS	Access Adit P25 & P25'	5,089	303	1,540,800	6,099	303	1,846,418	1,009	305,618	305,618
682	ACCESS ADITS	Access Adit P25 & P25'				293	303	88,709	293	88,709	
694	ACCESS ADITS	Access Adit P25A	258	258	66,386	1,343	258	346,197	1,086	279,811	279,811
695	ACCESS ADITS	Access Adit P25A	258	303	77,976	1,343	303	406,637	1,086	328,661	328,661
697	ACCESS ADITS	Access Adit P25A				3,417	303	1,034,531	3,417	1,034,531	
709	ACCESS ADITS	Access Adit P28-28*	341	258	87,877	1,606	258	414,019	1,265	326,143	326,143
710	ACCESS ADITS	Access Adit P28-28*	341	303	103,218	1,606	303	486,299	1,265	383,081	383,081
712	ACCESS ADITS	Access Adit P28-28*				391	303	118,317	391	118,317	
726	ACCESS ADITS	Access Adit P3	442	258	113,940	1,583	258	408,065	1,141	294,125	294,125
727	ACCESS ADITS	Access Adit P3	442	303	133,832	979	303	296,463	537	162,631	162,631
729	ACCESS ADITS	Access Adit P3				175	303	52,832	175	52,832	
742	ACCESS ADITS	Access Adit P35	124	258	31,928	133	258	34,251	9	2,323	2,323
743	ACCESS ADITS	Access Adit P35	124	303	37,502	133	303	40,231	9	2,728	2,728
745	ACCESS ADITS	Access Adit P35				224	303	67,903	224	67,903	
762	ACCESS ADITS	Access Adit P40	208	258	53,600	511	258	131,806	303	78,205	78,205
763	ACCESS ADITS	Access Adit P40	208	303	62,958	511	303	154,816	303	91,858	91,858
766	ACCESS ADITS	Access Adit P40				223	303	67,364	223	67,364	
781	ACCESS ADITS	Access Adit P80	413	258	106,472	502	258	129,501	89	23,029	23,029
782	ACCESS ADITS	Access Adit P80	413	303	125,060	502	303	152,110	89	27,050	27,050
2	ACCESS ADITS Totale		21,399		5,997,261	48,192		13,612,666	26,794	7,615,405	6,001,672

N°	Category	Item	TEAS			CLIENT			DIFFERENCES		
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount	Δamount TEAS UNIT PRICE
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	P1*(Q2-Q1)
1225	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	774	167	129,606				-774	-129,606	-129,606
1227	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	4,032	258	1,039,165	27,825	258	7,172,157	23,793	6,132,992	6,132,992
1228	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	4,032	303	1,220,583	27,825	303	8,424,279	23,793	7,203,696	7,203,696
1232	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch				70,552	303	21,360,324	70,552	21,360,324	
1249	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank	3,592	167	601,480				-3,592	-601,480	-601,480
1251	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank	8,000	258	2,061,960	18,311	258	4,719,722	10,311	2,657,763	2,657,763
1252	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank	8,000	303	2,421,938	18,311	303	5,543,696	10,311	3,121,758	3,121,758
1256	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left Bank				804	303	243,419	804	243,419	
1273	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	1,003	167	167,952	67	167	11,219	-936	-156,733	-156,733
1275	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	3,858	258	994,447	4,102	258	1,057,448	244	63,001	63,001
1276	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	3,858	303	1,168,058	4,102	303	1,242,058	244	73,999	73,999
1279	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right Bank				597	303	180,748	597	180,748	
1298	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	673	167	112,757	68	167	11,370	-605	-101,388	-101,388
1300	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	3,507	258	904,073	21,078	258	5,432,947	17,570	4,528,873	4,528,873
1301	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	3,507	303	1,061,907	21,078	303	6,381,436	17,570	5,319,529	5,319,529
1305	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch				2,392	303	724,081	2,392	724,081	
1322	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	3,269	167	547,347	110	167	18,436	-3,159	-528,911	-528,911
1324	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	7,280	258	1,876,383	6,900	258	1,778,469	-380	-97,914	-97,914
1325	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	7,280	303	2,203,964	6,900	303	2,088,956	-380	-115,008	-115,008
1329	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left Bank				1,351	303	409,029	1,351	409,029	
1345	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	1,184	167	198,184	79	167	13,245	-1,104	-184,938	-184,938
1347	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	4,552	258	1,173,447	4,841	258	1,247,785	288	74,338	74,338
1348	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	4,552	303	1,378,309	4,841	303	1,465,625	288	87,316	87,316
1351	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Right Bank				786	303	237,969	786	237,969	
1365	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1	938	258	241,845	3,419	258	881,287	2,481	639,441	639,441
1366	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1	938	303	284,067	3,419	303	1,035,142	2,481	751,076	751,076
1368	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1				430	303	130,187	430	130,187	
1379	DIVERSION TUNNELS & AUXILIARY TUNNEL	DT-3 given TT-1 TT-2	5,360	303	1,622,685	5,360	303	1,622,685			
1399	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	2,918	258	752,215	5,058	258	1,303,665	2,139	551,450	551,450
1400	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	2,918	303	883,537	5,058	303	1,531,260	2,139	647,723	647,723
1416	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Chamber	711	258	183,206	1,016	258	261,799	305	78,593	78,593
1417	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Chamber	711	303	215,190	1,016	303	307,504	305	92,314	92,314
1419	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Chamber				34	303	10,385	34	10,385	
1433	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Chamber	633	258	163,178	1,107	258	285,294	474	122,116	122,116
1434	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Chamber	633	303	191,665	1,107	303	335,101	474	143,436	143,436
3	DIVERSION TUNNELS & AUXILIARY TUNNEL Totale		88,712		23,799,150	269,940		77,468,725	181,228	53,669,575	30,373,435

N°	Category	Item	TEAS			CLIENT			DIFFERENCES		
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount	Δamount TEAS UNIT PRICE
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	P1*(Q2-Q1)
1447	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate chamber	378	167	63,296			0	-378	-63,296	-63,296
1449	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate chamber	1,406	258	362,514	3,189	258	822,118	1,783	459,604	459,604
1450	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate chamber	1,406	303	425,802	3,189	303	965,644	1,783	539,842	539,842
1453	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate chamber				480	303	145,325	480	145,325	
1472	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	1,101	258	283,670	1,345	258	346,708	245	63,038	63,038
1473	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber	1,101	303	333,193	1,345	303	407,236	245	74,043	74,043
1493	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks	1,213	258	312,599	2,677	258	690,127	1,465	377,528	377,528
1494	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks	1,213	303	367,172	2,677	303	810,610	1,465	443,437	443,437
1496	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks				122	303	37,049	122	37,049	
1520	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	2,502	258	644,866	10,747	258	2,770,203	8,245	2,125,337	2,125,337
1521	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	2,502	303	757,447	10,747	303	3,253,828	8,245	2,496,381	2,496,381
1559	POWER FACILITIES	Receiver hall				330	258	85,061	330	85,061	
1560	POWER FACILITIES	Receiver hall				330	303	99,911	330	99,911	
1577	POWER FACILITIES	Transformer Hall	1,589	258	409,572	7,327	258	1,888,690	5,738	1,479,118	1,479,118
1578	POWER FACILITIES	Transformer Hall	1,589	303	481,075	7,327	303	2,218,419	5,738	1,737,344	1,737,344
1594	POWER FACILITIES	Transformer Hall				487	303	147,444	487	147,444	
1606	POWER FACILITIES	Bus Duct Galleries (Units 5 & 6)	942	258	242,918	3,387	303	1,025,351	2,444	782,433	630,032
1610	POWER FACILITIES	Bus Duct Galleries (Units 5 & 6)	942	303	285,327	94	303	28,399	-849	-256,928	-256,928
1628	POWER FACILITIES	Bus Duct Galleries (Units №1 and №2)	899		62,983				-899	-62,983	
1644	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-19			318,779	73	303	21,950	73	-296,829	
1655	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-14									
1664	POWER FACILITIES	Collectors 1-9				3,869	303	1,171,354	3,869	1,171,354	
1677	POWER FACILITIES	Cable Tunnel 1	2,778	258	716,000	5,231	258	1,348,384	2,453	632,383	632,383
1678	POWER FACILITIES	Cable Tunnel 1	2,778	303	841,001	5,231	303	1,583,786	2,453	742,785	742,785
1680	POWER FACILITIES	Cable Tunnel 1				1,537	303	465,342	1,537	465,342	
1692	POWER FACILITIES	Cable tunnel 2	1,528	258	393,816	2,672	258	688,709	1,144	294,893	294,893
1693	POWER FACILITIES	Cable tunnel 2	1,528	303	462,568	2,672	303	808,944	1,144	346,376	346,376
1696	POWER FACILITIES	Cable tunnel 2				846	303	256,135	846	256,135	
1709	POWER FACILITIES	Cable tunnel 1 & 2 (Common Stretch)	564	258	145,337	2,271	258	585,445	1,707	440,108	440,108
1710	POWER FACILITIES	Cable tunnel 1 & 2 (Common Stretch)	564	303	170,710	2,271	303	687,653	1,707	516,943	516,943
1720	POWER FACILITIES	Cable Galleries				3,328	258	857,753	3,328	857,753	
1721	POWER FACILITIES	Cable Galleries				3,328	303	1,007,501	3,328	1,007,501	
4	POWER FACILITIES Totale		28,522		8,080,645	89,131		25,225,079	60,610	17,144,434	13,078,971

N°	Category	Item	TEAS			CLIENT			DIFFERENCES		
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount	Δamount TEAS UNIT PRICE
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	P1*(Q2-Q1)
1735	GROUTING GALLERIES	Dam Curtain Grouting Gallery, Joint Left - Right	2,289	258	590,087	2,651	258	683,255	361	93,168	93,168
1736	GROUTING GALLERIES	Dam Curtain Grouting Gallery, Joint Left - Right	2,289	303	693,104	2,651	303	802,538	361	109,434	109,434
1738	GROUTING GALLERIES	Dam Curtain Grouting Gallery, Joint Left - Right				560	303	169,546	560	169,546	
1751	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Active Stretch	1,830	258	471,804	3,140	258	809,325	1,309	337,521	337,521
1752	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Active Stretch	1,830	303	554,172	3,140	303	950,618	1,309	396,446	396,446
1766	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Passive Stretch	1,843	258	475,129	3,140	258	809,325	1,297	334,196	334,196
1767	GROUTING GALLERIES	Dam Curtain Grouting Gallery Left Bank, Passive Stretch	1,843	303	558,078	3,140	303	950,618	1,297	392,540	392,540
1773	GROUTING GALLERIES	Cement-grout curtain of upper coffeedam									
1788	GROUTING GALLERIES	Combined Saline & Dam Curtain Grouting Gallery,	3,029	258	780,703	3,672	258	946,477	643	165,773	165,773
1789	GROUTING GALLERIES	Combined Saline & Dam Curtain Grouting Gallery,	3,029	303	916,999	3,672	303	1,111,714	643	194,714	194,714
1807	GROUTING GALLERIES	Dam Grouting Gallery 1	261	258	67,275	581	258	149,877	320	82,602	82,602
1808	GROUTING GALLERIES	Dam Grouting Gallery 1	261	303	79,020	581	303	176,043	320	97,022	97,022
1820	GROUTING GALLERIES	Dam Grouting Gallery 2	232	258	59,852	673	258	173,524	441	113,672	113,672
1821	GROUTING GALLERIES	Dam Grouting Gallery 2	232	303	70,301	673	303	203,818	441	133,517	133,517
1838	GROUTING GALLERIES	Dam Grouting Gallery 3	63	258	16,342	75	258	19,360	12	3,018	3,018
1839	GROUTING GALLERIES	Dam Grouting Gallery 3	63	303	19,195	75	303	22,740	12	3,545	3,545
5	GROUTING GALLERIES Totale		18,575		5,352,062	28,424		7,978,778	9,327	2,626,716	2,457,170
1856	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	3,690	167	617,891	2,250	167	376,763	-1,440	-241,128	-241,128
1857	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers		11			11				
1859	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	2,470	258	636,661	3,727	258	960,563	1,257	323,902	323,902
1860	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	2,470	303	747,810	3,727	303	1,128,259	1,257	380,450	380,450
1862	DRAINAGE GALLERIES	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers				962	303	291,255	962	291,255	
1881	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	187	258	48,114	542	258	139,670	355	91,556	91,556
1882	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	187	303	56,513	542	303	164,054	355	107,540	107,540
1884	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Gate				123	303	37,239	123	37,239	
1902	DRAINAGE GALLERIES	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	109	258	28,053	342	258	88,236	233	60,183	60,184
1903	DRAINAGE GALLERIES	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	109	303	32,950	342	303	103,641	233	70,691	70,691
1920	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	755	258	194,712	877	258	226,007	121	31,295	31,295
1921	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	755	303	228,705	877	303	265,463	121	36,758	36,758
1923	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)					303				
1939	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)	821	258	211,544	971	258	250,215	150	38,672	38,672
1940	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)	821	303	248,475	971	303	293,898	150	45,423	45,423
1942	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)				179	303	54,161	179	54,161	
1958	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)	1,248	258	321,684	1,248	258	321,684			
1959	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)	1,248	303	377,844	1,248	303	377,844			
1961	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)				43	303	13,068	43	13,068	
6	DRAINAGE GALLERIES Totale		14,869		3,750,956	18,970		5,092,021	4,101	1,341,066	945,343

N°	Category	Item	TEAS			CLIENT			DIFFERENCES		
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount	Δamount TEAS UNIT PRICE
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1	P1*(Q2-Q1)
1976	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T5A	59	258	15,156	69	258	17,909	11	2,753	2,753
1977	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T5A	59	303	17,802	69	303	21,036	11	3,233	3,233
1991	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T4	59	258	15,156	542	258	139,670	483	124,514	124,514
1992	MISCELLANEOUS UNDERGROUND WORKS	Explosive Warehouse T4	59	303	17,802	542	303	164,054	483	146,251	146,251
2007	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B	1,059	258	272,915	3,791	258	977,122	2,732	704,206	704,206
2008	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B	1,059	303	320,561	3,791	303	1,147,709	2,732	827,147	827,147
2010	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B				89	303	26,885	89	26,885	
2024	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 8A	358	258	92,231	3,828	258	986,762	3,470	894,531	894,531
2025	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 8A	358	303	108,333	3,828	303	1,159,032	3,470	1,050,699	1,050,699
2027	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 8A				156	303	47,140	156	47,140	
2039	MISCELLANEOUS UNDERGROUND WORKS	Cross Slit n°1	154	258	39,593	188	258	48,394	34	8,801	8,801
2040	MISCELLANEOUS UNDERGROUND WORKS	Cross Slit n°1	154	303	46,505	188	303	56,843	34	10,338	10,338
2051	MISCELLANEOUS UNDERGROUND WORKS	Ventilation Gallery Parallel to Transportation Tunnel T3	980	258	252,705	1,198	258	308,861	218	56,156	56,153
2052	MISCELLANEOUS UNDERGROUND WORKS	Ventilation Gallery Parallel to Transportation Tunnel T3	980	303	296,823	1,198	303	362,782	218	65,959	65,956
7	MISCELLANEOUS UNDERGROUND WORKS Totale		5,336		1,495,584	19,477		5,464,198	14,141	3,968,614	3,894,584
	Total		**233,606**		**64,224,310**	**604,567**		**171,672,103**	**370,439**	**107,447,793**	**73,517,298**

N°	Category	Item	TEAS			CLIENT				
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
315	TRANSPORTATION TUNNELS	Transportation Tunnel T1	4,612.0	25.8	119,174.1	9,745.0	25.8	251,810.8	5,133.0	132,636.7
343	TRANSPORTATION TUNNELS	Transportation Tunnel T2	3,187.0	34.0	108,358.0	3,187.0	34.0	108,358.0		
352	TRANSPORTATION TUNNELS	Transportation Tunnel T3	18,531.2	34.0	630,246.1	18,531.2	34.0	630,246.1		
367	TRANSPORTATION TUNNELS	Transportation Tunnel T3'	15,891.5	25.8	410,636.4	15,891.5	25.8	410,636.4		
382	TRANSPORTATION TUNNELS	Transportation Tunnel T37	4,665.4	25.8	120,553.9	4,665.4	25.8	120,554.0		0.1
415	TRANSPORTATION TUNNELS	Transportation Tunnel T5A	968.8	34.0	32,948.9	968.8	34.0	32,948.9		
443	TRANSPORTATION TUNNELS	Transportation Tunnel T7	2,376.0	42.1	100,124.6	2,376.0	42.1	100,124.6		
444	TRANSPORTATION TUNNELS	Transportation Tunnel T7			85,025.0	6,630.0	34.0	225,486.3	6,630.0	140,461.3
464	TRANSPORTATION TUNNELS	Transportation Tunnel T7A	2,855.0	25.8	73,773.2	28,543.0	25.8	737,551.1	25,688.0	663,777.9
475	TRANSPORTATION TUNNELS	Transportation Tunnel T 22	4,896.0	34.0	166,513.0	4,896.0	34.0	166,513.0		
494	TRANSPORTATION TUNNELS	Transportation Tunnel, Stretch from T3 to T37	3,403.2	25.8	87,938.7	3,403.2	25.8	87,938.7		
507	TRANSPORTATION TUNNELS	Transportation Tunnel T8	7,317.0	34.0	248,851.2	7,317.0	34.0	248,851.2		
527	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 A				1,368.0	25.8	**35,349.1**	1,368.0	35,349.1
528	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 A				152.0	25.8	**3,927.7**	152.0	3,927.7
538	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 *	1,962.0	641.7		3,489.0	25.8	**90,155.8**	1,527.0	90,155.8
539	TRANSPORTATION TUNNELS	Transportation Tunnel t-37 *				96.0	25.8	**2,480.6**	96.0	2,480.6
1	TRANSPORTATION TUNNELS Totale				2,184,143			3,252,932		1,068,789
551	ACCESS ADITS	Access Adits P1	4,146	26	107,140	4,146	26	107,140		
552	ACCESS ADITS	Access Adits P1	360	34	12,244	360	34	12,244		
567	ACCESS ADITS	Access Adit P11	1,879	34	63,901	1,879	34	63,901		
594	ACCESS ADITS	Access Adit P16	333	26	8,605	333	26	8,605		
608	ACCESS ADITS	Access Adit P16B	755	34	25,679	755	34	25,678	0	-1
632	ACCESS ADITS	Access Adit P1B	353	26	9,122	353	34	12,006		2,884
639	ACCESS ADITS	Access Adit P21	8,775	26	226,746	8,775	26	226,746	0	0
655	ACCESS ADITS	Access Adit P23	4,173	26	107,817	7,006	26	181,035	2,834	73,218
656	ACCESS ADITS	Access Adit P23				396	26	10,233	396	10,233
672	ACCESS ADITS	Access Adit P25 & P25'	7,734	26	199,849	7,734	26	199,849		
673	ACCESS ADITS	Access Adit P25 & P25'	1,142	34	38,843	1,142	34	38,843		
688	ACCESS ADITS	Access Adit P25A	2,967	26	76,667	2,967	26	76,667		
703	ACCESS ADITS	Access Adit P28-28*	1,152	26	29,755	2,545	26	65,763	1,394	36,008
719	ACCESS ADITS	Access Adit P3	1,730	26	44,693	1,730	26	44,693		
720	ACCESS ADITS	Access Adit P3	1,026	34	34,908	1,026	34	34,908		
735	ACCESS ADITS	Access Adit P35	3,613	26	93,355	3,613	26	93,355		
751	ACCESS ADITS	Access Adit P40	7,604	26	196,480	7,604	26	196,480		
772	ACCESS ADITS	Access Adit P80	9,521	26	246,012	9,521	26	246,012		
2	ACCESS ADITS Totale				1,521,815			1,644,156		122,341

N°	Category	Item	TEAS			CLIENT				
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
1216	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Pressure Stretch	7,769	42	327,390	22,590	42	951,943	14,821	624,553
1239	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left B	2,794	34	95,024	2,794	34	95,024		
1240	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow stretch, Left B	18,336	42	772,679	18,336	42	772,679		
1269	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level I - Free Flow Stretch, Right	17,231	34	586,026	17,231	34	586,026		
1285	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch	6,759	42	284,828	6,759	42	284,829		1
1286	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch				2,051	42	86,429	2,051	86,429
1287	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch				3,672	34	124,885	3,672	124,885
1288	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch				2,660	34	90,467	2,660	90,467
1289	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Pressure Stretch				128	34	4,353	128	4,353
1312	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left I	2,175	34	73,968	2,175	34	73,968		
1313	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Level II - Free Flow Stretch, Left I	17,085	42	719,962	17,085	42	719,962		
1357	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1	5,668	42	238,858				-5,668	-238,858
1358	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1				4,231	34	143,896	4,231	143,896
1359	DIVERSION TUNNELS & AUXILIARY TUNNEL	Auxiliary Tunnel of Diversion Tunnel Level 1				1,541	43	66,571	1,541	66,571
1387	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	55	42	2,318	55	42	2,318		
1388	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	330	53	17,599	330	53	17,599		
1389	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	970	103	99,794	970	103	99,794		
1390	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Maintenance Gate Chamber	3,685	34	125,327	3,685	42	155,323		29,996
1406	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Cha	55	42	2,318	55	42	2,318		
1407	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Cha	389	53	20,745	389	53	20,745		
1408	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel Emergency and Sector Gate Cha	3,285	103	337,961	3,285	103	337,961		
1427	DIVERSION TUNNELS & AUXILIARY TUNNEL	Diversion Tunnel - Downstream Gate & Vent. Chan	1,600	26	41,344	1,600	26	41,344		
3	DIVERSION TUNNELS & AUXILIARY TUNNEL Totale				3,746,141			4,678,433		932,292
1441	POWER FACILITIES	Stage 1 Power Tunnel - From Intake to Gate cham	1,591	34	54,110	7,860	34	267,319	6,269	213,209
1464	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber			120,491	1,088	414	450,704	1,088	330,213
1465	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber				720	414	298,260	720	298,260
1466	POWER FACILITIES	Power Tunnel Stage 1 - Gate Chamber				354	414	146,645	354	146,645
1481	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penstocks				2,942	42	123,976	2,942	123,976
1482	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penst	80	42	3,371	3,011	42	126,884	2,931	123,512
1483	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penst	1,924	53	102,607	1,924	53	102,607		
1484	POWER FACILITIES	Power Tunnel Stage 1 - Erection Chamber & Penst	2,566	103	263,990	2,566	103	263,990		
1504	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 9	8,096	53	431,922	12,320	53	657,272	4,224	225,350
1505	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				13,215	26	341,476	13,215	341,476
1522	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl		1,413	0					
1523	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl		1,615	0					
1524	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl		1,824	0					
1525	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				186	329	61,193	186	61,193
1526	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				69	329	22,676	69	22,676
1527	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				74	329	24,320	74	24,320
1528	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				1,043	350	364,771	1,043	364,771
1529	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				4,023	345	1,389,613	4,023	1,389,613
1530	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				284	329	93,399	284	93,399

N°	Category	Item	TEAS			CLIENT				
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
1531	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				6,932	329	2,278,264	6,932	2,278,264
1532	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				4,880	329	1,603,763	4,880	1,603,763
1533	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl			1,426,536	637	329	209,344	637	-1,217,192
1534	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				7,654	414	3,170,690	7,654	3,170,690
1535	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				374	414	154,931	374	154,931
1536	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				84	414	34,797	84	34,797
1537	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				198	374	74,139	198	74,139
1538	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				23	374	8,462	23	8,462
1539	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				5,463	374	2,045,379	5,463	2,045,379
1540	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				580	330	191,574	580	191,574
1541	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				75	330	24,773	75	24,773
1542	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				8,597	313	2,693,283	8,597	2,693,283
1543	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				11,040	313	3,458,832	11,040	3,458,832
1544	POWER FACILITIES	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl				4,260	414	1,764,717	4,260	1,764,717
1557	POWER FACILITIES	Receiver hall				3,840	34	130,598	3,840	130,598
1567	POWER FACILITIES	Transformer Hall	12,048	46	560,068				-12,048	-560,068
1568	POWER FACILITIES	Transformer Hall				16,833	26	434,965	16,833	434,965
1569	POWER FACILITIES	Transformer Hall				14,191	53	756,806	14,191	756,806
1579	POWER FACILITIES	Transformer Hall				13,410	414	5,554,963	13,410	5,554,963
1580	POWER FACILITIES	Transformer Hall				1,260	414	521,958	1,260	521,958
1581	POWER FACILITIES	Transformer Hall				1,199	414	496,585	1,199	496,585
1582	POWER FACILITIES	Transformer Hall				2,220	414	919,641	2,220	919,641
1583	POWER FACILITIES	Transformer Hall				5,059	347	1,757,786	5,059	1,757,786
1584	POWER FACILITIES	Transformer Hall				10,717	347	3,723,514	10,717	3,723,514
1585	POWER FACILITIES	Transformer Hall				473	347	164,165	473	164,165
1586	POWER FACILITIES	Transformer Hall				6,263	347	2,175,843	6,263	2,175,843
1587	POWER FACILITIES	Transformer Hall				5,786	330	1,911,413	5,786	1,911,413
1588	POWER FACILITIES	Transformer Hall				0	350	0		
1589	POWER FACILITIES	Transformer Hall	200	1,764	352,894	153	345	52,846	-47	-300,048
1590	POWER FACILITIES	Transformer Hall	80	1,925	154,010	1,299	345	448,778	1,219	294,769
1591	POWER FACILITIES	Transformer Hall				1,523	329	500,354	1,523	500,354
1592	POWER FACILITIES	Transformer Hall				0	329	0		
1600	POWER FACILITIES	Bus Duct Galleries (Units 5 & 6)	3,927	34	133,557	3,927	34	133,557		
1601	POWER FACILITIES	Bus Duct Galleries (Units 5 & 6)	1,399	42	58,954	1,399	42	58,954		
1635	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-10	4,200	42	176,988	13,680	42	576,475	9,480	399,487
1636	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-11				1,380	34	46,934	1,380	46,934
1651	POWER FACILITIES	Main Draft Tubes Collector of Units 4-5-10	8,460	42	356,504				-8,460	-356,504
1674	POWER FACILITIES	Cable Tunnel 1	6,575		169,898	13,872	34	471,787	7,297	301,889
1694	POWER FACILITIES	Cable tunnel 2	7,840		202,586	17,640	34	599,936	9,800	397,351
1706	POWER FACILITIES	Cable tunnel 1 & 2 (Common Stretch)	459		11,861	459	34	15,611		3,750
4	POWER FACILITIES Totale				4,580,346			43,901,524		39,321,178

N°	Category	Item	TEAS			CLIENT				
			Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount
			Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
1797	GROUTING GALLERIES	Dam Grouting Gallery 1	1,132	26	29,243	1,132	26	29,243		
5	GROUTING GALLERIES Totale				29,243			29,243		0
1870	DRAINAGE GALLERIES	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	781	26	20,184	781	26	20,184		
1891	DRAINAGE GALLERIES	Drainage Gallery 4 of Stage 1 Power Tunnel Gate (	511	26	13,204	511	26	13,204		
1909	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	9,957	26	257,279	9,957	26	257,279		
1910	DRAINAGE GALLERIES	Powerhouse Drainage Gallery, Low Level (DT1)	1,817	34	61,793	1,817	34	61,793		
1929	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT2)	3,835	26	99,086	3,835	26	99,086		
1948	DRAINAGE GALLERIES	Drainage Gallery, Powerhouse Mid Level (DT3)	8,401	26	217,074	8,401	26	217,074		
6	DRAINAGE GALLERIES Totale				668,619			668,619		0
1998	MISCELLANEOUS UNDERGROUND WORKS	Conveyor Line 7A and 7B	337	26	8,719	337	26	8,718	0	0
2033	MISCELLANEOUS UNDERGROUND WORKS	Cross Slit n°1	406	34	13,820	406	34	13,822	0	1
2046	MISCELLANEOUS UNDERGROUND WORKS	Ventilation Gallery Parallel to Transportation Tunne	2,832	26	73,169	2,832	26	73,169		
7	MISCELLANEOUS UNDERGROUND WORKS Totale				95,708			95,709		1
	Total				**12,826,015**			**54,270,617**		**41,444,601**

N°	ITEM				TEAS			CLIENT			DIFFERENCES	
					Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount
					Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
	323	Transportation Tunnel T1	Grouting	m2				2,800.00	36.89	103,292.00	2,800.00	103,292.00
	337	Transportation Tunnel T2	Percussion contact grouting holes diam	m		22.40						
	338	Transportation Tunnel T2	Contact pressure grouting (excluding injected materials)	t		160.99						
	344	Transportation Tunnel T2	Grouting	m2			515,528.70	32,709.98	36.89	1,206,671.00	32,709.98	691,142.30
	360	Transportation Tunnel T3	Grouting	m2			1,956,709.44	88,692.20	36.89	3,271,855.26	88,692.20	1,315,145.82
	375	Transportation Tunnel T3'	Grouting	m2			854,246.03	98,865.00	36.89	3,647,129.85	98,865.00	2,792,883.82
	387	Transportation Tunnel T37	Grouting	m2			428,340.02	24,723.00	36.89	912,031.47	24,723.00	483,691.45
	408	Transportation Tunnel T4	Grouting	m2			1,603,776.85	88,271.00	36.89	3,256,317.19	88,271.00	1,652,540.34
	435	Transportation Tunnel T6	Grouting	m2			92,021.38	11,540.00	36.89	425,710.60	11,540.00	333,689.22
	453	Transportation Tunnel T7	Grouting	m2			284,269.40	7,362.60	36.89	271,606.31	7,362.60	-12,663.08
	468	Transportation Tunnel T7A	Grouting	m2			133,050.32	6,360.60	36.89	234,642.53	6,360.60	101,592.21
	486	Transportation Tunnel T 22	Grouting	m2			254,761.53	7,095.00	36.89	261,734.55	7,095.00	6,973.02
	515	Transportation Tunnel T8	Grouting	m2			310,194.50	9,290.00	36.89	342,708.10	9,290.00	32,513.60
1	**TRANSPORTATION TUNNELS**						**6,432,898**			**13,933,699**		**7,500,801**
	560	Access Adits P1	Grouting	m2			115,920	3,195	37	117,864	3,195	1,943
	630	Access Adit P1B	Grouting	m2				544	37	20,068	544	20,068
	647	Access Adit P21	Grouting	m2			45,489	10,810	37	398,781	10,810	353,292
	665	Access Adit P23	Grouting	m2			69,667	1,991	37	73,448	1,991	3,781
	681	Access Adit P25 & P25'	Grouting	m2			103,466	3,103	37	114,470	3,103	11,003
	696	Access Adit P25A	Grouting	m2			74,781	2,338	37	86,249	2,338	11,468
	711	Access Adit P28-28*	Grouting	m2			44,022	12,471	37	460,055	12,471	416,033
	728	Access Adit P3	Grouting	m2			91,760	4,655	37	171,716	4,655	79,956
	744	Access Adit P35	Grouting	m2			15,740	428	37	15,789	428	49
	759	Access Adit P40	Percussion contact grouting holes diam	m	285.00	22.40	6,384	642	22	14,381	357	7,997
	760	Access Adit P40	Contact pressure grouting (excluding injected materials)	t	85.00	160.99	13,684	19	161	3,059	-66	-10,625
	765	Access Adit P40	Grouting	m2			24,561	8,018	37	295,784	8,018	271,223
	778	Access Adit P80	Percussion contact grouting holes, holes, 40-48 mm diameter	m	130.00	22.40	2,912	130	22	2,912		0
	779	Access Adit P80	Contact pressure grouting (excluding injected materials)	t	4.00	160.99	644	4	161	644		0
2	**ACCSS ADITS**						**609,030**			**1,775,218**		**1,166,189**

N°	ITEM				TEAS			CLIENT			DIFFERENCES	
					Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq	Amount USD Eq.	D Qty	Δamount
					Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
	1223	Diversion Tunnel Level I - Pressure Stretch	Percussion contact grouting holes, 40-48 mm dia.	m	2,400.00	22.40	53,760	2,400	22	53,760		0
	1225	Diversion Tunnel Level I - Pressure Stretch	Contact & consolidation cement grouting, excluding materials	t	774.00	167.45	129,606				-774	-129,606
	1230	Diversion Tunnel Level I - Pressure Stretch	Consolidation grouting	m			250,213	8,914	167	1,492,649	8,914	1,242,436
	1231	Diversion Tunnel Level I - Pressure Stretch	Grouting	m2				7,055	37	260,263	7,055	260,263
	1247	Diversion Tunnel Level I - Free Flow stretch, Left Bank	Percussion contact grouting holes, 40-48 mm dia.	m	4,000.00	22.40	89,600	4,000	22	89,600		0
	1249	Diversion Tunnel Level I - Free Flow stretch, Left Bank	Contact & consolidation cement grouting, excluding materials	t	3,592.00	167.45	601,480				-3,592	-601,480
	1254	Diversion Tunnel Level I - Free Flow stretch, Left Bank	Consolidation grouting	m			1,200,688	11,970	167	2,004,377	11,970	803,688
	1255	Diversion Tunnel Level I - Free Flow stretch, Left Bank	Grouting	m2				29,084	37	1,072,909	29,084	1,072,909
	1271	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	Percussion contact grouting holes, 40-48 mm dia.	m	2,230.00	22.40	49,952	2,230	22	49,952		0
	1273	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	Contact & consolidation cement grouting, excluding materials	t	1,003.00	167.45	167,952	67	167	11,219	-936	-156,733
	1277	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	Consolidation grouting	m			328,501	3,833	167	641,836	3,833	313,335
	1278	Diversion Tunnel Level I - Free Flow Stretch, Right Bank	Grouting	m2				53,456	37	1,971,992	53,456	1,971,992
	1296	Diversion Tunnel Level II - Pressure Stretch	Percussion contact grouting holes, 40-48 mm dia.	m	2,088.00	22.40	46,771	2,088	22	46,771		0
	1298	Diversion Tunnel Level II - Pressure Stretch	Contact & consolidation cement grouting, excluding materials	t	673.38	167.45	112,757	68	167	11,370	-605	-101,388
	1303	Diversion Tunnel Level II - Pressure Stretch	Consolidation grouting	m			217,685	14,162	167	2,371,410	14,162	2,153,725
	1304	Diversion Tunnel Level II - Pressure Stretch	Grouting	m2				75,504	37	2,785,335	75,504	2,785,335
	1320	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	Percussion contact grouting holes, 40-48 mm dia.	m	3,640.00	22.40	81,536	3,640	22	81,536		0
	1322	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	Contact & consolidation cement grouting, excluding materials	t	3,268.72	167.45	547,347	110	167	18,436	-3,159	-528,911
	1327	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	Consolidation grouting	m			1,092,626	2,540	167	425,290	2,540	-667,337
	1328	Diversion Tunnel Level II - Free Flow Stretch, Left Bank	Grouting	m2				36,551	37	1,348,366	36,551	1,348,366
	1343	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	Percussion contact grouting holes, 40-48 mm dia.	m	2,631.40	22.40	58,943	2,631	22	58,943		0
	1345	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	Contact & consolidation cement grouting, excluding materials	t	1,183.54	167.45	198,184	79	167	13,245	-1,104	-184,938
	1349	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	Consolidation grouting	m			387,631	510	167	85,400	510	-302,231
	1350	Diversion Tunnel Level II - Free Flow Stretch, Right Bank	Grouting	m2				75,546	37	2,786,892	75,546	2,786,892
	1367	Auxiliary Tunnel of Diversion Tunnel Level 1	Grouting	m2			254,804	14,284	37	526,937	14,284	272,133
	1418	Diversion Tunnel Emergency and Sector Gate Chamber	Grouting	m2			39,495	1,076	37	39,694	1,076	199
		Treatment of Fault 35	Treatment of Fault 35				6,948,312			0		-6,948,312
3	**DIVERSION TUNNELS & AUXILIARY TUNNEL**						**12,857,845**			**18,248,181**		**5,390,336**
	1446	Stage 1 Power Tunnel - From Intake to Gate chamber	Rotary consolidation grout holes, 40-48 mm min. diameter	m	7,092.00	36.89	261,624			0	-7,092	-261,624
	1447	Stage 1 Power Tunnel - From Intake to Gate chamber	Contact & consolidation cement grouting, excluding materials	t	378.00	167.45	63,296			0	-378	-63,296
	1451	Stage 1 Power Tunnel - From Intake to Gate chamber	Consolidation grouting excludung injected materials	m				6,086	303	1,842,597	6,086	1,842,597
	1452	Stage 1 Power Tunnel - From Intake to Gate chamber	Contact grouting excluding injected materials	m2				24,683	37	910,556	24,683	910,556
	1495	Power Tunnel Stage 1 - Erection Chamber & Penstocks	Contact grouting excluding injected materials	m2				7,700	258	1,984,850	7,700	1,984,850
	1503	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	Grouted anchor bars, 36 mm diameter, lateral walls	m	21,980.00	24.54	539,389	16,650	25	408,591	-5,330	-130,798
	1511	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	Percussion contact grout holes, 40-48 mm diameter	m	1,689.00	22.40	37,834	1,689	22	37,834		0
	1512	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	Rotary consolidation grout holes, 40-48 mm min. diameter	m	11,265.00	46.89	528,216	4,506	47	211,286	-6,759	-316,930
	1515	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	Contact pressure grouting excluding injected materials	t	172.30	160.99	27,739				-172	-27,739
	1516	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	Consolidation pressure grouting excluding injected materials	t	788.55	172.78	136,246				-789	-136,246
	1546	Powerhouse, Stage 1 down to Elevations 966.5 - 962.2 masl	Grouting	m2				16,904	37	623,589	16,904	623,589
	1593	Transformer Hall	Grouting	m2			472,014	12,992	37	479,275	12,992	7,261
	1605	Bus Duct Galleries (Units 5 & 6)	Grouting	m2			45,587	3,298	37	121,663	3,298	76,077
	1609	Bus Duct Galleries (Units 5 & 6)	Grouting	m2				3,298	37	121,663	3,298	121,663
	1643	Main Draft Tubes Collector of Units 4-5-18	Grouting	m2			174,637	11,434	37	421,800	11,434	247,163
	1654	Main Draft Tubes Collector of Units 4-5-13	Grouting	m2								0
	1679	Cable Tunnel 1	Grouting	m2			115,517	41,336	37	1,524,885	41,336	1,409,368
	1695	Cable tunnel 2	Grouting	m2			202,694	31,936	37	1,178,119	31,936	975,425
4	**POWER FACILITES**						**2,604,792**			**9,866,708**		**7,261,917**

N°	ITEM				TEAS			CLIENT			DIFFERENCES	
					Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq	Amount USD Eq.	D Qty	Δamount
					Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
	1724		**GROUTING GALLERIES**									
	1725	Dam Curtain Grouting Gallery, Joint Left - Right	**Dam Curtain Grouting Gallery, Joint Left - Right**									
	1732	Dam Curtain Grouting Gallery, Joint Left - Right	Percussion contact grouting holes, 40-48 mm dia.	m	525.00	22.40	11,760	500	22	11,200	-25	-560
	1733	Dam Curtain Grouting Gallery, Joint Left - Right	Consolidation grouting excluding injected materials	t	241.00	167.45	40,355	14	161	2,254	-227	-38,102
	1737	Dam Curtain Grouting Gallery, Joint Left - Right	Grouting	m2			74,380	3,897	37	143,760	3,897	69,380
	1741	Dam Curtain Grouting Gallery Left Bank, Active Stretch	**Dam Curtain Grouting Gallery Left Bank, Active Stretch**									
	1748	Dam Curtain Grouting Gallery Left Bank, Active Stretch	Percussion contact grouting holes, 40-48 mm dia.	m	1,000.00	22.40	22,400	1,000	22	22,400		0
	1749	Dam Curtain Grouting Gallery Left Bank, Active Stretch	Contact pressure grouting (excluding injected materials)	t	30.00	160.99	4,830	30	161	4,830		0
	1756	Dam Curtain Grouting Gallery Left Bank, Passive Stretch	**Dam Curtain Grouting Gallery Left Bank, Passive Stretch**									0
	1763	Dam Curtain Grouting Gallery Left Bank, Passive Stretch	Percussion contact grouting holes, 40-48 mm dia.	m	1,050.00	22.40	23,520	1,050	22	23,520		0
	1764	Dam Curtain Grouting Gallery Left Bank, Passive Stretch	Contact pressure grouting (excluding injected materials)	t	30.00	160.99	4,830	30	161	4,830		0
	1772	Top of salt wedge (Ionakhsh Fault Salt protection)	Grouting	m			6,349,446	39,440	161	6,349,446	39,440	0
	1773	Cement-grout curtain of upper coffeedam	**Cement-grout curtain of upper coffeedam**									
	1774	Cement-grout curtain of upper coffeedam	Grouting	m			77,660	482	161	77,662	482	2
	1776	Sealing spline at portal P-5 Противофильтрационный шпонку у портала П	Grouting	m			486,835	3,024	161	486,834	3,024	-1
	1777	Combined Saline & Dam Curtain Grouting Gallery,	**Combined Saline & Dam Curtain Grouting Gallery,**									
	1785	Combined Saline & Dam Curtain Grouting Gallery,	Percussion contact grouting holes, 40-48 mm dia.	m	1,600.00	22.40	35,840	1,600	22	35,840		0
	1786	Combined Saline & Dam Curtain Grouting Gallery,	Contact pressure grouting (excluding injected materials)	t	49.00	160.99	7,889	49	161	7,889		0
	1794	Dam Grouting Gallery 1	**Dam Grouting Gallery 1**									
	1804	Dam Grouting Gallery 1	Percussion contact grouting holes, 40-48 mm dia.	m	500.00	34.59	17,295	500	35	17,295		0
	1805	Dam Grouting Gallery 1	Contact pressure grouting (excluding injected materials)	t	15.00	160.99	2,415	15	161	2,415		0
	1809	Dam Grouting Gallery 1	Consolidation grouting	m			0	43,498	167	7,283,740	43,498	7,283,740
	1813	Dam Grouting Gallery 2	**Dam Grouting Gallery 2**									
	1822	Dam Grouting Gallery 2	Consolidation grouting	m			0	21,020	167	3,519,766	21,020	3,519,766
	1826	Dam Grouting Gallery 3	**Dam Grouting Gallery 3**									
	1835	Dam Grouting Gallery 3	Percussion contact grouting holes, 40-48 mm dia.	m	135.00	34.59	4,670	135	35	4,670		0
	1836	Dam Grouting Gallery 3	Contact pressure grouting (excluding injected materials)	t	4.00	160.99	644	4	161	644		0
	1840	Dam Grouting Gallery 3	Consolidation grouting	m			0	5,638	167	943,999	5,638	943,999
5	**GROUTING GALLERIES**						**7,164,768**			**18,942,991**		**11,778,224**

N°	ITEM				TEAS			CLIENT			DIFFERENCES	
					Qty	Price USD Eq.	Amount USD Eq.	Qty	Price USD Eq.	Amount USD Eq.	D Qty	Δamount
					Q1	P1	A1	Q2	P2	A2	Q2-Q1	A2-A1
	1854	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	Rotary consolidation grout holes, 40-48 mm min. diameter	m	48,000.00	27.91	1,339,680	48,000	28	1,339,680		
	1856	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	Contact & consolidation cement grouting, excluding materials	t	3,690.00	167.45	617,891	2,250	167	376,763	-1,440	-241,128
	1857	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	Cement grouting between concrete and steel lining	m2		11.40			11			
	1861	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	Grouting	m2				25,148	37	927,710	25,148	927,710
	1863	Drainage Gallery 1 & 2 of Diversion Tunnel Gate Chambers	Consolidation grouting	m				13,192	167	2,209,000	13,192	2,209,000
	1877	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	Percussion contact grouting holes, 40-48 mm dia.	m	307.00	34.59	10,619	307	35	10,619		
	1878	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	Rotary impermeabilization grout holes, 40-48 mm min. diameter	m	1,300.00	27.91	36,283	1,800	28	50,238	500	13,955
	1879	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	Contact pressure grouting (excluding injected materials)	t	165.00	167.45	27,629	74	167	12,391	-91	-15,238
	1883	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	Grouting	m2				3,622	37	133,616	3,622	133,616
	1885	Drainage Gallery 3 of Stage 1 Power Tunnel Gate	Consolidation grouting	m				2,286	167	382,791	2,286	382,791
	1896	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	Drilling and grouting									
	1898	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	Percussion contact grouting holes, 40-48 mm dia.	m	243.00	34.59	8,405	243	35	8,405		0
	1899	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	Rotary impermeabilization grout holes, 40-48 mm min. diameter	m	800.00	27.91	22,328	800	28	22,328		0
	1900	Drainage Gallery 4 of Stage 1 Power Tunnel Gate Chamber	Contact pressure grouting (excluding injected materials)	t	47.00	167.45	7,870	47	167	7,870		0
	1917	Powerhouse Drainage Gallery, Low Level (DT1)	Percussion contact grouting holes, 40-48 mm dia.	m	2,517.00	22.40	56,381	2,517	22	56,381		0
	1918	Powerhouse Drainage Gallery, Low Level (DT1)	Contact pressure grouting (excluding injected materials)	t	76.00	160.99	12,235	76	161	12,235		0
	1922	Powerhouse Drainage Gallery, Low Level (DT1)	Grouting	m2					37			
	1936	Drainage Gallery, Powerhouse Mid Level (DT2)	Percussion contact grouting holes, 40-48 mm dia.	m	1,756.00	22.40	39,334	1,756	22	39,334		0
	1937	Drainage Gallery, Powerhouse Mid Level (DT2)	Contact pressure grouting (excluding injected materials)	t	53.00	160.99	8,532	53	161	8,532		0
	1941	Drainage Gallery, Powerhouse Mid Level (DT2)	Grouting	m2				3,330	37	122,833	3,330	122,833
	1955	Drainage Gallery, Powerhouse Mid Level (DT3)	Percussion contact grouting holes, 40-48 mm dia.	m	2,992.00	22.40	67,021	2,992	22	67,021		0
	1956	Drainage Gallery, Powerhouse Mid Level (DT3)	Contact pressure grouting (excluding injected materials)	t	91.00	160.99	14,650	91	161	14,650		0
	1960	Drainage Gallery, Powerhouse Mid Level (DT3)	Grouting	m2				2,984	37	110,080	2,984	110,080
6	**DRAINAGE GALLERIES**						**2,268,859**			**5,912,477**		**3,643,618**
	1973	Explosive Warehouse T5A	Percussion contact grouting holes, 40-48 mm dia.	m	120.00	22.40	2,688	120	22	2,688		0
	1974	Explosive Warehouse T5A	Contact pressure grouting (excluding injected materials)	t	4.00	160.99	644	4	161	644		0
	1987	Explosive Warehouse T4	Drilling and grouting									
	1988	Explosive Warehouse T4	Percussion contact grouting holes, 40-48 mm dia.	m	120.00	22.40	2,688	120	22	2,688		0
	1989	Explosive Warehouse T4	Contact pressure grouting (excluding injected materials)	t	4.00	160.99	644	4	161	644		0
	2004	Conveyor Line 7A and 7B	Percussion contact grouting holes, 40-48 mm dia.	m	800.00	22.40	17,920	2,148	22	48,115	1,348	30,195
	2005	Conveyor Line 7A and 7B	Contact pressure grouting (excluding injected materials)	t	322.00	167.45	53,919	65	161	10,464	-257	-43,455
	2009	Conveyor Line 7A and 7B	Grouting	m2			97,964	4,070	37	150,142	4,070	52,178
	2021	Conveyor Line 8A	Percussion contact grouting holes, 40-48 mm dia.	m	364.00	22.40	8,154	1,000	22	22,400	636	14,246
	2022	Conveyor Line 8A	Contact pressure grouting (excluding injected materials)	t	142.00	167.45	23,778	30	161	4,830	-112	-18,948
	2026	Conveyor Line 8A	Grouting	m2			42,898	3,210	37	118,417	3,210	75,519
7	**MISCELLANEOUS UNDERGROUND WORKS**						**251,296**			**361,032**		**109,736**
							32,189,487			69,040,308		36,850,820
		Grouting Left bank					6,349,446			6,349,446		0
		Total					**38,538,933**			**75,389,753**		**36,850,820**

N°	Description of Works	unit	TEAS		CLIENT		DIFFERENCES
			Price USD Eq. TEAS	Amount USD Eq. - TEAS	Price USD Eq. Client	Amount USD Eq. client	Δ Amount
	MAINTENANCE OF MAIN TRANSPORTATION TUNNELS						
	DURING THE CONSTRUCTION OF UNDERGROUND WORKS						
1	Care of transit lanes	l.s	2,305,400	2,305,400	40,691,165	40,691,165	38,385,765
2	Care of water inflows	l.s	1,627,000	1,627,000	8,060,453	8,060,453	6,433,453
3	Ventilation	l.s	7,558,500	7,558,500	10,075,566	10,075,566	2,517,066
4	Lighting	l.s	2,006,900	2,006,900	6,924,668	6,924,668	4,917,768
	Total			13,497,800.00		65,751,851.90	**52,254,051.90**

N°	ITEM	Unit	TEAS	CLIENT			DIFFERENCES
			Amount Eq. USD	Qty	Price USD Eq.	Amount USD Eq.	Δ Amount Eq. USD
				Q2	P2	A2	
2197	IE devices geokon USA obtaining	pcs	2,867,986	13,218.00	216.98	2,867,986	0
2198	Crushing and Screening Plant at construction sites	2 set	0			6,659,809	6,659,809
2199	Mixing Station at the construction sites	2 set	0			797,649	797,649
2204	Final cleaning of mountain sites and mashed barriers		0			8,821,041	8,821,041
2211	Water and air supply		1,918,457			19,184,569	17,266,112
2224	Power supply		3,502,227			35,022,273	31,520,046
2227	Pumping stations of the construction sites № 1,2 and left bar	ком	2,074,305	5.00	414,861.00	2,074,305	0
2230	Design		15,000,000			21,782,216	6,782,216
2231	Geophysical investigations and installation of IE		0			751,915	751,915
2232	Geotechnical and geological investigation of assumed flood zone of Right Bank at EL.1400-1700		0			1,565,850	1,565,850
2233	Investigations		15,000,000			23,340,447	8,340,447
2235	Conveer lines		0			1,679,261	1,679,261
2236	Elok base		16,544,570			16,544,570	0
2237	Administrative building of JSC "Rogun HPP"		1,193,559			1,193,559	0
2238	9-stored residential houses	4 build.	7,743,585			7,743,585	0
2239	Cottage	2 build.	0			458,010	458,010
2240	Reconstruction of power boiler house		0			1,012,762	1,012,762
2242	Costs made for flood zone		50,459,084			50,459,084	0
2243	Geodetic and reference points to 2008 (according to the accounting records)		0			3,636,617	3,636,617
	Works Added by the Client	**Total**	**116,303,774**			**205,595,510**	**89,291,736**

PART – IX

TEAS CONSULTANT-CLIENT BoQ COMPARISON

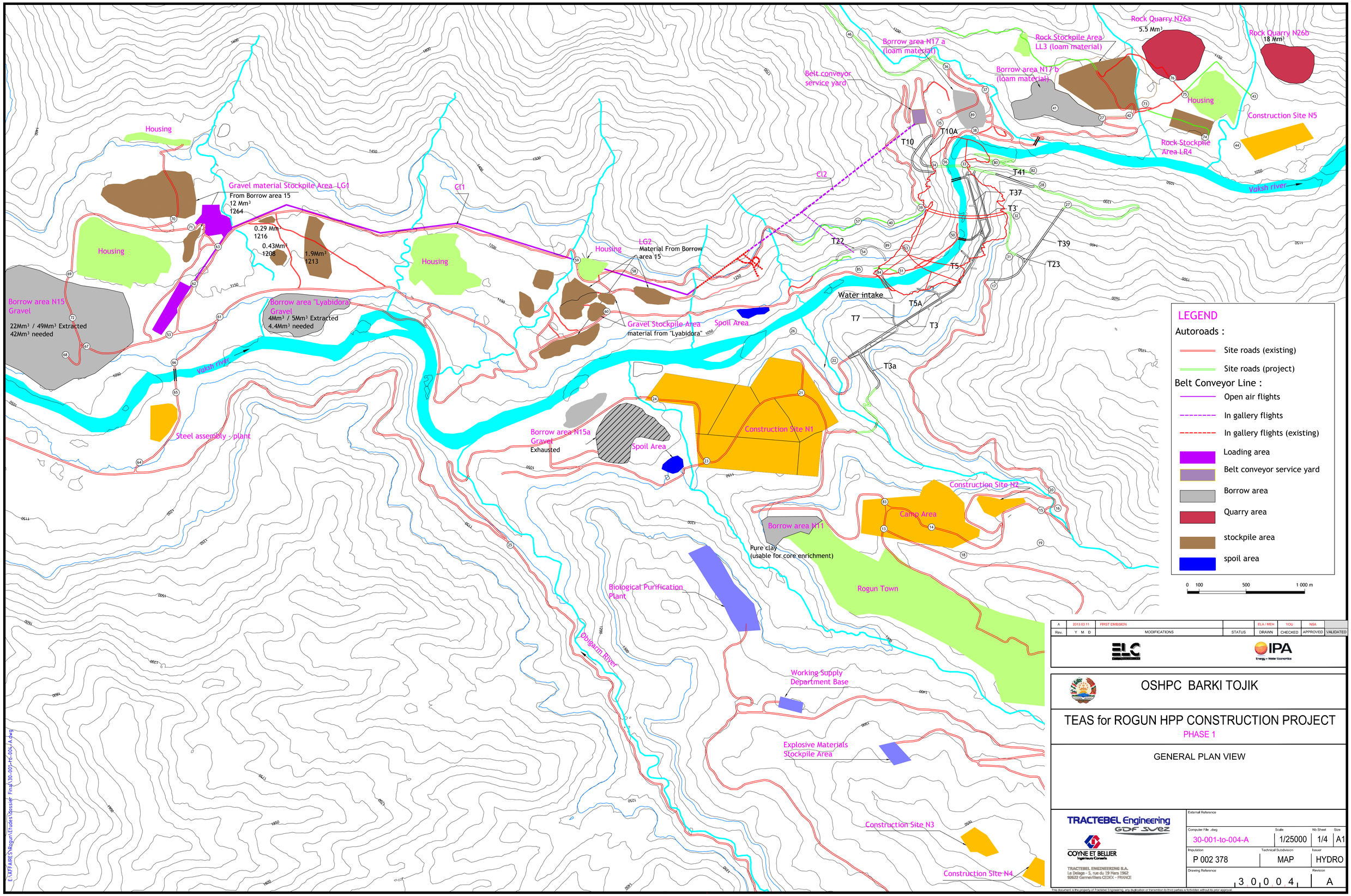
(Permanent Equipment)

ELECTROMECHANICAL EQUIPMENT - BILL OF QUANTITIES COMPARISON						
№	ITEMS	TEAS USD Eq.		CLIENT USD Eq.		
		Unit price	Amount	At Site	Stored in the plants	Amount
1	**Unit №1**					
1.1	Hydraulic turbine and rpm governor (speed) -unit №1	38.03	23,385.38	30,746.47	4,038.95	34,785.42
1.2	Generator and excitation equipment -unit №1	23.40	14,391.00	8,169.00	15,531.00	23,700.00
	Total Unit №1		**37,776.38**	**38,915.47**	**19,569.95**	**58,485.42**
2	**Unit №2**					
2.1	Hydraulic turbine and rpm governor (speed)-unit №2	38.03	23,385.38	28,069.30	6,030.63	34,099.93
2.2	Generator and excitation equipment -unit №2				23,700.00	23,700.00
	Total Unit №2		**23,385.38**	**28,069.30**	**29,730.63**	**57,799.93**
3	Blowout preventer of units №1 and №2, all included	4.10	5,036.85			
4	Electrical traveling cranes of 550 t capacity		7,771.83	7,771.83		7,771.83
5	Compressor unit				2,546.82	2,546.82
6	Ventilation equipment and air conditioning equipment				1,342.98	1,342.98
7	Main step-up transformers №1 and №2 of 715 MVA 525/15,75kV				23,438.00	23,438.00
8	CATS cabinets (Complex of auxiliaries transformer substations)		15,678.01	15,678.01		15,678.01
	Miscellanea		28,486.69	23,449.84	27,327.80	50,777.64
	TOTAL for Units №1 and №2 and Miscellanea		**89,648.44**	**90,434.62**	**76,628.38**	**167,063.00**

Difference	**77,414.56**

PART – X

ANNEXES



Rev.	Y M D	MODIFICATIONS	STATUS	DRAWN	CHECKED	APPROVED	VALIDATED
A	2013.03.11	FIRST EMISSION		ELA / MEH	YOU	NSA	

ELC Electroconsult

IPA Energy + Water Economics

OSHPC BARKI TOJIK

TEAS for ROGUN HPP CONSTRUCTION PROJECT

PHASE 1

GENERAL PLAN VIEW

TRACTEBEL Engineering GDF SUEZ

COYNE ET BELLIER Ingénieurs Conseils

TRACTEBEL ENGINEERING S.A.
Le Delage - 5, rue du 19 Mars 1962
92622 Gennevilliers CEDEX - FRANCE

External Reference			
Computer File .dwg	Scale	Nb Sheet	Size
30-001-to-004-A	1/25000	1/4	A1
Imputation	Technical Subdivision	Issuer	
P 002 378	MAP	HYDRO	
Drawing Reference		Revision	
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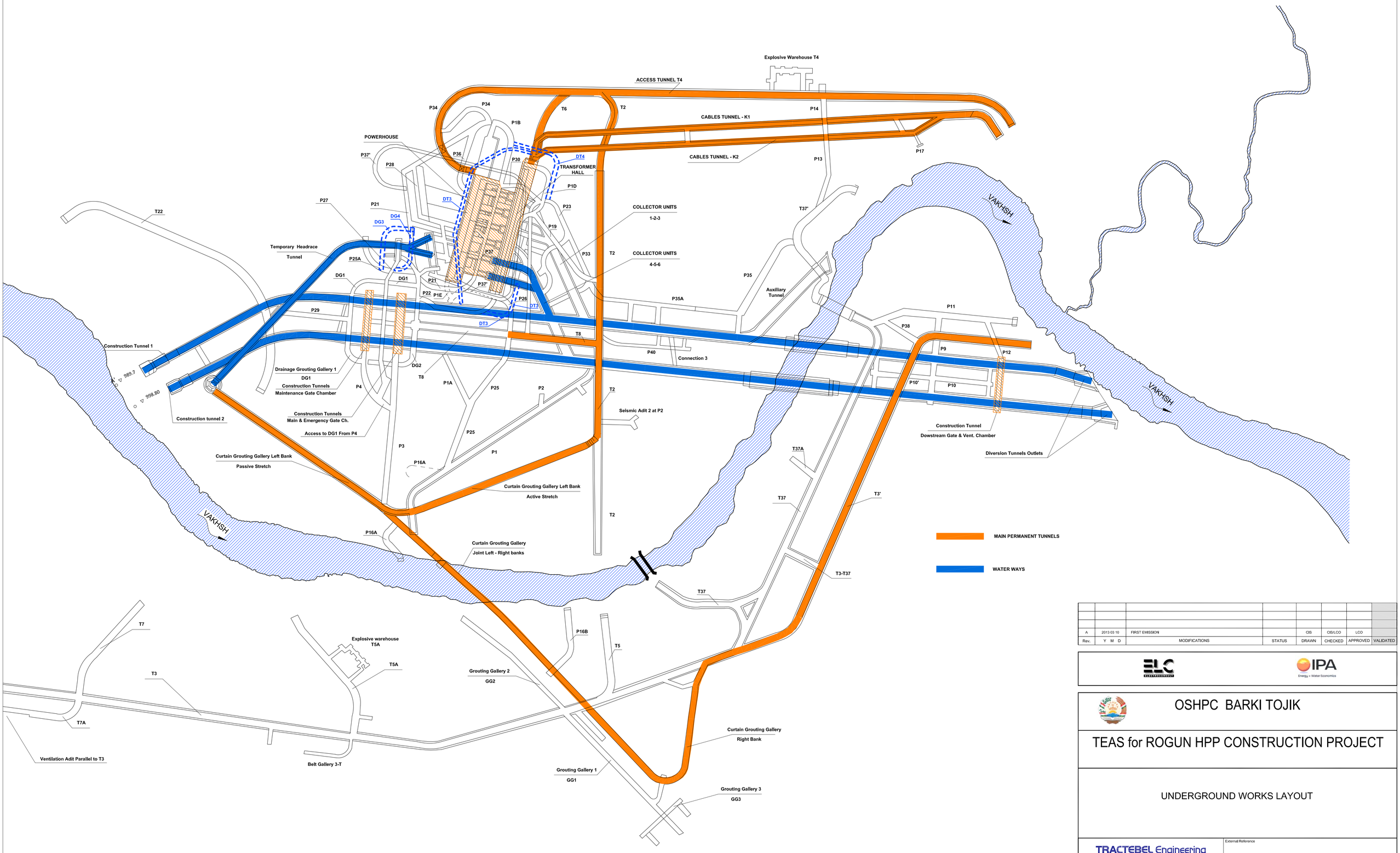

Rev.	Y	M	D	MODIFICATIONS	STATUS	DRAWN	CHECKED	APPROVED	VALIDATED
A	2013	03	10	FIRST EMISSION		CIS	CIS/LCO	LCO	

ELC ELECTROCONSULT

IPA Energy + Water Economics

OSHPC BARKI TOJIK

TEAS for ROGUN HPP CONSTRUCTION PROJECT

UNDERGROUND WORKS LAYOUT

TRACTEBEL Engineering GDF SUEZ

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External Reference

Computer File .dwg	Scale	Nb Sheet	Size
130311__UNDG WKS LAYOUT			A1

Imputation	Technical Subdivision	Issuer

Drawing Reference	Revision
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