



OSHPC BARKI TOJIK

TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT



PHASE 1 ASSESSMENT OF EXISTING ROGUN HPP WORKS

Cost Estimate Volume 2 – Civil Works - Analyses of Unit Prices

RP 39

September 2013

TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

PHASE 1 ASSESSMENT OF EXISTING ROGUN HPP WORKS

Cost Estimate Volume 2 – Civil Works - Analyses of Unit Prices

September 2013

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C	15 Sep 2013	Final Assessment with PH Cavern	Various	LCO/CIS	LCO
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1 FOREWORD

This volume includes the detailed analyses performed for establishing the unit prices for the cost estimate of the civil works related to the Phase I (Assessment of the Existing Works) of the Rogun Hydroelectric Power Plant (Tajikistan).

The Cost Estimate is composed of two volumes:

- Volume 1 entitled “Cost Estimate - Volume 1 - Methodology, Rates and Priced BoQ”;
- Volume 2 entitled “Cost Estimate - Volume 2 - Civil Works - Analyses of Unit Prices”.

The Analyses of Unit Prices have been grouped in eight sections which contain a number of sub-sections, as follows:

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On the right side of the header of each Table, a code for the identification of each analysis is given. SEC means “section”, ANA means “analysis”, RC means “rock class”, and T. means “table”.

The unit prices of underground excavations performed in formations composed of two or more classes of rock, have been established according to the weighted mean which is given on the Annex 1.

SECTION – 1

SURFACE EXCAVATION

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - GENERAL COMMON EXCAVATION FOR ROADS

SEC 1
 ANA 003
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	100.18	0.00	43.75	0.00	4,382.93
1.02	Gang foreman	----	h	1,001.81	6.11	0.00	6,121.07	0.00
1.03	Operator, bulldozer with blade	----	h	0.00	5.39	0.00	0.00	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	2,845.39	5.39	0.00	15,336.63	0.00
1.06	Helper for ditto	1	h	2,845.39	2.20	0.00	6,259.85	0.00
1.07	Operator, wheel loader	----	h	-	5.39	0.00	0.00	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	1,556.46	5.39	0.00	8,389.32	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	2,263.20	5.39	0.00	12,198.65	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	507.69	5.39	0.00	2,736.46	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	0.00	1.29	97.19	0.00	0.00
		s.b.	h	0.00	0.00	36.66	0.00	0.00
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	3,880.07	3.19	171.52	12,377.43	665,509.70
		s.b.	h	776.01	0.00	59.83	0.00	46,428.92
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	2,586.71	3.19	171.52	8,251.62	443,673.13
		s.b.	h	517.34	0.00	59.83	0.00	30,952.62
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	0.00	0.60	54.76	0.00	0.00
		s.b.	h	0.00	0.00	21.07	0.00	0.00
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	790.85	0.58	56.52	458.69	44,698.82
		s.b.	h	158.17	0.00	23.56	0.00	3,726.48
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	624.11	0.63	66.88	393.19	41,740.71
		s.b.	h	124.82	0.00	25.76	0.00	3,215.43
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	2,057.46	1.32	98.59	2,715.84	202,844.50
		s.b.	h	411.49	0.00	33.74	0.00	13,883.71
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	423.08	0.63	48.81	266.54	20,650.38
		s.b.	h	84.62	0.00	20.84	0.00	1,763.38
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							75,505	1,523,471
Missing items and construction contingencies			%	1.50%			1,133	22,852
Total Direct Costs							76,638	1,546,323
Overheads, risks and profit			%	52.00%			84,394	759,546
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	1,100,000		0.15	2.10
AGGREGATE UNIT PRICE				m³				2.24

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 1
ANA 004

SURFACE EXCAVATION - TRENCH AND FOUNDATION COMMON EXCAVATION FOR ROADS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	22.69	0.00	43.75	0.00	992.48
1.02	Gang foreman	----	h	226.85	6.11	0.00	1,386.07	0.00
1.03	Operator, bulldozer with blade	----	h	0.00	5.39	0.00	0.00	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	-	5.39	0.00	0.00	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe	----	h	1,213.35	5.39	0.00	6,539.96	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, reartipper and dumper	----	h	1,052.33	5.39	0.00	5,672.08	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	2.84	5.39	0.00	15.30	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	0.00	1.29	97.19	0.00	0.00
		s.b.	h	0.00	0.00	36.66	0.00	0.00
2.02	Bulldozer 231 kW with b. & mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	0.00	0.60	54.76	0.00	0.00
		s.b.	h	0.00	0.00	21.07	0.00	0.00
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	830.44	0.58	56.52	481.66	46,936.46
		s.b.	h	166.09	0.00	23.56	0.00	3,913.03
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	272.61	0.63	66.88	171.74	18,231.91
		s.b.	h	54.52	0.00	25.76	0.00	1,404.47
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	0.00	1.32	98.59	0.00	0.00
		s.b.	h	0.00	0.00	33.74	0.00	0.00
2.11	Rear tipper, 24 ton pay load	Op.	h	956.67	0.44	55.14	420.93	52,750.60
		s.b.	h	191.33	0.00	16.94	0.00	3,241.19
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	2.37	0.63	48.81	1.49	115.45
		s.b.	h	0.47	0.00	20.84	0.00	9.86
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							14,689	127,595
Missing items and construction contingencies			%	1.50%			220	1,914
Total Direct Costs							14,910	129,509
Overheads, risks and profit			%	52.00%			7,510	67,588
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	41,000		0.55	4.81
AGGREGATE UNIT PRICE				m³				5.35

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - COMMON EXCAVATION, DIVERSION TUNNEL INLETS

SEC 1
 ANA 005
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	0.99	0.00	43.75	0.00	43.37
1.02	Gang foreman	----	h	9.91	6.11	0.00	60.57	0.00
1.03	Operator, bulldozer with blade	----	h	8.59	5.39	0.00	46.32	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	8.82	5.39	0.00	47.56	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	12.48	5.39	0.00	67.28	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	60.01	5.39	0.00	323.45	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	9.23	5.39	0.00	49.75	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	7.81	1.29	97.19	10.08	759.30
		s.b.	h	1.56	0.00	36.66	0.00	57.28
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	1.00	3.19	171.52	3.19	171.52
		s.b.	h	0.20	0.00	59.83	0.00	11.97
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	8.02	0.60	54.76	4.81	439.25
		s.b.	h	1.60	0.00	21.07	0.00	33.80
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	0.00	0.58	56.52	0.00	0.00
		s.b.	h	0.00	0.00	23.56	0.00	0.00
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	11.35	0.63	66.88	7.15	758.92
		s.b.	h	2.27	0.00	25.76	0.00	58.46
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	54.55	1.32	98.59	72.01	5,378.54
		s.b.	h	10.91	0.00	33.74	0.00	368.13
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	7.69	0.63	48.81	4.85	375.46
		s.b.	h	1.54	0.00	20.84	0.00	32.06
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							697	8,488
Missing items and construction contingencies			%	1.50%			10	127
Total Direct Costs							707	8,615
Overheads, risks and profit			%	52.00%			485	4,363
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	4,000		0.30	3.24
AGGREGATE UNIT PRICE				m³				

SEC 1

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - COMMON EXCAVATION, DIVERSION TUNNEL OUTLET

SEC 1
 ANA 006
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	0.17	0.00	43.75	0.00	7.51
1.02	Gang foreman	----	h	1.72	6.11	0.00	10.49	0.00
1.03	Operator, bulldozer with blade	----	h	1.11	5.39	0.00	6.00	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	1.14	5.39	0.00	6.16	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	1.62	5.39	0.00	8.72	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	12.10	5.39	0.00	65.23	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	1.20	5.39	0.00	6.45	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	1.01	1.29	97.19	1.31	98.40
		s.b.	h	0.20	0.00	36.66	0.00	7.42
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	0.13	3.19	171.52	0.41	22.23
		s.b.	h	0.03	0.00	59.83	0.00	1.55
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	1.04	0.60	54.76	0.62	56.93
		s.b.	h	0.21	0.00	21.07	0.00	4.38
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	0.00	0.58	56.52	0.00	0.00
		s.b.	h	0.00	0.00	23.56	0.00	0.00
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	1.47	0.63	66.88	0.93	98.36
		s.b.	h	0.29	0.00	25.76	0.00	7.58
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	11.00	1.32	98.59	14.52	1,084.68
		s.b.	h	2.20	0.00	33.74	0.00	74.24
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	1.00	0.63	48.81	0.63	48.66
		s.b.	h	0.20	0.00	20.84	0.00	4.16
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							121	1,516
Missing items and construction contingencies			%	1.50%			2	23
Total Direct Costs							123	1,539
Overheads, risks and profit			%	52.00%			86	778
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	518		0.40	4.47
AGGREGATE UNIT PRICE				m³				4.87

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - COMMON EXCAVATION, STAGE 1 POWER TUNNEL INTAKE

SEC 1
 ANA 007
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	1.59	0.00	43.75	0.00	69.66
1.02	Gang foreman	----	h	15.92	6.11	0.00	97.28	0.00
1.03	Operator, bulldozer with blade	----	h	13.36	5.39	0.00	71.99	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	13.71	5.39	0.00	73.92	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	19.40	5.39	0.00	104.57	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	98.40	5.39	0.00	530.36	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	14.35	5.39	0.00	77.33	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	12.14	1.29	97.19	15.66	1,180.16
		s.b.	h	2.43	0.00	36.66	0.00	89.03
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	1.55	3.19	171.52	4.96	266.59
		s.b.	h	0.31	0.00	59.83	0.00	18.60
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	12.47	0.60	54.76	7.48	682.72
		s.b.	h	2.49	0.00	21.07	0.00	52.54
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	0.00	0.58	56.52	0.00	0.00
		s.b.	h	0.00	0.00	23.56	0.00	0.00
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	17.64	0.63	66.88	11.11	1,179.57
		s.b.	h	3.53	0.00	25.76	0.00	90.87
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	89.45	1.32	98.59	118.08	8,819.08
		s.b.	h	17.89	0.00	33.74	0.00	603.62
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	11.96	0.63	48.81	7.53	583.57
		s.b.	h	2.39	0.00	20.84	0.00	49.83
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							1,120	13,686
Missing items and construction contingencies			%	1.50%			17	205
Total Direct Costs							1,137	13,891
Overheads, risks and profit			%	52.00%			781	7,033
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	6,217			0.31	3.37
AGGREGATE UNIT PRICE			m³					3.67

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 1
ANA 008
Table A

SURFACE EXCAVATION- COMMON EXCAVATION, PORTAL OF TRANSPORTATION TUNNEL T3

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	0.07	0.00	43.75	0.00	3.10
1.02	Gang foreman	----	h	0.71	6.11	0.00	4.33	0.00
1.03	Operator, bulldozer with blade	----	h	0.42	5.39	0.00	2.26	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	0.43	5.39	0.00	2.32	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	0.61	5.39	0.00	3.28	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	5.18	5.39	0.00	27.90	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	0.45	5.39	0.00	2.43	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	0.38	1.29	97.19	0.49	37.02
		s.b.	h	0.08	0.00	36.66	0.00	2.79
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	0.05	3.19	171.52	0.16	8.36
		s.b.	h	0.01	0.00	59.83	0.00	0.58
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	0.39	0.60	54.76	0.23	21.41
		s.b.	h	0.08	0.00	21.07	0.00	1.65
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	0.00	0.58	56.52	0.00	0.00
		s.b.	h	0.00	0.00	23.56	0.00	0.00
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	0.55	0.63	66.88	0.35	37.00
		s.b.	h	0.11	0.00	25.76	0.00	2.85
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	4.71	1.32	98.59	6.21	463.91
		s.b.	h	0.94	0.00	33.74	0.00	31.75
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	0.38	0.63	48.81	0.24	18.30
		s.b.	h	0.08	0.00	20.84	0.00	1.56
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							50	630
Missing items and construction contingencies			%	1.50%			1	9
Total Direct Costs							51	640
Overheads, risks and profit			%	52.00%			36	323
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	195		0.45	4.94
AGGREGATE UNIT PRICE				m³				5.38

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 1
ANA 009

SURFACE EXCAVATION - COMMON EXCAVATION, PORTALS OF TRANS. TUNNEL T4 & CABLE TUNNEL Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	0.11	0.00	43.75	0.00	5.01
1.02	Gang foreman	----	h	1.15	6.11	0.00	7.00	0.00
1.03	Operator, bulldozer with blade	----	h	0.75	5.39	0.00	4.03	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	0.77	5.39	0.00	4.14	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	1.09	5.39	0.00	5.85	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	8.11	5.39	0.00	43.70	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	0.75	5.39	0.00	4.02	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	0.68	1.29	97.19	0.88	66.06
		s.b.	h	0.14	0.00	36.66	0.00	4.98
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	0.09	3.19	171.52	0.28	14.92
		s.b.	h	0.02	0.00	59.83	0.00	1.04
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	0.70	0.60	54.76	0.42	38.21
		s.b.	h	0.14	0.00	21.07	0.00	2.94
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	0.00	0.58	56.52	0.00	0.00
		s.b.	h	0.00	0.00	23.56	0.00	0.00
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	0.99	0.63	66.88	0.62	66.03
		s.b.	h	0.20	0.00	25.76	0.00	5.09
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	7.37	1.32	98.59	9.73	726.60
		s.b.	h	1.47	0.00	33.74	0.00	49.73
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	0.62	0.63	48.81	0.39	30.33
		s.b.	h	0.12	0.00	20.84	0.00	2.59
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							81	1,014
Missing items and construction contingencies			%	1.50%			1	15
Total Direct Costs							82	1,029
Overheads, risks and profit			%	52.00%			58	520
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	348		0.40	4.45
AGGREGATE UNIT PRICE				m³				4.85

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 1
ANA 010
Table A

SURFACE EXCAVATION - COMMON EXCAVATION, PORTALS OF TRANSPORTATION TUNNEL T22

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	LABOUR							
1.01	General foreman	----	h	0.59	0.00	43.75	0.00	25.79
1.02	Gang foreman	----	h	5.90	6.11	0.00	36.02	0.00
1.03	Operator, bulldozer with blade	----	h	5.48	5.39	0.00	29.53	0.00
1.04	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, bulldozer with blade and ripper	----	h	0.00	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.07	Operator, wheel loader	----	h	5.63	5.39	0.00	30.32	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, hydraulic backhoe or front shovel	----	h	7.96	5.39	0.00	42.89	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, rear dumper	----	h	34.43	5.39	0.00	185.58	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.13	Operator, bulldozer in disposal area)	----	h	5.46	5.39	0.00	29.45	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
2	EQUIPMENT							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	4.98	1.29	97.19	6.42	484.05
		s.b.	h	1.00	0.00	36.66	0.00	36.52
2.02	Bulldozer 231 kW with b. & mono-shank rippe	Op.	h	0.64	3.19	171.52	2.03	109.34
		s.b.	h	0.13	0.00	59.83	0.00	7.63
2.03	Bulldozer 302 kW with mono-shank ripper	Op.	h	0.00	3.19	171.52	0.00	0.00
		s.b.	h	0.00	0.00	59.83	0.00	0.00
2.04	Wheel loader, 157 kW, 3.30 m ³ heaped buck.	Op.	h	5.11	0.60	54.76	3.07	280.02
		s.b.	h	1.02	0.00	21.07	0.00	21.55
2.06	Wheel loader, 199 kW, 4.30 m ³ heaped buck.	Op.	h	0.00	0.83	73.62	0.00	0.00
		s.b.	h	0.00	0.00	28.96	0.00	0.00
2.07	Hydraulic backhoe, 130 kW, 1.80 m ³ h. buck.	Op.	h	0.00	0.58	56.52	0.00	0.00
		s.b.	h	0.00	0.00	23.56	0.00	0.00
2.08	Hydraulic backhoe, 161 kW, 2.35 m ³ h. b.	Op.	h	7.23	0.63	66.88	4.56	483.81
		s.b.	h	1.45	0.00	25.76	0.00	37.27
2.09	Hydraulic front shovel, 301 kW, 410 m ³ h. b.	Op.	h	0.00	1.37	123.22	0.00	0.00
		s.b.	h	0.00	0.00	53.08	0.00	0.00
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	31.30	1.32	98.59	41.32	3,085.94
		s.b.	h	6.26	0.00	33.74	0.00	211.22
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	0.00	1.61	116.24	0.00	0.00
		s.b.	h	0.00	0.00	39.01	0.00	0.00
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	4.55	0.63	48.81	2.87	222.26
		s.b.	h	0.91	0.00	20.84	0.00	18.98
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	0.00	0.07	6.41	0.00	0.00
		s.b.	h	0.00	0.00	3.46	0.00	0.00
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							414	5,024
Missing items and construction contingencies			%	1.50%			6	75
Total Direct Costs							420	5,100
Overheads, risks and profit			%	52.00%			287	2,583
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	2,550			0.28	3.01
AGGREGATE UNIT PRICE			m³					3.29

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 1
ANA 015

SURFACE EXCAVATION - ROADS - GENERAL ROCK EXCAVATION UP TO ROADWAY LEVEL

Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	388.98	0.00	43.75	0.00	17,018.06	
1.02	Foreman	h	3,889.84	6.11	0.00	23,766.93	0.00	
1.03	Equipment operator	h	19,874.57	5.39	0.00	107,123.92	0.00	
1.04	Hand held drill miner	h	2,421.29	2.77	0.00	6,706.97	0.00	
1.04	Operator's helper	h	5,079.13	2.20	0.00	11,174.08	0.00	
1.05	Explosive specialist	h	5,609.64	3.42	0.00	19,184.97	0.00	
1.06	Explosive specialist's helper	h	5,609.64	2.20	0.00	12,341.21	0.00	
1.07	Integral steel and bit grinder	h	304.15	3.42	0.00	1,040.20	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	1,100.59	0.05	2.71	55.03	2,982.59	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	2,691.24	0.54	46.87	1,453.27	126,138.51	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	1,358.40	0.68	66.30	923.71	90,062.14	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	366.86	0.15	24.64	55.03	9,039.48	
2.06	Flat bed lorry with crane, 10 t pay load	h	314.29	0.32	5.46	100.57	1,716.00	
2.07	Integral drill steel grinder	h	66.04	0.01	2.29	0.66	151.22	
2.08	Button bits grinder	h	187.42	0.04	5.32	7.50	997.10	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	2,409.92	1.37	123.22	3,301.59	296,949.93	
2.10	Bulldozer with blade, 231 kW	h	402.46	1.80	163.89	724.42	65,958.53	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	716.25	0.58	56.52	415.42	40,482.28	
2.12	Bulldozer with blade, 306 kW	h	1,680.00	1.64	121.99	2,755.20	204,943.20	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	914.67	0.63	48.81	576.24	44,644.88	
2.14	Off-highway dup truck, 36.6 ton pay load	h	7,580.57	1.32	98.59	10,006.35	747,368.47	
2.15	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.92%	0.00	129,158.53	
2.18	MATERIALS							
3	Explosive, amonite type	kg	55,125.00	2.31	0.00	127,338.75	0.00	
3.01	Explosive, gramonite type	kg	139,650.00	2.06	0.00	287,679.00	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	137,796.92	0.00	0.82	0.00	112,993.48	
3.04	Slow burning fuse fuse	ea	89.72	0.00	0.51	0.00	45.76	
3.05	Electric detonator, 3.0 m leading wire	ea	16,093.33	0.00	1.98	0.00	31,864.78	
3.06	Plain detonator	ea	29.91	0.00	0.78	0.00	23.33	
3.07	Copper type shotfiring cable	m	94,970.23	0.00	0.13	0.00	12,346.13	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	47.75	0.00	483.24	0.00	23,073.06	
3.09	Shank adapter for Ø 76 mm holes	ea	16.30	0.00	277.11	0.00	4,517.13	
3.10	Coupling for Ø 76 mm holes	ea	73.46	0.00	54.15	0.00	3,977.66	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	38.55	0.00	483.24	0.00	18,629.43	
3.12	Shank adapter for Ø 51 mm holes	ea	23.68	0.00	277.11	0.00	6,562.78	
3.13	Coupling for Ø 51 mm dia.	ea	59.31	0.00	54.15	0.00	3,211.60	
3.14	Crawler drill bit for Ø 76 mm holes	ea	50.94	0.00	394.21	0.00	20,081.11	
3.15	Crawler drill bit for Ø 51 mm holes	ea	74.01	0.00	164.35	0.00	12,163.40	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	44.02	0.00	180.14	0.00	7,930.21	
3.17	Grease for rods, couplings and shank adapters	kg	10,163.81	0.00	4.80	0.00	48,786.28	
Sub-total				----->>		616,731.01	2,083,817.03	
Missing items and construction contingencies		%	2.00%	----->>		12,335	41,676	
Total direct costs				----->>		629,066	2,125,493	
Overheads, risks and profit		%	52.00%	----->>		143,237	1,289,134	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	490,000	----->>		1.58	6.97
AGGREGATE UNIT PRICE				----->>		8.54		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - ROCK - DIVERSION TUNNEL INLETS

SEC 1
 ANA 017
 Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	3.02	0.00	43.75	0.00	131.91	
1.02	Foreman	h	30.15	6.11	0.00	184.22	0.00	
1.03	Equipment operator	h	134.71	5.39	0.00	726.10	0.00	
1.04	Hand held drill miner	h	63.29	2.77	0.00	175.31	0.00	
1.04	Operator's helper	h	19.03	2.20	0.00	41.87	0.00	
1.05	Explosive specialist	h	41.30	3.42	0.00	141.24	0.00	
1.06	Explosive specialist's helper	h	41.30	2.20	0.00	90.86	0.00	
1.07	Integral steel and bit grinder	h	1.87	3.42	0.00	6.41	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	28.77	0.05	2.71	1.44	77.96	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	5.78	0.54	46.87	3.12	271.07	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	8.42	0.68	66.30	5.73	558.34	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	9.59	0.15	24.64	1.44	236.28	
2.06	Flat bed lorry with crane, 10 t pay load	h	1.54	0.32	5.46	0.49	8.40	
2.07	Integral drill steel grinder	h	0.56	0.01	2.29	0.01	1.27	
2.08	Button bits grinder	h	1.00	0.04	5.32	0.04	5.35	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	23.43	1.37	123.22	32.10	2,886.82	
2.10	Bulldozer with blade, 231 kW	h	2.23	1.80	163.89	4.01	364.77	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	2.85	0.58	56.52	1.65	161.10	
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.00	0.00	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	10.40	0.63	48.81	6.55	507.62	
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.00	0.00	
2.15	Off-highway dup truck, 36.6 ton pay load	h	67.82	1.32	98.59	89.52	6,686.20	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.67%	0.00	902.03	
2.18	MATERIALS							
3	Explosive, amonite type	kg	438.75	2.31	0.00	1,013.51	0.00	
3.01	Explosive, gramonite type	kg	1,111.50	2.06	0.00	2,289.69	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	767.10	0.00	0.82	0.00	629.02	
3.04	Slow burning fuse fuse	ea	88.51	0.00	0.51	0.00	45.14	
3.05	Electric detonator, 3.0 m leading wire	ea	77.15	0.00	1.98	0.00	152.76	
3.06	Plain detonator	ea	78.25	0.00	0.78	0.00	61.04	
3.07	Copper type shotfiring cable	m	559.57	0.00	0.13	0.00	72.74	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	0.48	0.00	483.24	0.00	232.51	
3.09	Shank adapter for Ø 76 mm holes	ea	0.16	0.00	277.11	0.00	45.29	
3.10	Coupling for Ø 76 mm holes	ea	0.74	0.00	54.15	0.00	40.08	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	0.08	0.00	483.24	0.00	40.03	
3.12	Shank adapter for Ø 51 mm holes	ea	0.05	0.00	277.11	0.00	14.10	
3.13	Coupling for Ø 51 mm dia.	ea	0.13	0.00	54.15	0.00	6.90	
3.14	Crawler drill bit for Ø 76 mm holes	ea	0.51	0.00	394.21	0.00	201.35	
3.15	Crawler drill bit for Ø 51 mm holes	ea	0.16	0.00	164.35	0.00	26.14	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	1.15	0.00	180.14	0.00	207.28	
3.17	Grease for rods, couplings and shank adapters	kg	22.17	0.00	4.80	0.00	106.43	
Sub-total				----->>		4,815.29	14,679.93	
Missing items and construction contingencies		%	2.00%	----->>		96	294	
Total direct costs				----->>		4,912	14,974	
Overheads, risks and profit		%	52.00%	----->>		1,034	9,306	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	3,900	----->>		1.52	6.23
AGGREGATE UNIT PRICE				----->>		7.75		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - ROCK - DIVERSION TUNNEL OUTLETS

SEC 1
 ANA 018
 Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	2.38	0.00	43.75	0.00	104.21	
1.02	Foreman	h	23.82	6.11	0.00	145.54	0.00	
1.03	Equipment operator	h	125.67	5.39	0.00	677.38	0.00	
1.04	Hand held drill miner	h	42.06	2.77	0.00	116.51	0.00	
1.04	Operator's helper	h	12.65	2.20	0.00	27.83	0.00	
1.05	Explosive specialist	h	28.29	3.42	0.00	96.74	0.00	
1.06	Explosive specialist's helper	h	28.29	2.20	0.00	62.23	0.00	
1.07	Integral steel and bit grinder	h	1.24	3.42	0.00	4.26	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	19.12	0.05	2.71	0.96	51.81	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	3.84	0.54	46.87	2.08	180.16	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	5.60	0.68	66.30	3.81	371.08	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	6.37	0.15	24.64	0.96	157.03	
2.06	Flat bed lorry with crane, 10 t pay load	h	1.02	0.32	5.46	0.33	5.58	
2.07	Integral drill steel grinder	h	0.37	0.01	2.29	0.00	0.85	
2.08	Button bits grinder	h	0.67	0.04	5.32	0.03	3.55	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	15.57	1.37	123.22	21.33	1,918.63	
2.10	Bulldozer with blade, 231 kW	h	1.48	1.80	163.89	2.66	242.43	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	1.89	0.58	56.52	1.10	107.07	
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.00	0.00	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	6.91	0.63	48.81	4.35	337.37	
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.00	0.00	
2.15	Off-highway dup truck, 36.6 ton pay load	h	77.93	1.32	98.59	102.87	7,683.13	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.40%	0.00	818.27	
2.18	MATERIALS							
3	Explosive, amonite type	kg	291.60	2.31	0.00	673.60	0.00	
3.01	Explosive, gramonite type	kg	738.72	2.06	0.00	1,521.76	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	509.83	0.00	0.82	0.00	418.06	
3.04	Slow burning fuse fuse	ea	58.83	0.00	0.51	0.00	30.00	
3.05	Electric detonator, 3.0 m leading wire	ea	51.28	0.00	1.98	0.00	101.52	
3.06	Plain detonator	ea	52.01	0.00	0.78	0.00	40.57	
3.07	Copper type shotfiring cable	m	371.90	0.00	0.13	0.00	48.35	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	0.32	0.00	483.24	0.00	154.53	
3.09	Shank adapter for Ø 76 mm holes	ea	0.11	0.00	277.11	0.00	30.10	
3.10	Coupling for Ø 76 mm holes	ea	0.49	0.00	54.15	0.00	26.64	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	0.06	0.00	483.24	0.00	26.61	
3.12	Shank adapter for Ø 51 mm holes	ea	0.03	0.00	277.11	0.00	9.37	
3.13	Coupling for Ø 51 mm dia.	ea	0.08	0.00	54.15	0.00	4.59	
3.14	Crawler drill bit for Ø 76 mm holes	ea	0.34	0.00	394.21	0.00	133.82	
3.15	Crawler drill bit for Ø 51 mm holes	ea	0.11	0.00	164.35	0.00	17.37	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	0.76	0.00	180.14	0.00	137.76	
3.17	Grease for rods, couplings and shank adapters	kg	14.74	0.00	4.80	0.00	70.73	
Sub-total				----->>		3,466.32	13,231.21	
Missing items and construction contingencies		%	2.00%	----->>		69	265	
Total direct costs				----->>		3,536	13,496	
Overheads, risks and profit		%	52.00%	----->>		886	7,971	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	2,592.0	----->>		1.73	8.30
AGGREGATE UNIT PRICE				----->>		10.03		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - ROCK - STAGE 1 POWER TUNNEL INTAKE

SEC 1
 ANA 019
 Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	19.22	0.00	43.75	0.00	840.78	
1.02	Foreman	h	192.18	6.11	0.00	1,174.21	0.00	
1.03	Equipment operator	h	885.13	5.39	0.00	4,770.83	0.00	
1.04	Hand held drill miner	h	403.56	2.77	0.00	1,117.86	0.00	
1.04	Operator's helper	h	121.37	2.20	0.00	267.01	0.00	
1.05	Explosive specialist	h	249.89	3.42	0.00	854.64	0.00	
1.06	Explosive specialist's helper	h	249.89	2.20	0.00	549.77	0.00	
1.07	Integral steel and bit grinder	h	11.94	3.42	0.00	40.84	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	183.44	0.05	2.71	9.17	497.11	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	36.88	0.54	46.87	19.91	1,728.47	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	53.70	0.68	66.30	36.52	3,560.23	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	61.15	0.15	24.64	9.17	1,506.62	
2.06	Flat bed lorry with crane, 10 t pay load	h	9.81	0.32	5.46	3.14	53.55	
2.07	Integral drill steel grinder	h	3.55	0.01	2.29	0.04	8.12	
2.08	Button bits grinder	h	6.41	0.04	5.32	0.26	34.08	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	149.39	1.37	123.22	204.66	18,407.78	
2.10	Bulldozer with blade, 231 kW	h	14.19	1.80	163.89	25.55	2,325.93	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	18.18	0.58	56.52	10.54	1,027.27	
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.00	0.00	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	66.32	0.63	48.81	41.78	3,236.86	
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.00	0.00	
2.15	Off-highway dup truck, 36.6 ton pay load	h	456.20	1.32	98.59	602.19	44,977.11	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.64%	0.00	5,909.99	
2.18	MATERIALS							
3	Explosive, amonite type	kg	2,797.68	2.31	0.00	6,462.65	0.00	
3.01	Explosive, gramonite type	kg	7,087.47	2.06	0.00	14,600.18	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	4,891.42	0.00	0.82	0.00	4,010.97	
3.04	Slow burning fuse fuse	ea	564.39	0.00	0.51	0.00	287.84	
3.05	Electric detonator, 3.0 m leading wire	ea	491.95	0.00	1.98	0.00	974.05	
3.06	Plain detonator	ea	498.99	0.00	0.78	0.00	389.21	
3.07	Copper type shotfiring cable	m	3,568.07	0.00	0.13	0.00	463.85	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	3.07	0.00	483.24	0.00	1,482.59	
3.09	Shank adapter for Ø 76 mm holes	ea	1.04	0.00	277.11	0.00	288.81	
3.10	Coupling for Ø 76 mm holes	ea	4.72	0.00	54.15	0.00	255.59	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	0.53	0.00	483.24	0.00	255.28	
3.12	Shank adapter for Ø 51 mm holes	ea	0.32	0.00	277.11	0.00	89.93	
3.13	Coupling for Ø 51 mm dia.	ea	0.81	0.00	54.15	0.00	44.01	
3.14	Crawler drill bit for Ø 76 mm holes	ea	3.26	0.00	394.21	0.00	1,283.91	
3.15	Crawler drill bit for Ø 51 mm holes	ea	1.01	0.00	164.35	0.00	166.67	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	7.34	0.00	180.14	0.00	1,321.74	
3.17	Grease for rods, couplings and shank adapters	kg	141.38	0.00	4.80	0.00	678.62	
Sub-total				----->>		30,800.90	96,106.94	
Missing items and construction contingencies		%	2.00%	----->>		616	1,922	
Total direct costs				----->>		31,417	98,029	
Overheads, risks and profit		%	52.00%	----->>		6,731	60,581	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	24,868	----->>		1.53	6.38
AGGREGATE UNIT PRICE				----->>		7.91		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - ROCK - PORTAL OF TRANSPORTATION TUNNEL T3

SEC 1
 ANA 020
 Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	1.82	0.00	43.75	0.00	79.60	
1.02	Foreman	h	18.19	6.11	0.00	111.17	0.00	
1.03	Equipment operator	h	96.05	5.39	0.00	517.71	0.00	
1.04	Hand held drill miner	h	31.64	2.77	0.00	87.65	0.00	
1.04	Operator's helper	h	9.52	2.20	0.00	20.94	0.00	
1.05	Explosive specialist	h	21.90	3.42	0.00	74.89	0.00	
1.06	Explosive specialist's helper	h	21.90	2.20	0.00	48.18	0.00	
1.07	Integral steel and bit grinder	h	0.94	3.42	0.00	3.20	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	14.38	0.05	2.71	0.72	38.98	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	2.89	0.54	46.87	1.56	135.53	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	4.21	0.68	66.30	2.86	279.17	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	4.79	0.15	24.64	0.72	118.14	
2.06	Flat bed lorry with crane, 10 t pay load	h	0.77	0.32	5.46	0.25	4.20	
2.07	Integral drill steel grinder	h	0.28	0.01	2.29	0.00	0.64	
2.08	Button bits grinder	h	0.50	0.04	5.32	0.02	2.67	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	11.71	1.37	123.22	16.05	1,443.41	
2.10	Bulldozer with blade, 231 kW	h	1.11	1.80	163.89	2.00	182.38	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	1.43	0.58	56.52	0.83	80.55	
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.00	0.00	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	5.20	0.63	48.81	3.28	253.81	
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.00	0.00	
2.15	Off-highway dup truck, 36.6 ton pay load	h	59.99	1.32	98.59	79.19	5,914.84	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.39%	0.00	624.70	
2.18	MATERIALS							
3	Explosive, amonite type	kg	219.38	2.31	0.00	506.76	0.00	
3.01	Explosive, gramonite type	kg	555.75	2.06	0.00	1,144.85	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	383.55	0.00	0.82	0.00	314.51	
3.04	Slow burning fuse fuse	ea	44.26	0.00	0.51	0.00	22.57	
3.05	Electric detonator, 3.0 m leading wire	ea	38.57	0.00	1.98	0.00	76.38	
3.06	Plain detonator	ea	39.13	0.00	0.78	0.00	30.52	
3.07	Copper type shotfiring cable	m	279.78	0.00	0.13	0.00	36.37	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	0.24	0.00	483.24	0.00	116.25	
3.09	Shank adapter for Ø 76 mm holes	ea	0.08	0.00	277.11	0.00	22.65	
3.10	Coupling for Ø 76 mm holes	ea	0.37	0.00	54.15	0.00	20.04	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	0.04	0.00	483.24	0.00	20.02	
3.12	Shank adapter for Ø 51 mm holes	ea	0.03	0.00	277.11	0.00	7.05	
3.13	Coupling for Ø 51 mm dia.	ea	0.06	0.00	54.15	0.00	3.45	
3.14	Crawler drill bit for Ø 76 mm holes	ea	0.26	0.00	394.21	0.00	100.68	
3.15	Crawler drill bit for Ø 51 mm holes	ea	0.08	0.00	164.35	0.00	13.07	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	0.58	0.00	180.14	0.00	103.64	
3.17	Grease for rods, couplings and shank adapters	kg	11.09	0.00	4.80	0.00	53.21	
Sub-total				----->>		2,622.82	10,099.04	
Missing items and construction contingencies		%	2.00%	----->>		52	202	
Total direct costs				----->>		2,675	10,301	
Overheads, risks and profit		%	52.00%	----->>		675	6,073	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	1,950	----->>		1.72	8.40
AGGREGATE UNIT PRICE				----->>			10.11	

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
SURFACE EXCAVATION - ROCK - PORTAL OF TRANSPORTATION TUNNEL T4 AND CABLE TUNNEL

SEC 1
ANA 021
Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	2.76	0.00	43.75	0.00	120.89	
1.02	Foreman	h	27.63	6.11	0.00	168.82	0.00	
1.03	Equipment operator	h	125.15	5.39	0.00	674.58	0.00	
1.04	Hand held drill miner	h	59.67	2.77	0.00	165.30	0.00	
1.04	Operator's helper	h	28.63	2.20	0.00	62.98	0.00	
1.05	Explosive specialist	h	30.24	3.42	0.00	103.42	0.00	
1.06	Explosive specialist's helper	h	30.24	2.20	0.00	66.52	0.00	
1.07	Integral steel and bit grinder	h	2.38	3.42	0.00	8.13	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	27.12	0.05	2.71	1.36	73.51	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	22.18	0.54	46.87	11.98	1,039.79	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	0.00	0.68	66.30	0.00	0.00	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	9.04	0.15	24.64	1.36	222.78	
2.06	Flat bed lorry with crane, 10 t pay load	h	1.86	0.32	5.46	0.59	10.14	
2.07	Integral drill steel grinder	h	1.07	0.01	2.29	0.01	2.44	
2.08	Button bits grinder	h	0.92	0.04	5.32	0.04	4.87	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	0.00	1.37	123.22	0.00	0.00	
2.10	Bulldozer with blade, 231 kW	h	0.00	1.80	163.89	0.00	0.00	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	27.33	0.58	56.52	15.85	1,544.94	
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.00	0.00	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	4.99	0.63	48.81	3.14	243.40	
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.00	0.00	
2.15	Off-highway dup truck, 36.6 ton pay load	h	57.41	1.32	98.59	75.79	5,660.44	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.66%	0.00	674.54	
2.18	MATERIALS							
3	Explosive, amonite type	kg	280.50	2.31	0.00	647.96	0.00	
3.01	Explosive, gramonite type	kg	448.80	2.06	0.00	924.53	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	907.35	0.00	0.82	0.00	744.03	
3.04	Slow burning fuse fuse	ea	43.54	0.00	0.51	0.00	22.20	
3.05	Electric detonator, 3.0 m leading wire	ea	131.81	0.00	1.98	0.00	260.98	
3.06	Plain detonator	ea	37.89	0.00	0.78	0.00	29.55	
3.07	Copper type shotfiring cable	m	836.05	0.00	0.13	0.00	108.69	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	0.00	0.00	483.24	0.00	0.00	
3.09	Shank adapter for Ø 76 mm holes	ea	0.00	0.00	277.11	0.00	0.00	
3.10	Coupling for Ø 76 mm holes	ea	0.00	0.00	54.15	0.00	0.00	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	0.32	0.00	483.24	0.00	153.57	
3.12	Shank adapter for Ø 51 mm holes	ea	0.20	0.00	277.11	0.00	54.10	
3.13	Coupling for Ø 51 mm dia.	ea	0.49	0.00	54.15	0.00	26.47	
3.14	Crawler drill bit for Ø 76 mm holes	ea	0.00	0.00	394.21	0.00	0.00	
3.15	Crawler drill bit for Ø 51 mm holes	ea	0.61	0.00	164.35	0.00	100.27	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	1.08	0.00	180.14	0.00	195.45	
3.17	Grease for rods, couplings and shank adapters	kg	83.11	0.00	4.80	0.00	398.93	
Sub-total				----->>		2,932.35	11,691.97	
Missing items and construction contingencies		%	2.00%	----->>		59	234	
Total direct costs				----->>		2,991	11,926	
Overheads, risks and profit		%	52.00%	----->>		776	6,981	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	1,870.0	----->>		2.01	10.11
AGGREGATE UNIT PRICE				----->>			12.12	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE EXCAVATION - ROCK - TRANSPORTATION TUNNEL T22 PORTALS

SEC 1
 ANA 022
 Table A

N°	DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL COST		
				L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR							
1.01	General foreman	h	3.87	0.00	43.75	0.00	169.38	
1.02	Foreman	h	38.72	6.11	0.00	236.56	0.00	
1.03	Equipment operator	h	172.67	5.39	0.00	930.67	0.00	
1.04	Hand held drill miner	h	81.95	2.77	0.00	227.00	0.00	
1.04	Operator's helper	h	24.65	2.20	0.00	54.22	0.00	
1.05	Explosive specialist	h	52.74	3.42	0.00	180.36	0.00	
1.06	Explosive specialist's helper	h	52.74	2.20	0.00	116.02	0.00	
1.07	Integral steel and bit grinder	h	2.43	3.42	0.00	8.29	0.00	
2	EQUIPMENT							
2.01	Air powered hand-held rock drill, heavy weight	h	37.25	0.05	2.71	1.86	100.95	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	7.49	0.54	46.87	4.04	351.00	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	10.90	0.68	66.30	7.42	722.97	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.00	0.00	
2.05	Motorcompressor, 10.0 m3/min	h	12.42	0.15	24.64	1.86	305.95	
2.06	Flat bed lorry with crane, 10 t pay load	h	1.99	0.32	5.46	0.64	10.87	
2.07	Integral drill steel grinder	h	0.72	0.01	2.29	0.01	1.65	
2.08	Button bits grinder	h	1.30	0.04	5.32	0.05	6.92	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap.	h	30.34	1.37	123.22	41.56	3,738.06	
2.10	Bulldozer with blade, 231 kW	h	2.88	1.80	163.89	5.19	472.33	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	h	3.69	0.58	56.52	2.14	208.61	
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.00	0.00	
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	13.47	0.63	48.81	8.48	657.31	
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.00	0.00	
2.15	Off-highway dup truck, 36.6 ton pay load	h	86.21	1.32	98.59	113.79	8,499.19	
2.16	Portable diesel powered floodlight, 10000 W	h	0.00	0.01	6.41	0.00	0.00	
2.17	Cost of construction equipment standby units	%	----	0.0%	7.68%	0.00	1,157.30	
2.18	MATERIALS							
3	Explosive, amonite type	kg	568.13	2.31	0.00	1,312.37	0.00	
3.01	Explosive, gramonite type	kg	1,439.25	2.06	0.00	2,964.86	0.00	
3.02	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	m	993.30	0.00	0.82	0.00	814.51	
3.04	Slow burning fuse fuse	ea	114.61	0.00	0.51	0.00	58.45	
3.05	Electric detonator, 3.0 m leading wire	ea	99.90	0.00	1.98	0.00	197.80	
3.06	Plain detonator	ea	101.33	0.00	0.78	0.00	79.04	
3.07	Copper type shotfiring cable	m	724.57	0.00	0.13	0.00	94.19	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	0.62	0.00	483.24	0.00	301.07	
3.09	Shank adapter for Ø 76 mm holes	ea	0.21	0.00	277.11	0.00	58.65	
3.10	Coupling for Ø 76 mm holes	ea	0.96	0.00	54.15	0.00	51.90	
3.11	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	0.11	0.00	483.24	0.00	51.84	
3.12	Shank adapter for Ø 51 mm holes	ea	0.07	0.00	277.11	0.00	18.26	
3.13	Coupling for Ø 51 mm dia.	ea	0.17	0.00	54.15	0.00	8.94	
3.14	Crawler drill bit for Ø 76 mm holes	ea	0.66	0.00	394.21	0.00	260.72	
3.15	Crawler drill bit for Ø 51 mm holes	ea	0.21	0.00	164.35	0.00	33.85	
3.16	Integrall drill steel, 800/4000 mm (average)	ea	1.49	0.00	180.14	0.00	268.40	
3.17	Grease for rods, couplings and shank adapters	kg	28.71	0.00	4.80	0.00	137.81	
Sub-total				----->>		6,217.40	18,837.93	
Missing items and construction contingencies		%	2.00%	----->>		124	377	
Total direct costs				----->>		6,342	19,215	
Overheads, risks and profit		%	52.00%	----->>		1,329	11,960	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m3	5,050	----->>		1.52	6.17
AGGREGATE UNIT PRICE				----->>		7.69		

SECTION – 2

UNDERGROUND EXCAVATION

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T1 - (ROCK CLASS III)

SEC 2-01
 ANA 001
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	202.98	0.00	47.25	0.00	9,590.67
1.02	Gang foreman	1	h	2,029.77	6.60	0.00	13,396.49	0.00
1.03	Tunnel specialist	1	h	2,029.77	0.00	45.38	0.00	92,111.00
1.04	Tunneling jumbo operator	1	h	2,029.77	5.82	0.00	11,813.27	0.00
1.05	Loader operator	---	h	480.32	5.82	0.00	2,795.45	0.00
1.06	Operator of dumpers and other units	---	h	2,271.35	5.82	0.00	13,219.23	0.00
1.07	Miner	4	h	8,119.08	2.99	0.00	24,276.06	0.00
1.08	Explosive specialist	1	h	2,029.77	3.69	0.00	7,489.85	0.00
1.09	Electrician	0.33	h	675.91	3.69	0.00	2,494.12	0.00
1.10	Mechanic	0.33	h	675.91	3.69	0.00	2,494.12	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	134.46	3.69	0.00	496.16	0.00
1.12	Pipe fitter	0.33	h	675.91	3.69	0.00	2,494.12	0.00
1.13	Helper	5	h	10,148.85	2.38	0.00	24,154.27	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	3.52	0.00	19,479.66	0.00	68,644.52
		---	h	377.70	3.17	94.80	1,197.30	35,805.76
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	14.10	0.00	187.16	0.00	2,638.14
		---	h	184.46	0.07	1.53	12.91	282.22
2.03	Hand-held rock drill, medium weight type	3	m.th	10.57	0.00	130.63	0.00	1,380.98
		---	h	276.68	0.04	2.03	11.07	561.67
2.04	Hand-held breaker, medium weight type	4	m.th	14.10	0.00	46.95	0.00	661.79
		---	h	590.26	0.03	0.91	17.71	537.14
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	2,029.77	0.15	24.64	304.47	50,013.55
		s.b	h	405.95	0.00	5.46	0.00	2,216.51
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	400.26	0.75	70.52	300.20	28,226.68
		s.b	h	80.05	0.00	26.87	0.00	2,151.02
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	1,388.04	1.12	114.78	1,554.61	159,319.78
		s.b	h	277.61	0.00	50.07	0.00	13,899.88
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	3.52	0.00	856.34	0.00	3,017.66
		---	h	2,029.77	0.38	29.58	771.31	60,040.62
2.11	Halogen flood light, 1000 W	2	m.th	7.05	0.00	79.92	0.00	563.26
		---	h	4,059.54	0.01	0.43	40.60	1,745.60
2.12	Halogen flood light, 2000 W	1	m.th	3.52	0.00	92.77	0.00	326.91
		---	h	2,029.77	0.01	0.48	20.30	974.29
2.13	Ligthning line along tunnel, 100 m section	10.5	m.th	36.94	0.00	130.82	0.00	4,832.55
		---	h	21,277.72	0.01	0.41	212.78	8,723.87
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	380.58	0.15	18.51	57.09	7,044.57
		s.b	h	76.12	0.00	7.46	0.00	567.83
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	183.03	0.32	29.23	58.57	5,349.92
		s.b	h	36.61	0.00	12.36	0.00	452.45
2.16	Extendable lifter with 1000 kg cap. platform, 12 m	Op.	h	843.39	0.26	24.87	219.28	20,975.01
		s.b	h	168.68	0.00	15.28	0.00	2,577.39
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	113.20	0.63	48.81	71.32	5,525.53
		s.b	h	22.64	0.00	20.84	0.00	471.84
Total to carry forward ----->>							109,973	591,231

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T1 - (ROCK CLASS III)

SEC 2-01
 ANA 001
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						109,973	591,231
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.52	0.00	82.94	0.00	292.27
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moil point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.52	0.42	100.34	1.48	353.59
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	10.5	do	36.94	1.73	117.13	63.91	4,326.84
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	10.91	1.36	134.52	14.84	1,467.88
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	10.5	do	36.94	0.14	13.13	5.17	485.03
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	10.5	do	36.94	0.37	34.41	13.67	1,271.12
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.52	2.37	278.28	8.35	980.63
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	10.5	do	36.94	0.55	55.77	20.32	2,060.17
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.5	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2877.52	2.31	0.00	6,647.06	0.00
3.02	Explosive, gramonite type	----	kg	25897.65	2.06	0.00	53,349.16	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	12941.25	0.00	1.98	0.00	25,623.67
3.06	Blasting connection wire	----	m	4575.71	0.00	0.13	0.00	594.84
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	7.23	0.00	459.99	0.00	3,323.54
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	7.23	0.00	808.44	0.00	5,841.18
3.09	Jumbo drill shank adapter	----	n.	12.50	0.00	302.37	0.00	3,778.57
3.10	Jumbo drill bit, 51 mm dia.	----	n.	39.74	0.00	164.35	0.00	6,531.09
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.92	0.00	586.85	0.00	537.05
3.12	Integral drill steel, 800 mm	----	n.	4.92	0.00	132.65	0.00	652.48
3.13	Integral drill steel, 1600 mm	----	n.	4.30	0.00	153.97	0.00	662.68
3.14	Integral drill steel, 2400 mm	----	n.	3.07	0.00	174.35	0.00	536.00
3.15	Breaker tool, moil point	----	n.	12.30	0.00	32.37	0.00	398.06
3.16	Pipeline supports including anchors	----	kg	1,747.22	1.38	3.22	2,411.16	5,626.04
3.17	Cable tray including supports and anchors	----	m	698.89	0.35	0.83	247.41	577.28
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	698.89	0.79	7.11	552.12	4,969.09
	Sub-total						173,307	662,120
	Missing items and construction contingencies	%		2.00%			3,466	13,242
	Total Direct Costs						176,773	675,362
	Overheads, risks and profit	%		52.00%			44,311	398,799
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	24,594			8.99	43.68
	AGGREGATE UNIT PRICE		m³					52.66

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T1 - (ROCK CLASS IV)

SEC 2-01
 ANA 001
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	113.21	0.00	47.25	0.00	5,349.32
1.02	Gang foreman	1	h	1,132.13	6.60	0.00	7,472.07	0.00
1.03	Tunnel specialist	1	h	1,132.13	0.00	45.38	0.00	51,376.13
1.04	Tunneling jumbo operator	1	h	1,132.13	5.82	0.00	6,589.01	0.00
1.05	Loader operator	---	h	252.73	5.82	0.00	1,470.87	0.00
1.06	Operator of dumpers and other units	---	h	1,210.37	5.82	0.00	7,044.36	0.00
1.07	Miner	4	h	4,528.53	2.99	0.00	13,540.29	0.00
1.08	Explosive specialist	1	h	1,132.13	3.69	0.00	4,177.57	0.00
1.09	Electrician	0.33	h	377.00	3.69	0.00	1,391.13	0.00
1.10	Mechanic	0.33	h	377.00	3.69	0.00	1,391.13	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	66.13	3.69	0.00	244.03	0.00
1.12	Pipe fitter	0.33	h	377.00	3.69	0.00	1,391.13	0.00
1.13	Helper	5	h	5,660.66	2.38	0.00	13,472.37	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.97	0.00	19,479.66	0.00	38,287.39
		---	h	200.06	3.17	94.80	634.19	18,965.54
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	7.86	0.00	187.16	0.00	1,471.46
		---	h	92.21	0.07	1.53	6.45	141.09
2.03	Hand-held rock drill, medium weight type	3	m.th	5.90	0.00	130.63	0.00	770.26
		---	h	138.32	0.04	2.03	5.53	280.79
2.04	Hand-held breaker, medium weight type	4	m.th	7.86	0.00	46.95	0.00	369.12
		---	h	295.09	0.03	0.91	8.85	268.53
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,132.13	0.15	24.64	169.82	27,895.72
		s.b	h	226.43	0.00	5.46	0.00	1,236.29
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	210.61	0.75	70.52	157.95	14,851.96
		s.b	h	42.12	0.00	26.87	0.00	1,131.80
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	723.48	1.12	114.78	810.30	83,041.07
		s.b	h	144.70	0.00	50.07	0.00	7,244.93
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	1.97	0.00	856.34	0.00	1,683.14
		---	h	1,132.13	0.38	29.58	430.21	33,488.45
2.11	Halogen flood light, 1000 W	2	m.th	3.93	0.00	79.92	0.00	314.17
		---	h	2,264.26	0.01	0.43	22.64	973.63
2.12	Halogen flood light, 2000 W	1	m.th	1.97	0.00	92.77	0.00	182.34
		---	h	1,132.13	0.01	0.48	11.32	543.42
2.13	Ligthing line along tunnel, 100 m section	10.5	m.th	20.60	0.00	130.82	0.00	2,695.42
		---	h	11,867.93	0.01	0.41	118.68	4,865.85
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	212.27	0.15	18.51	31.84	3,929.20
		s.b	h	42.45	0.00	7.46	0.00	316.71
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	105.58	0.32	29.23	33.78	3,086.03
		s.b	h	21.12	0.00	12.36	0.00	260.99
2.16	Extendable lifter with 1000 kg cap. platform, 12 m	Op.	h	476.83	0.26	24.87	123.98	11,858.74
		s.b	h	95.37	0.00	15.28	0.00	1,457.19
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	59.00	0.63	48.81	37.17	2,880.03
		s.b	h	11.80	0.00	20.84	0.00	245.93
Total to carry forward ----->>							60,787	321,463

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T1 - (ROCK CLASS IV)

SEC 2-01
 ANA 001
 RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						60,787	321,463
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.97	0.00	82.94	0.00	163.02
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moil point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.97	0.42	100.34	0.83	197.22
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	10.5	do	20.60	1.73	117.13	35.64	2,413.35
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	6.09	1.36	134.52	8.28	818.73
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	10.5	do	20.60	0.14	13.13	2.88	270.53
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	10.5	do	20.60	0.37	34.41	7.62	708.99
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.97	2.37	278.28	4.66	546.96
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	10.5	do	20.60	0.55	55.77	11.33	1,149.09
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.5	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1358.62	2.31	0.00	3,138.42	0.00
3.02	Explosive, gramonite type	----	kg	12227.61	2.06	0.00	25,188.88	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	7290.78	0.00	1.98	0.00	14,435.75
3.06	Blasting connection wire	----	m	2639.44	0.00	0.13	0.00	343.13
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.53	0.00	459.99	0.00	1,623.64
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.53	0.00	808.44	0.00	2,853.58
3.09	Jumbo drill shank adapter	----	n.	6.10	0.00	302.37	0.00	1,845.93
3.10	Jumbo drill bit, 51 mm dia.	----	n.	19.41	0.00	164.35	0.00	3,190.61
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.46	0.00	586.85	0.00	268.49
3.12	Integral drill steel, 800 mm	----	n.	2.46	0.00	132.65	0.00	326.19
3.13	Integral drill steel, 1600 mm	----	n.	2.15	0.00	153.97	0.00	331.29
3.14	Integral drill steel, 2400 mm	----	n.	1.54	0.00	174.35	0.00	267.96
3.15	Breaker tool, moil point	----	n.	6.15	0.00	32.37	0.00	199.00
3.16	Pipeline supports including anchors	----	kg	873.48	1.38	3.22	1,205.40	2,812.60
3.17	Cable tray including supports and anchors	----	m	349.39	0.35	0.83	123.68	288.60
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	349.39	0.79	7.11	276.02	2,484.17
	Sub-total						90,790	359,002
	Missing items and construction contingencies	%		2.00%			1,816	7,180
	Total Direct Costs						92,606	366,182
	Overheads, risks and profit	%		52.00%			23,857	214,713
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	12,295			9.47	47.25
	AGGREGATE UNIT PRICE		m³					56.72

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T2 - (ROCK CLASS III)

SEC 2-01
 ANA 002
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	506.08	0.00	47.25	0.00	23,912.27	
1.02	Gang foreman	1	hr	5,060.80	6.60	0.00	33,401.26	0.00	
1.03	Tunnel specialist	1	hr	3,002.74	0.00	45.38	0.00	136,264.25	
1.04	Tunneling jumbo operator	1	hr	3,002.74	5.82	0.00	17,475.93	0.00	
1.05	Loader operator	---	hr	775.25	5.82	0.00	4,511.93	0.00	
1.06	Operator of dumpers and other units	---	h	4,577.25	5.82	0.00	26,639.61	0.00	
1.07	Miner	5	hr	15,013.69	2.99	0.00	44,890.93	0.00	
1.08	Explosive specialist	1	hr	3,002.74	3.69	0.00	11,080.10	0.00	
1.09	Electrician	0.33	hr	999.91	3.69	0.00	3,689.67	0.00	
1.10	Mechanic	0.33	hr	999.91	3.69	0.00	3,689.67	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	217.41	3.69	0.00	802.25	0.00	
1.12	Pipe fitter	0.33	hr	999.91	3.69	0.00	3,689.67	0.00	
1.13	Helper	6	hr	18,016.43	2.38	0.00	42,879.10	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	5.21	0.00	21,868.22	0.00	114,000.92	
		---	h	419.47	3.71	122.14	1,556.24	51,234.14	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	26.07	0.00	187.16	0.00	4,878.41	
		---	h	368.48	0.07	1.53	25.79	563.78	
2.03	Hand-held rock drill, medium weight type	4	m.th	20.85	0.00	130.63	0.00	2,723.94	
		---	h	552.73	0.04	2.03	22.11	1,122.03	
2.04	Hand-held breaker, medium weight type	5	m.th	26.07	0.00	46.95	0.00	1,223.77	
		---	h	1,179.15	0.03	0.91	35.37	1,073.02	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	3,002.74	0.29	77.99	870.79	234,183.53	
		s.b	h	600.55	0.00	10.73	0.00	6,443.88	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	646.04	1.05	95.46	678.34	61,670.86	
		---	h	129.21	0.00	36.59	0.00	4,727.71	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	124.17	0.70	64.44	86.92	8,001.68	
		s.b	h	24.83	0.00	40.23	0.00	999.09	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	3,103.03	1.12	114.78	3,475.39	356,165.56	
		s.b	h	620.61	0.00	50.07	0.00	31,073.72	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	5.21	0.00	856.34	0.00	4,464.17	
		---	h	3,002.74	0.55	29.58	1,651.51	88,820.99	
2.11	Halogen flood light, 1000 W	2	m.th	10.43	0.00	79.92	0.00	833.26	
		---	h	6,005.48	0.01	0.43	60.05	2,582.35	
2.12	Halogen flood light, 2000 W	2	m.th	10.43	0.00	92.77	0.00	967.24	
		---	h	6,005.48	0.01	0.48	60.05	2,882.63	
2.13	Ligthing line along tunnel, 100 m section	7.3	m.th	38.04	0.00	130.82	0.00	4,975.91	
		---	h	21,908.90	0.01	0.41	219.09	8,982.65	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	563.01	0.15	18.51	84.45	10,421.38	
		s.b	h	112.60	0.00	7.46	0.00	840.02	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	274.39	0.32	29.23	87.80	8,020.43	
		s.b	h	54.88	0.00	12.36	0.00	678.29	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	1,212.99	0.33	30.84	400.29	37,408.48	
		s.b	h	242.60	0.00	19.27	0.00	4,674.85	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	220.71	0.63	48.81	139.05	10,772.73	
		s.b	h	44.14	0.00	20.84	0.00	919.91	
Total to carry forward ----->>								202,203	1,228,508

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T2 - (ROCK CLASS III)**

**SEC 2-01
ANA 002
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						202,203	1,228,508
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	5.21	0.00	128.05	0.00	667.54
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moil point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	5.21	0.42	100.34	2.19	523.08
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	7.3	do	38.04	1.93	130.66	73.41	4,969.82
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	12.82	2.01	198.33	25.77	2,542.66
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	7.3	do	38.04	0.20	18.98	7.61	721.93
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	7	do	38.04	0.37	34.41	14.07	1,308.83
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	5.21	3.15	370.12	16.42	1,929.47
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7.3	do	38.04	0.38	38.10	14.45	1,449.18
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	7.3	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	7.3	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	5,394.60	2.31	0.00	12,461.52	0.00
3.02	Explosive, gramonite type	----	kg	48,551.39	2.06	0.00	100,015.87	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	19,045.76	0.00	1.98	0.00	37,710.60
3.06	Blasting connection wire	----	m	6,859.76	0.00	0.13	0.00	891.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	10.64	0.00	459.99	0.00	4,893.39
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	10.64	0.00	808.44	0.00	8,600.22
3.09	Jumbo drill shank adapter	----	n.	18.40	0.00	302.37	0.00	5,563.34
3.10	Jumbo drill bit, 51 mm dia.	----	n.	58.51	0.00	164.35	0.00	9,615.99
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.37	0.00	586.85	0.00	805.13
3.12	Integral drill steel, 800 mm	----	n.	9.83	0.00	132.65	0.00	1,303.45
3.13	Integral drill steel, 1600 mm	----	n.	8.60	0.00	153.97	0.00	1,323.83
3.14	Integral drill steel, 2400 mm	----	n.	6.14	0.00	174.35	0.00	1,070.75
3.15	Breaker tool, moil point	----	n.	24.57	0.00	32.37	0.00	795.19
3.16	Pipeline supports including anchors	----	kg	1,639.84	1.38	3.22	2,262.98	5,280.30
3.17	Cable tray including supports and anchors	----	m	655.94	0.35	0.83	232.20	541.80
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	655.94	0.79	7.11	518.19	4,663.71
	Sub-total						317,848	1,325,680
	Missing items and construction contingencies	%		2.00%			6,357	26,514
	Total Direct Costs						324,205	1,352,193
	Overheads, risks and profit	%		52.00%			87,173	784,554
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	49,131			8.37	43.49
	AGGREGATE UNIT PRICE		m ³					51.86

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T2 - (ROCK CLASS IV)

SEC 2-01
 ANA 002
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	63.58	0.00	47.25	0.00	3,004.02
1.02	Gang foreman	1	hr	635.77	6.60	0.00	4,196.09	0.00
1.03	Tunnel specialist	1	hr	379.96	0.00	45.38	0.00	17,242.56
1.04	Tunneling jumbo operator	1	hr	379.96	5.82	0.00	2,211.36	0.00
1.05	Loader operator	---	hr	91.16	5.82	0.00	530.57	0.00
1.06	Operator of dumpers and other units	---	h	543.46	5.82	0.00	3,162.93	0.00
1.07	Miner	5	hr	1,899.80	2.99	0.00	5,680.39	0.00
1.08	Explosive specialist	1	hr	379.96	3.69	0.00	1,402.05	0.00
1.09	Electrician	0.33	hr	126.53	3.69	0.00	466.88	0.00
1.10	Mechanic	0.33	hr	126.53	3.69	0.00	466.88	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	24.08	3.69	0.00	88.87	0.00
1.12	Pipe fitter	0.33	hr	126.53	3.69	0.00	466.88	0.00
1.13	Helper	6	hr	2,279.76	2.38	0.00	5,425.82	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.66	0.00	21,868.22	0.00	14,425.41
		---	h	50.33	3.71	122.14	186.74	6,147.89
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	3.30	0.00	187.16	0.00	617.30
		---	h	41.40	0.07	1.53	2.90	63.34
2.03	Hand-held rock drill, medium weight type	4	m.th	2.64	0.00	130.63	0.00	344.68
		---	h	62.10	0.04	2.03	2.48	126.06
2.04	Hand-held breaker, medium weight type	5	m.th	3.30	0.00	46.95	0.00	154.85
		---	h	132.47	0.03	0.91	3.97	120.55
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	379.96	0.29	77.99	110.19	29,633.04
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	75.97	1.05	95.46	79.77	7,251.99
		---	h	15.19	0.00	36.59	0.00	555.94
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	15.62	0.70	64.44	10.93	1,006.43
		s.b	h	3.12	0.00	40.23	0.00	125.66
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	361.53	1.12	114.78	404.91	41,496.14
		s.b	h	72.31	0.00	50.07	0.00	3,620.34
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.66	0.00	856.34	0.00	564.89
		---	h	379.96	0.55	29.58	208.98	11,239.20
2.11	Halogen flood light, 1000 W	2	m.th	1.32	0.00	79.92	0.00	105.44
		---	h	759.92	0.01	0.43	7.60	326.77
2.12	Halogen flood light, 2000 W	2	m.th	1.32	0.00	92.77	0.00	122.39
		---	h	759.92	0.01	0.48	7.60	364.76
2.13	Ligthing line along tunnel, 100 m section	7.3	m.th	4.81	0.00	130.82	0.00	629.64
		---	h	2,772.30	0.01	0.41	27.72	1,136.64
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	71.24	0.15	18.51	10.69	1,318.70
		s.b	h	14.25	0.00	7.46	0.00	106.29
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	35.57	0.32	29.23	11.38	1,039.70
		s.b	h	7.11	0.00	12.36	0.00	87.93
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	156.12	0.33	30.84	51.52	4,814.73
		s.b	h	31.22	0.00	19.27	0.00	601.69
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	25.71	0.63	48.81	16.20	1,255.11
		s.b	h	5.14	0.00	20.84	0.00	107.18
Total to carry forward ----->>							25,242	149,757

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T2 - (ROCK CLASS IV)**

**SEC 2-01
ANA 002
RC IV-T B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						25,242	149,757
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.66	0.00	128.05	0.00	84.47
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.66	0.42	100.34	0.28	66.19
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	7.3	do	4.81	1.93	130.66	9.29	628.87
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	1.62	2.01	198.33	3.26	321.74
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	7.3	do	4.81	0.20	18.98	0.96	91.35
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	7	do	4.81	0.37	34.41	1.78	165.62
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.66	3.15	370.12	2.08	244.15
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7.3	do	4.81	0.38	38.10	1.83	183.38
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	7.3	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	7.3	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	572.40	2.31	0.00	1,322.24	0.00
3.02	Explosive, gramonite type	----	kg	5,151.57	2.06	0.00	10,612.24	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2,413.99	0.00	1.98	0.00	4,779.70
3.06	Blasting connection wire	----	m	889.24	0.00	0.13	0.00	115.60
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.17	0.00	459.99	0.00	537.81
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.17	0.00	808.44	0.00	945.21
3.09	Jumbo drill shank adapter	----	n.	2.02	0.00	302.37	0.00	611.44
3.10	Jumbo drill bit, 51 mm dia.	----	n.	6.43	0.00	164.35	0.00	1,056.85
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.15	0.00	586.85	0.00	90.45
3.12	Integral drill steel, 800 mm	----	n.	1.10	0.00	132.65	0.00	146.44
3.13	Integral drill steel, 1600 mm	----	n.	0.97	0.00	153.97	0.00	148.73
3.14	Integral drill steel, 2400 mm	----	n.	0.69	0.00	174.35	0.00	120.30
3.15	Breaker tool, moiil point	----	n.	2.76	0.00	32.37	0.00	89.34
3.16	Pipeline supports including anchors	----	kg	184.23	1.38	3.22	254.24	593.23
3.17	Cable tray including supports and anchors	----	m	73.69	0.35	0.83	26.09	60.87
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	73.69	0.79	7.11	58.22	523.95
	Sub-total						37,535	161,363
	Missing items and construction contingencies	%		2.00%			751	3,227
	Total Direct Costs						38,286	164,590
	Overheads, risks and profit	%		52.00%			10,550	94,946
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	5,520			8.85	47.02
	AGGREGATE UNIT PRICE		m ³					55.87

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T3 - (ROCK CLASS III)

SEC 2-01
 ANA 003
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	175.43	0.00	47.25	0.00	8,289.26	
1.02	Gang foreman	1	hr	1,754.34	6.60	0.00	11,578.64	0.00	
1.03	Tunnel specialist	1	hr	1,046.47	0.00	45.38	0.00	47,488.58	
1.04	Tunneling jumbo operator	1	hr	1,046.47	5.82	0.00	6,090.43	0.00	
1.05	Loader operator	---	hr	303.37	5.82	0.00	1,765.64	0.00	
1.06	Operator of dumpers and other units	---	h	1,464.67	5.82	0.00	8,524.37	0.00	
1.07	Miner	5	hr	5,232.33	2.99	0.00	15,644.65	0.00	
1.08	Explosive specialist	1	hr	1,046.47	3.69	0.00	3,861.46	0.00	
1.09	Electrician	0.33	hr	348.47	3.69	0.00	1,285.86	0.00	
1.10	Mechanic	0.33	hr	348.47	3.69	0.00	1,285.86	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	79.43	3.69	0.00	293.09	0.00	
1.12	Pipe fitter	0.33	hr	348.47	3.69	0.00	1,285.86	0.00	
1.13	Helper	6	hr	6,278.79	2.38	0.00	14,943.52	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.82	0.00	21,868.22	0.00	39,729.74	
		---	h	137.00	3.71	122.14	508.26	16,732.80	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	9.08	0.00	187.16	0.00	1,700.14	
		---	h	150.85	0.07	1.53	10.56	230.80	
2.03	Hand-held rock drill, medium weight type	4	m.th	7.27	0.00	130.63	0.00	949.30	
		---	h	226.27	0.04	2.03	9.05	459.33	
2.04	Hand-held breaker, medium weight type	5	m.th	9.08	0.00	46.95	0.00	426.49	
		---	h	482.71	0.03	0.91	14.48	439.27	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,046.47	0.29	77.99	303.47	81,613.81	
		s.b	h	209.29	0.00	10.73	0.00	2,245.71	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	252.81	1.05	95.46	265.45	24,133.42	
		---	h	50.56	0.00	36.59	0.00	1,850.08	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	41.61	0.70	64.44	29.12	2,681.05	
		s.b	h	8.32	0.00	40.23	0.00	334.76	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	965.49	1.12	114.78	1,081.35	110,818.78	
		s.b	h	193.10	0.00	50.07	0.00	9,668.40	
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	1.82	0.00	978.67	0.00	1,778.03	
		---	h	1,046.47	0.55	44.15	575.56	46,201.43	
2.11	Halogen flood light, 1000 W	2	m.th	3.63	0.00	79.92	0.00	290.39	
		---	h	2,092.93	0.01	0.43	20.93	899.96	
2.12	Halogen flood light, 2000 W	2	m.th	3.63	0.00	92.77	0.00	337.09	
		---	h	2,092.93	0.01	0.48	20.93	1,004.61	
2.13	Ligthing line along tunnel, 100 m section	15.5	m.th	28.15	0.00	130.82	0.00	3,682.95	
		---	h	16,216.02	0.01	0.41	162.16	6,648.57	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	196.21	0.15	18.51	29.43	3,631.89	
		s.b	h	39.24	0.00	7.46	0.00	292.75	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	81.58	0.32	29.23	26.11	2,384.54	
		s.b	h	16.32	0.00	12.36	0.00	201.66	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	417.53	0.33	30.84	137.79	12,876.68	
		s.b	h	83.51	0.00	19.27	0.00	1,609.17	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	88.24	0.63	48.81	55.59	4,306.83	
		s.b	h	17.65	0.00	20.84	0.00	367.77	
Total to carry forward ----->>								69,810	436,306

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T3 - (ROCK CLASS III)

SEC 2-01
 ANA 003
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						69,810	436,306
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.82	0.00	128.05	0.00	232.64
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.82	0.57	133.79	1.04	243.07
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	15.5	do	28.15	2.21	149.88	62.22	4,219.54
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	4	do	7.45	2.01	198.33	14.97	1,477.03
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	15.5	do	28.15	0.20	18.98	5.63	534.34
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	15.5	do	28.15	0.44	41.32	12.39	1,163.27
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.82	3.15	370.12	5.72	672.43
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	15	do	28.15	0.55	55.77	15.48	1,570.08
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	15	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	15	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2,027.38	2.31	0.00	4,683.24	0.00
3.02	Explosive, gramonite type	----	kg	18,246.40	2.06	0.00	37,587.58	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	6,569.57	0.00	1.98	0.00	13,007.76
3.06	Blasting connection wire	----	m	2,039.47	0.00	0.13	0.00	265.13
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.66	0.00	459.99	0.00	1,682.44
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.66	0.00	808.44	0.00	2,956.92
3.09	Jumbo drill shank adapter	----	n.	6.33	0.00	302.37	0.00	1,912.79
3.10	Jumbo drill bit, 51 mm dia.	----	n.	20.12	0.00	164.35	0.00	3,306.17
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.41	0.00	586.85	0.00	239.37
3.12	Integral drill steel, 800 mm	----	n.	4.02	0.00	132.65	0.00	533.59
3.13	Integral drill steel, 1600 mm	----	n.	3.52	0.00	153.97	0.00	541.94
3.14	Integral drill steel, 2400 mm	----	n.	2.51	0.00	174.35	0.00	438.33
3.15	Breaker tool, moiil point	----	n.	10.06	0.00	32.37	0.00	325.53
3.16	Pipeline supports including anchors	----	kg	480.38	1.38	3.22	662.92	1,546.81
3.17	Cable tray including supports and anchors	----	m	192.15	0.35	0.83	68.02	158.72
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	192.15	0.79	7.11	151.80	1,366.19
	Sub-total						113,081	474,700
	Missing items and construction contingencies	%		2.00%			2,262	9,494
	Total Direct Costs						115,342	484,194
	Overheads, risks and profit	%		52.00%			31,176	280,583
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		20,113			7.28	38.02
	AGGREGATE UNIT PRICE	m ³						45.31

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T3 - (ROCK CLASS IV)

SEC 2-01
 ANA 003
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	1,381.57	0.00	47.25	0.00	65,279.04	
1.02	Gang foreman	1	hr	13,815.67	6.60	0.00	91,183.42	0.00	
1.03	Tunnel specialist	1	hr	8,299.60	0.00	45.38	0.00	376,635.71	
1.04	Tunneling jumbo operator	1	hr	8,299.60	5.82	0.00	48,303.65	0.00	
1.05	Loader operator	---	hr	2,227.28	5.82	0.00	12,962.78	0.00	
1.06	Operator of dumpers and other units	---	h	10,890.18	5.82	0.00	63,380.88	0.00	
1.07	Miner	5	hr	41,497.98	2.99	0.00	124,078.97	0.00	
1.08	Explosive specialist	1	hr	8,299.60	3.69	0.00	30,625.51	0.00	
1.09	Electrician	0.33	hr	2,763.77	3.69	0.00	10,198.30	0.00	
1.10	Mechanic	0.33	hr	2,763.77	3.69	0.00	10,198.30	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	553.58	3.69	0.00	2,042.70	0.00	
1.12	Pipe fitter	0.33	hr	2,763.77	3.69	0.00	10,198.30	0.00	
1.13	Helper	6	hr	49,797.58	2.38	0.00	118,518.24	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	14.41	0.00	21,868.22	0.00	315,099.67	
		---	h	1,030.37	3.71	122.14	3,822.66	125,848.94	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	72.05	0.00	187.16	0.00	13,483.96	
		---	h	1,065.66	0.07	1.53	74.60	1,630.46	
2.03	Hand-held rock drill, medium weight type	4	m.th	57.64	0.00	130.63	0.00	7,529.00	
		---	h	1,598.49	0.04	2.03	63.94	3,244.93	
2.04	Hand-held breaker, medium weight type	5	m.th	72.05	0.00	46.95	0.00	3,382.52	
		---	h	3,410.11	0.03	0.91	102.30	3,103.20	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	8,299.60	0.29	77.99	2,406.88	647,285.56	
		s.b	h	0.00	0.00	10.73	0.00	0.00	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	1,856.07	1.05	95.46	1,948.87	177,180.29	
		---	h	371.21	0.00	36.59	0.00	13,582.71	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	328.31	0.70	64.44	229.81	21,155.97	
		s.b	h	65.66	0.00	40.23	0.00	2,641.54	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	7,035.99	1.12	114.78	7,880.31	807,591.22	
		s.b	h	1,407.20	0.00	50.07	0.00	70,458.43	
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	14.41	0.00	978.67	0.00	14,101.68	
		---	h	8,299.60	0.55	44.15	4,564.78	366,427.20	
2.11	Halogen flood light, 1000 W	2	m.th	28.82	0.00	79.92	0.00	2,303.14	
		---	h	16,599.19	0.01	0.43	165.99	7,137.65	
2.12	Halogen flood light, 2000 W	2	m.th	28.82	0.00	92.77	0.00	2,673.45	
		---	h	16,599.19	0.01	0.48	165.99	7,967.61	
2.13	Ligthing line along tunnel, 100 m section	15.5	m.th	223.28	0.00	130.82	0.00	29,209.78	
		---	h	128,610.57	0.01	0.41	1,286.11	52,730.33	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	1,556.17	0.15	18.51	233.43	28,804.79	
		s.b	h	311.23	0.00	7.46	0.00	2,321.81	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	664.98	0.32	29.23	212.79	19,437.29	
		s.b	h	133.00	0.00	12.36	0.00	1,643.82	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	3,378.86	0.33	30.84	1,115.02	104,204.08	
		s.b	h	675.77	0.00	19.27	0.00	13,022.13	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	643.02	0.63	48.81	405.10	31,385.98	
		s.b	h	128.60	0.00	20.84	0.00	2,680.12	
Total to carry forward ----->>								546,370	3,341,184

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T3 - (ROCK CLASS IV)**

**SEC 2-01
ANA 003
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						546,370	3,341,184
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	14.41	0.00	128.05	0.00	1,845.08
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	14.41	0.57	133.79	8.21	1,927.78
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	15.5	do	223.28	2.21	149.88	493.45	33,465.54
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	4	do	59.07	2.01	198.33	118.72	11,714.45
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	15.5	do	223.28	0.20	18.98	44.66	4,237.90
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	15.5	do	223.28	0.44	41.32	98.24	9,226.02
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	14.41	3.15	370.12	45.39	5,333.07
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	15.5	do	223.28	0.55	55.77	122.81	12,452.45
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	15.5	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	15.5	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	13,526.75	2.31	0.00	31,246.79	0.00
3.02	Explosive, gramonite type	----	kg	121,740.75	2.06	0.00	250,785.94	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	52,342.02	0.00	1.98	0.00	103,637.20
3.06	Blasting connection wire	----	m	16,624.44	0.00	0.13	0.00	2,161.18
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	25.27	0.00	459.99	0.00	11,622.76
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	25.27	0.00	808.44	0.00	20,427.19
3.09	Jumbo drill shank adapter	----	n.	43.70	0.00	302.37	0.00	13,214.03
3.10	Jumbo drill bit, 51 mm dia.	----	n.	138.97	0.00	164.35	0.00	22,839.85
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	2.88	0.00	586.85	0.00	1,691.05
3.12	Integral drill steel, 800 mm	----	n.	28.42	0.00	132.65	0.00	3,769.59
3.13	Integral drill steel, 1600 mm	----	n.	24.87	0.00	153.97	0.00	3,828.52
3.14	Integral drill steel, 2400 mm	----	n.	17.76	0.00	174.35	0.00	3,096.62
3.15	Breaker tool, moiil point	----	n.	71.04	0.00	32.37	0.00	2,299.69
3.16	Pipeline supports including anchors	----	kg	3,393.62	1.38	3.22	4,683.20	10,927.47
3.17	Cable tray including supports and anchors	----	m	1,357.45	0.35	0.83	480.54	1,121.25
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,357.45	0.79	7.11	1,072.39	9,651.47
	Sub-total						835,570	3,631,674
	Missing items and construction contingencies	%		2.00%			16,711	72,633
	Total Direct Costs						852,281	3,704,308
	Overheads, risks and profit	%		52.00%			236,943	2,132,484
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		142,088			7.67	41.08
	AGGREGATE UNIT PRICE	m ³						48.74

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNELT3' - (ROCK CLASS III)

SEC 2-01
 ANA 004
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	457.25	0.00	47.25	0.00	21,605.06	
1.02	Gang foreman	1	hr	4,572.50	6.60	0.00	30,178.49	0.00	
1.03	Tunnel specialist	1	hr	2,773.81	0.00	45.38	0.00	125,875.70	
1.04	Tunneling jumbo operator	1	hr	2,773.81	5.82	0.00	16,143.60	0.00	
1.05	Loader operator	---	hr	754.87	5.82	0.00	4,393.36	0.00	
1.06	Operator of dumpers and other units	---	h	3,160.56	5.82	0.00	18,394.49	0.00	
1.07	Miner	5	hr	13,869.07	2.99	0.00	41,468.53	0.00	
1.08	Explosive specialist	1	hr	2,773.81	3.69	0.00	10,235.38	0.00	
1.09	Electrician	0.33	hr	923.68	3.69	0.00	3,408.38	0.00	
1.10	Mechanic	0.33	hr	923.68	3.69	0.00	3,408.38	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	205.11	3.69	0.00	756.84	0.00	
1.12	Pipe fitter	0.33	hr	923.68	3.69	0.00	3,408.38	0.00	
1.13	Helper	6	hr	16,642.89	2.38	0.00	39,610.07	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	4.82	0.00	21,868.22	0.00	105,309.70	
		---	h	374.68	3.71	122.14	1,390.07	45,763.64	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	24.08	0.00	187.16	0.00	4,506.49	
		---	h	367.05	0.07	1.53	25.69	561.59	
2.03	Hand-held rock drill, medium weight type	4	m.th	19.26	0.00	130.63	0.00	2,516.27	
		---	h	550.58	0.04	2.03	22.02	1,117.68	
2.04	Hand-held breaker, medium weight type	5	m.th	24.08	0.00	46.95	0.00	1,130.47	
		---	h	1,174.57	0.03	0.91	35.24	1,068.86	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	2,773.81	0.29	77.99	804.41	216,329.79	
		s.b	h	554.76	0.00	10.73	0.00	5,952.61	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	629.06	1.05	95.46	660.51	60,050.19	
		---	h	125.81	0.00	36.59	0.00	4,603.47	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	111.04	0.70	64.44	77.73	7,155.25	
		s.b	h	22.21	0.00	40.23	0.00	893.41	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	1,902.22	1.12	114.78	2,130.49	218,337.31	
		s.b	h	380.44	0.00	50.07	0.00	19,048.87	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	4.82	0.00	856.34	0.00	4,123.83	
		---	h	2,773.81	0.55	29.58	1,525.60	82,049.43	
2.11	Halogen flood light, 1000 W	2	m.th	9.63	0.00	79.92	0.00	769.73	
		---	h	5,547.63	0.01	0.43	55.48	2,385.48	
2.12	Halogen flood light, 2000 W	2	m.th	9.63	0.00	92.77	0.00	893.50	
		---	h	5,547.63	0.01	0.48	55.48	2,662.86	
2.13	Ligthning line along tunnel, 100 m section	10.0	m.th	47.96	0.00	130.82	0.00	6,274.64	
		---	h	27,627.22	0.01	0.41	276.27	11,327.16	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	520.09	0.15	18.51	78.01	9,626.87	
		s.b	h	104.02	0.00	7.46	0.00	775.97	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	233.59	0.32	29.23	74.75	6,827.73	
		s.b	h	46.72	0.00	12.36	0.00	577.43	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	1,115.36	0.33	30.84	368.07	34,397.70	
		s.b	h	223.07	0.00	19.27	0.00	4,298.60	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	217.34	0.63	48.81	136.92	10,608.36	
		s.b	h	43.47	0.00	20.84	0.00	905.87	
Total to carry forward ----->>>								179,123	1,020,331

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNELT3' - (ROCK CLASS III)

SEC 2-01
 ANA 004
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						179,123	1,020,331
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	4.82	0.00	128.05	0.00	616.64
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	4.82	0.57	133.79	2.74	644.29
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	10.0	do	47.96	2.21	149.88	106.00	7,188.83
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	14.41	2.01	198.33	28.96	2,857.62
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	10.0	do	47.96	0.20	18.98	9.59	910.36
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	10	do	47.96	0.37	34.41	17.75	1,650.44
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	4.82	3.15	370.12	15.17	1,782.37
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	10.0	do	47.96	0.38	38.10	18.23	1,827.43
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	10.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	10.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 150 KVA	1	do	0.00	0.67	74.68	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	5,285.56	2.31	0.00	12,209.64	0.00
3.02	Explosive, gramonite type	----	kg	47,570.02	2.06	0.00	97,994.24	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	17,512.35	0.00	1.98	0.00	34,674.45
3.06	Blasting connection wire	----	m	5,839.66	0.00	0.13	0.00	759.16
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	9.76	0.00	459.99	0.00	4,491.59
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	9.76	0.00	808.44	0.00	7,894.05
3.09	Jumbo drill shank adapter	----	n.	16.89	0.00	302.37	0.00	5,106.53
3.10	Jumbo drill bit, 51 mm dia.	----	n.	53.70	0.00	164.35	0.00	8,826.41
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.17	0.00	586.85	0.00	685.40
3.12	Integral drill steel, 800 mm	----	n.	9.79	0.00	132.65	0.00	1,298.39
3.13	Integral drill steel, 1600 mm	----	n.	8.56	0.00	153.97	0.00	1,318.69
3.14	Integral drill steel, 2400 mm	----	n.	6.12	0.00	174.35	0.00	1,066.59
3.15	Breaker tool, moiil point	----	n.	24.47	0.00	32.37	0.00	792.10
3.16	Pipeline supports including anchors	----	kg	1,857.54	1.38	3.22	2,563.40	5,981.28
3.17	Cable tray including supports and anchors	----	m	743.02	0.35	0.83	263.03	613.73
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	743.02	0.79	7.11	586.98	5,282.84
	Sub-total						292,938	1,116,601
	Missing items and construction contingencies	%		2.00%			5,859	22,332
	Total Direct Costs						298,797	1,138,933
	Overheads, risks and profit	%		52.00%			74,762	672,858
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	48,940			7.63	37.02
	AGGREGATE UNIT PRICE		m³					44.65

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNELT3' - (ROCK CLASS IV)

SEC 2-01
 ANA 004
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	174.09	0.00	47.25	0.00	8,225.67	
1.02	Gang foreman	1	hr	1,740.88	6.60	0.00	11,489.83	0.00	
1.03	Tunnel specialist	1	hr	1,062.12	0.00	45.38	0.00	48,199.02	
1.04	Tunneling jumbo operator	1	hr	1,062.12	5.82	0.00	6,181.54	0.00	
1.05	Loader operator	---	hr	268.07	5.82	0.00	1,560.19	0.00	
1.06	Operator of dumpers and other units	---	h	1,141.14	5.82	0.00	6,641.44	0.00	
1.07	Miner	5	hr	5,310.60	2.99	0.00	15,878.70	0.00	
1.08	Explosive specialist	1	hr	1,062.12	3.69	0.00	3,919.22	0.00	
1.09	Electrician	0.33	hr	353.69	3.69	0.00	1,305.10	0.00	
1.10	Mechanic	0.33	hr	353.69	3.69	0.00	1,305.10	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	68.87	3.69	0.00	254.14	0.00	
1.12	Pipe fitter	0.33	hr	353.69	3.69	0.00	1,305.10	0.00	
1.13	Helper	6	hr	6,372.72	2.38	0.00	15,167.08	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.84	0.00	21,868.22	0.00	40,324.10	
		---	h	136.03	3.71	122.14	504.66	16,614.45	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	9.22	0.00	187.16	0.00	1,725.58	
		---	h	124.98	0.07	1.53	8.75	191.21	
2.03	Hand-held rock drill, medium weight type	4	m.th	7.38	0.00	130.63	0.00	963.51	
		---	h	187.46	0.04	2.03	7.50	380.55	
2.04	Hand-held breaker, medium weight type	5	m.th	9.22	0.00	46.95	0.00	432.87	
		---	h	399.92	0.03	0.91	12.00	363.93	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,062.12	0.29	77.99	308.01	82,834.77	
		s.b	h	0.00	0.00	10.73	0.00	0.00	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	223.40	1.05	95.46	234.57	21,325.31	
		---	h	44.68	0.00	36.59	0.00	1,634.81	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	42.28	0.70	64.44	29.60	2,724.82	
		s.b	h	8.46	0.00	40.23	0.00	340.22	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	669.94	1.12	114.78	750.33	76,895.76	
		s.b	h	133.99	0.00	50.07	0.00	6,708.78	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	1.84	0.00	856.34	0.00	1,579.06	
		---	h	1,062.12	0.55	29.58	584.17	31,417.52	
2.11	Halogen flood light, 1000 W	2	m.th	3.69	0.00	79.92	0.00	294.74	
		---	h	2,124.24	0.01	0.43	21.24	913.42	
2.12	Halogen flood light, 2000 W	2	m.th	3.69	0.00	92.77	0.00	342.13	
		---	h	2,124.24	0.01	0.48	21.24	1,019.64	
2.13	Ligthing line along tunnel, 100 m section	10.0	m.th	18.37	0.00	130.82	0.00	2,402.62	
		---	h	10,578.73	0.01	0.41	105.79	4,337.28	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	199.15	0.15	18.51	29.87	3,686.22	
		s.b	h	39.83	0.00	7.46	0.00	297.13	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	91.77	0.32	29.23	29.37	2,682.37	
		s.b	h	18.35	0.00	12.36	0.00	226.85	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	435.43	0.33	30.84	143.69	13,428.75	
		s.b	h	87.09	0.00	19.27	0.00	1,678.16	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	76.54	0.63	48.81	48.22	3,736.14	
		s.b	h	15.31	0.00	20.84	0.00	319.04	
Total to carry forward ----->>>								67,846	378,246

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNELT3' - (ROCK CLASS IV)

SEC 2-01
 ANA 004
 RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						67,846	378,246
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.84	0.00	128.05	0.00	236.12
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.84	0.57	133.79	1.05	246.70
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	10.0	do	18.37	2.21	149.88	40.59	2,752.67
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	5.52	2.01	198.33	11.09	1,094.21
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	10.0	do	18.37	0.20	18.98	3.67	348.58
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	10	do	18.37	0.37	34.41	6.80	631.97
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.84	3.15	370.12	5.81	682.49
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	10.0	do	18.37	0.38	38.10	6.98	699.74
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	10.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	10.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 150 KVA	1	do	0.00	0.67	74.68	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1,699.66	2.31	0.00	3,926.22	0.00
3.02	Explosive, gramonite type	----	kg	15,296.94	2.06	0.00	31,511.70	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	6,725.73	0.00	1.98	0.00	13,316.95
3.06	Blasting connection wire	----	m	2,294.19	0.00	0.13	0.00	298.25
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.25	0.00	459.99	0.00	1,495.77
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.25	0.00	808.44	0.00	2,628.84
3.09	Jumbo drill shank adapter	----	n.	5.62	0.00	302.37	0.00	1,700.55
3.10	Jumbo drill bit, 51 mm dia.	----	n.	17.88	0.00	164.35	0.00	2,939.33
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.40	0.00	586.85	0.00	233.37
3.12	Integral drill steel, 800 mm	----	n.	3.33	0.00	132.65	0.00	442.08
3.13	Integral drill steel, 1600 mm	----	n.	2.92	0.00	153.97	0.00	448.99
3.14	Integral drill steel, 2400 mm	----	n.	2.08	0.00	174.35	0.00	363.16
3.15	Breaker tool, moiil point	----	n.	8.33	0.00	32.37	0.00	269.70
3.16	Pipeline supports including anchors	----	kg	632.46	1.38	3.22	872.79	2,036.52
3.17	Cable tray including supports and anchors	----	m	252.98	0.35	0.83	89.56	208.96
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	252.98	0.79	7.11	199.86	1,798.72
	Sub-total						104,523	413,120
	Missing items and construction contingencies	%		2.00%			2,090	8,262
	Total Direct Costs						106,613	421,382
	Overheads, risks and profit	%		52.00%			27,456	247,102
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	16,663			8.05	40.12
	AGGREGATE UNIT PRICE		m³					48.16

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T 4 (ROCK CLASS II)

SEC 2-01
 ANA 005
 RC II-T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	718.54	0.00	47.25	0.00	33,951.25
1.02	Gang foreman	1	hr	7,185.45	6.60	0.00	47,423.97	0.00
1.03	Tunnel specialist	1	hr	4,252.49	0.00	45.38	0.00	192,978.05
1.04	Tunneling jumbo operator	1	hr	4,252.49	5.82	0.00	24,749.50	0.00
1.05	Loader operator	---	hr	1,491.31	5.82	0.00	8,679.45	0.00
1.06	Operator of dumpers and other units	---	h	6,173.68	5.82	0.00	35,930.84	0.00
1.07	Miner	5	hr	21,262.46	2.99	0.00	63,574.74	0.00
1.08	Explosive specialist	1	hr	4,252.49	3.69	0.00	15,691.69	0.00
1.09	Electrician	0.33	hr	1,416.08	3.69	0.00	5,225.33	0.00
1.10	Mechanic	0.33	hr	1,416.08	3.69	0.00	5,225.33	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	406.38	3.69	0.00	1,499.55	0.00
1.12	Pipe fitter	0.33	hr	1,416.08	3.69	0.00	5,225.33	0.00
1.13	Helper	6	hr	25,514.95	2.38	0.00	60,725.57	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	7.38	0.00	21,868.22	0.00	161,448.63
		---	h	632.76	3.71	122.14	2,347.54	77,285.37
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	36.91	0.00	187.16	0.00	6,908.82
		---	h	784.70	0.07	1.53	54.93	1,200.59
2.03	Hand-held rock drill, medium weight type	4	m.th	29.53	0.00	130.63	0.00	3,857.66
		---	h	11,770.51	0.04	2.03	470.82	23,894.13
2.04	Hand-held breaker, medium weight type	5	m.th	36.91	0.00	46.95	0.00	1,733.11
		---	h	2,511.04	0.03	0.91	75.33	2,285.05
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	4,252.49	0.29	77.99	1,233.22	331,651.78
		s.b	h	850.50	0.00	10.73	0.00	9,125.85
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	1,242.76	1.05	95.46	1,304.90	118,634.02
		---	h	248.55	0.00	36.59	0.00	9,094.53
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	200.66	0.70	64.44	140.46	12,930.47
		s.b	h	40.13	0.00	40.23	0.00	1,614.50
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	4,024.71	1.12	114.78	4,507.67	461,955.64
		s.b	h	804.94	0.00	50.07	0.00	40,303.40
2.10	Sound-proof axial tunnel fan, 175 kW	1	m.th	7.38	0.00	1,027.61	0.00	7,586.64
		---	h	4,252.49	0.55	51.43	2,338.87	218,705.62
2.11	Halogen flood light, 1000 W	2	m.th	14.77	0.00	79.92	0.00	1,180.07
		---	h	8,504.98	0.01	0.43	85.05	3,657.14
2.12	Halogen flood light, 2000 W	2	m.th	14.77	0.00	92.77	0.00	1,369.80
		---	h	8,504.98	0.01	0.48	85.05	4,082.39
2.13	Ligthning line along tunnel, 100 m section	11.2	m.th	82.73	0.00	130.82	0.00	10,822.70
		---	h	47,652.31	0.01	0.41	476.52	19,537.45
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	797.34	0.15	18.51	119.60	14,758.80
		s.b	h	159.47	0.00	7.46	0.00	1,189.63
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	353.18	0.32	29.23	113.02	10,323.44
		s.b	h	70.64	0.00	12.36	0.00	873.06
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	1,525.09	0.33	30.84	503.28	47,033.75
		s.b	h	305.02	0.00	19.27	0.00	5,877.69
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	437.21	0.63	48.81	275.44	21,340.40
		s.b	h	87.44	0.00	20.84	0.00	1,822.31
Total to carry forward ----->>							288,083	1,861,014

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T 4 (ROCK CLASS II)

SEC 2-01
 ANA 005
 RC II-T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						288,083	1,861,014
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	7.38	0.00	128.05	0.00	945.37
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	7.38	0.71	167.24	5.24	1,234.70
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	11.2	do	82.73	2.21	149.88	182.83	12,399.53
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	23.93	2.01	198.33	48.10	4,745.79
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	11.2	do	82.73	0.20	18.98	16.55	1,570.21
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	11.2	do	82.73	0.44	41.32	36.40	3,418.39
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	7.38	3.15	370.12	23.26	2,732.52
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11.2	do	82.73	0.55	55.77	45.50	4,613.84
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	11.2	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	11.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	0	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	11,874.09	2.31	0.00	27,429.14	0.00
3.02	Explosive, gramonite type	----	kg	106,866.79	2.06	0.00	220,145.60	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	28,518.10	0.00	1.98	0.00	56,465.84
3.06	Blasting connection wire	----	m	8,829.49	0.00	0.13	0.00	1,147.83
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	18.52	0.00	459.99	0.00	8,520.15
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	18.52	0.00	808.44	0.00	14,974.30
3.09	Jumbo drill shank adapter	----	n.	32.04	0.00	302.37	0.00	9,686.64
3.10	Jumbo drill bit, 51 mm dia.	----	n.	101.87	0.00	164.35	0.00	16,742.92
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	2.06	0.00	586.85	0.00	1,209.04
3.12	Integral drill steel, 800 mm	----	n.	20.93	0.00	132.65	0.00	2,775.75
3.13	Integral drill steel, 1600 mm	----	n.	18.31	0.00	153.97	0.00	2,819.14
3.14	Integral drill steel, 2400 mm	----	n.	13.08	0.00	174.35	0.00	2,280.21
3.15	Breaker tool, moi point	----	n.	52.31	0.00	32.37	0.00	1,693.38
3.16	Pipeline supports including anchors	----	kg	2,709.31	1.38	3.22	3,738.85	8,723.99
3.17	Cable tray including supports and anchors	----	m	1,083.73	0.35	0.83	383.64	895.16
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,083.73	0.79	7.11	856.14	7,705.29
	Sub-total						540,994	2,028,314
	Missing items and construction contingencies	%		2.00%			10,820	40,566
	Total Direct Costs						551,814	2,068,880
	Overheads, risks and profit	%		52.00%			136,276	1,226,485
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	104,627			6.58	31.50
	AGGREGATE UNIT PRICE		m³					38.07

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T 4 (ROCK CLASS III)

SEC 2-01
 ANA 005
 RC III-T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	30.53	0.00	47.25	0.00	1,442.52
1.02	Gang foreman	1	hr	305.30	6.60	0.00	2,014.95	0.00
1.03	Tunnel specialist	1	hr	183.84	0.00	45.38	0.00	8,342.48
1.04	Tunneling jumbo operator	1	hr	183.84	5.82	0.00	1,069.93	0.00
1.05	Loader operator	---	hr	53.53	5.82	0.00	311.57	0.00
1.06	Operator of dumpers and other units	---	h	228.43	5.82	0.00	1,329.46	0.00
1.07	Miner	5	hr	919.18	2.99	0.00	2,748.35	0.00
1.08	Explosive specialist	1	hr	183.84	3.69	0.00	678.36	0.00
1.09	Electrician	0.33	hr	61.22	3.69	0.00	225.89	0.00
1.10	Mechanic	0.33	hr	61.22	3.69	0.00	225.89	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	13.64	3.69	0.00	50.33	0.00
1.12	Pipe fitter	0.33	hr	61.22	3.69	0.00	225.89	0.00
1.13	Helper	6	hr	1,103.02	2.38	0.00	2,625.18	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.32	0.00	21,868.22	0.00	6,979.46
		---	h	23.23	3.71	122.14	86.20	2,837.90
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	1.60	0.00	187.16	0.00	298.67
		---	h	26.68	0.07	1.53	1.87	40.82
2.03	Hand-held rock drill, medium weight type	4	m.th	1.28	0.00	130.63	0.00	166.77
		---	h	40.02	0.04	2.03	1.60	81.24
2.04	Hand-held breaker, medium weight type	5	m.th	1.60	0.00	46.95	0.00	74.92
		---	h	85.38	0.03	0.91	2.56	77.69
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	183.84	0.29	77.99	53.31	14,337.37
		s.b	h	36.77	0.00	10.73	0.00	394.51
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	44.61	1.05	95.46	46.84	4,258.59
		---	h	8.92	0.00	36.59	0.00	326.47
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	7.68	0.70	64.44	5.38	495.06
		s.b	h	1.54	0.00	40.23	0.00	61.81
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	143.59	1.12	114.78	160.82	16,480.92
		s.b	h	28.72	0.00	50.07	0.00	1,437.88
2.10	Sound-proof axial tunnel fan, 175 kW	1	m.th	0.32	0.00	1,027.61	0.00	327.97
		---	h	183.84	0.55	51.43	101.11	9,454.69
2.11	Halogen flood light, 1000 W	2	m.th	0.64	0.00	79.92	0.00	51.01
		---	h	367.67	0.01	0.43	3.68	158.10
2.12	Halogen flood light, 2000 W	2	m.th	0.64	0.00	92.77	0.00	59.22
		---	h	367.67	0.01	0.48	3.68	176.48
2.13	Ligthing line along tunnel, 100 m section	11.2	m.th	3.58	0.00	130.82	0.00	467.87
		---	h	2,060.02	0.01	0.41	20.60	844.61
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	34.47	0.15	18.51	5.17	638.03
		s.b	h	6.89	0.00	7.46	0.00	51.43
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.01	0.32	29.23	4.48	409.50
		s.b	h	2.80	0.00	12.36	0.00	34.63
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	72.48	0.33	30.84	23.92	2,235.23
		s.b	h	14.50	0.00	19.27	0.00	279.33
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	15.60	0.63	48.81	9.83	761.35
		s.b	h	3.12	0.00	20.84	0.00	65.01
Total to carry forward ----->>							12,037	74,150

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T 4 (ROCK CLASS III)

SEC 2-01
 ANA 005
 RC III-T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						12,037	74,150
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.32	0.00	128.05	0.00	40.87
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.32	0.71	167.24	0.23	53.38
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	11.2	do	3.58	2.21	149.88	7.90	536.03
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	1.03	2.01	198.33	2.08	205.16
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	11.2	do	3.58	0.20	18.98	0.72	67.88
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	11.2	do	3.58	0.44	41.32	1.57	147.78
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.32	3.15	370.12	1.01	118.13
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11.2	do	3.58	0.55	55.77	1.97	199.46
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	11.2	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	11.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	0	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	374.58	2.31	0.00	865.29	0.00
3.02	Explosive, gramonite type	----	kg	3,371.26	2.06	0.00	6,944.80	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,106.66	0.00	1.98	0.00	2,191.18
3.06	Blasting connection wire	----	m	350.24	0.00	0.13	0.00	45.53
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.62	0.00	459.99	0.00	283.52
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.62	0.00	808.44	0.00	498.29
3.09	Jumbo drill shank adapter	----	n.	1.07	0.00	302.37	0.00	322.34
3.10	Jumbo drill bit, 51 mm dia.	----	n.	3.39	0.00	164.35	0.00	557.15
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.07	0.00	586.85	0.00	41.11
3.12	Integral drill steel, 800 mm	----	n.	0.71	0.00	132.65	0.00	94.38
3.13	Integral drill steel, 1600 mm	----	n.	0.62	0.00	153.97	0.00	95.85
3.14	Integral drill steel, 2400 mm	----	n.	0.44	0.00	174.35	0.00	77.53
3.15	Breaker tool, moi point	----	n.	1.78	0.00	32.37	0.00	57.58
3.16	Pipeline supports including anchors	----	kg	92.12	1.38	3.22	127.12	296.62
3.17	Cable tray including supports and anchors	----	m	36.85	0.35	0.83	13.04	30.44
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	36.85	0.79	7.11	29.11	261.98
	Sub-total						20,032	80,372
	Missing items and construction contingencies	%		2.00%			401	1,607
	Total Direct Costs						20,432	81,979
	Overheads, risks and profit	%		52.00%			5,325	47,929
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		3,557			7.24	36.52
	AGGREGATE UNIT PRICE	m³						43.76

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS II)

SEC 2-01
 ANA 006
 RC II- T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	15.86	0.00	47.25	0.00	749.54	
1.02	Gang foreman	1	h	158.63	6.60	0.00	1,046.98	0.00	
1.03	Tunnel specialist	1	h	158.63	0.00	45.38	0.00	7,198.79	
1.04	Tunneling jumbo operator	1	h	158.63	5.82	0.00	923.25	0.00	
1.05	Loader operator	---	h	47.14	5.82	0.00	274.37	0.00	
1.06	Operator of dumpers and other units	---	h	233.36	5.82	0.00	1,358.15	0.00	
1.07	Miner	4	h	634.53	2.99	0.00	1,897.26	0.00	
1.08	Explosive specialist	1	h	158.63	3.69	0.00	585.36	0.00	
1.09	Electrician	0.33	h	52.82	3.69	0.00	194.92	0.00	
1.10	Mechanic	0.33	h	52.82	3.69	0.00	194.92	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	12.23	3.69	0.00	45.12	0.00	
1.12	Pipe fitter	0.33	h	52.82	3.69	0.00	194.92	0.00	
1.13	Helper	5	h	793.17	2.38	0.00	1,887.74	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.28	0.00	19,479.66	0.00	5,364.80	
		---	h	29.80	3.17	94.80	94.46	2,824.88	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.10	0.00	187.16	0.00	206.18	
		---	h	19.92	0.07	1.53	1.39	30.48	
2.03	Hand-held rock drill, medium weight type	3	m.th	0.83	0.00	130.63	0.00	107.93	
		---	h	298.78	0.04	2.03	11.95	606.53	
2.04	Hand-held breaker, medium weight type	4	m.th	1.10	0.00	46.95	0.00	51.72	
		---	h	63.74	0.03	0.91	1.91	58.00	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	158.63	0.15	24.64	23.80	3,908.73	
		s.b	h	31.73	0.00	5.46	0.00	173.23	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	39.29	0.75	70.52	29.46	2,770.43	
		s.b	h	7.86	0.00	26.87	0.00	211.12	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	156.76	1.12	114.78	175.58	17,993.38	
		s.b	h	31.35	0.00	50.07	0.00	1,569.84	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.28	0.00	856.34	0.00	235.84	
		---	h	158.63	0.38	29.58	60.28	4,692.38	
2.11	Halogen flood light, 1000 W	2	m.th	0.55	0.00	79.92	0.00	44.02	
		---	h	317.27	0.01	0.43	3.17	136.42	
2.12	Halogen flood light, 2000 W	1	m.th	0.28	0.00	92.77	0.00	25.55	
		---	h	158.63	0.01	0.48	1.59	76.14	
2.13	Ligthing line along tunnel, 100 m section	10.9	m.th	3.00	0.00	130.82	0.00	392.35	
		---	h	1,727.52	0.01	0.41	17.28	708.28	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	29.74	0.15	18.51	4.46	550.56	
		s.b	h	5.95	0.00	7.46	0.00	44.38	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.30	0.32	29.23	4.58	418.11	
		s.b	h	2.86	0.00	12.36	0.00	35.36	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	56.32	0.26	24.87	14.64	1,400.66	
		s.b	h	11.26	0.00	15.28	0.00	172.11	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	11.33	0.63	48.81	7.14	553.11	
		s.b	h	2.27	0.00	20.84	0.00	47.23	
Total to carry forward ----->>								9,055	53,358

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS II)**

**SEC 2-01
ANA 006
RC II- T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						9,055	53,358
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.28	0.00	82.94	0.00	22.84
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.28	0.14	33.45	0.04	9.21
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	10.9	do	3.00	1.73	117.13	5.19	351.29
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	0.88	1.36	134.52	1.19	117.74
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	10.9	do	3.00	0.14	13.13	0.42	39.38
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	10.9	do	3.00	0.37	34.41	1.11	103.20
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.28	2.37	278.28	0.65	76.64
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	10.9	do	3.00	0.55	55.77	1.65	167.26
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	329.75	2.31	0.00	761.73	0.00
3.02	Explosive, gramonite type	----	kg	2,967.76	2.06	0.00	6,113.59	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	933.88	0.00	1.98	0.00	1,849.09
3.06	Blasting connection wire	----	m	357.60	0.00	0.13	0.00	46.49
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.61	0.00	459.99	0.00	280.35
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.61	0.00	808.44	0.00	492.71
3.09	Jumbo drill shank adapter	----	n.	1.05	0.00	302.37	0.00	318.73
3.10	Jumbo drill bit, 51 mm dia.	----	n.	3.35	0.00	164.35	0.00	550.91
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.08	0.00	586.85	0.00	48.97
3.12	Integral drill steel, 800 mm	----	n.	0.53	0.00	132.65	0.00	70.46
3.13	Integral drill steel, 1600 mm	----	n.	0.46	0.00	153.97	0.00	71.56
3.14	Integral drill steel, 2400 mm	----	n.	0.33	0.00	174.35	0.00	57.88
3.15	Breaker tool, moiil point	----	n.	1.33	0.00	32.37	0.00	42.99
3.16	Pipeline supports including anchors	----	kg	544.50	1.38	3.22	751.41	1,753.29
3.17	Cable tray including supports and anchors	----	m	217.80	0.35	0.83	77.10	179.90
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	217.80	0.79	7.11	172.06	1,548.56
	Sub-total						16,941	61,558
	Missing items and construction contingencies	%		2.00%			339	1,231
	Total Direct Costs						17,280	62,789
	Overheads, risks and profit	%		52.00%			4,164	37,472
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	2,656			8.07	37.75
	AGGREGATE UNIT PRICE		m³					45.82

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS III)

SEC 2-01
 ANA 006
 RC III- T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	39.02	0.00	47.25	0.00	1,843.69	
1.02	Gang foreman	1	h	390.20	6.60	0.00	2,575.32	0.00	
1.03	Tunnel specialist	1	h	390.20	0.00	45.38	0.00	17,707.25	
1.04	Tunneling jumbo operator	1	h	390.20	5.82	0.00	2,270.96	0.00	
1.05	Loader operator	---	h	98.27	5.82	0.00	571.94	0.00	
1.06	Operator of dumpers and other units	---	h	436.46	5.82	0.00	2,540.18	0.00	
1.07	Miner	4	h	1,560.80	2.99	0.00	4,666.79	0.00	
1.08	Explosive specialist	1	h	390.20	3.69	0.00	1,439.84	0.00	
1.09	Electrician	0.33	h	129.94	3.69	0.00	479.47	0.00	
1.10	Mechanic	0.33	h	129.94	3.69	0.00	479.47	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	23.52	3.69	0.00	86.78	0.00	
1.12	Pipe fitter	0.33	h	129.94	3.69	0.00	479.47	0.00	
1.13	Helper	5	h	1,951.00	2.38	0.00	4,643.37	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.68	0.00	19,479.66	0.00	13,196.10	
		---	h	62.61	3.17	94.80	198.48	5,935.62	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.71	0.00	187.16	0.00	507.15	
		---	h	38.84	0.07	1.53	2.72	59.43	
2.03	Hand-held rock drill, medium weight type	3	m.th	2.03	0.00	130.63	0.00	265.48	
		---	h	58.26	0.04	2.03	2.33	118.27	
2.04	Hand-held breaker, medium weight type	4	m.th	2.71	0.00	46.95	0.00	127.22	
		---	h	124.29	0.03	0.91	3.73	113.11	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	390.20	0.15	24.64	58.53	9,614.52	
		s.b	h	78.04	0.00	5.46	0.00	426.10	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	81.89	0.75	70.52	61.42	5,775.12	
		s.b	h	16.38	0.00	26.87	0.00	440.09	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	267.62	1.12	114.78	299.73	30,717.04	
		s.b	h	53.52	0.00	50.07	0.00	2,679.91	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.68	0.00	856.34	0.00	580.11	
		---	h	390.20	0.38	29.58	148.28	11,542.10	
2.11	Halogen flood light, 1000 W	2	m.th	1.35	0.00	79.92	0.00	108.28	
		---	h	780.40	0.01	0.43	7.80	335.57	
2.12	Halogen flood light, 2000 W	1	m.th	0.68	0.00	92.77	0.00	62.85	
		---	h	390.20	0.01	0.48	3.90	187.30	
2.13	Ligthing line along tunnel, 100 m section	10.9	m.th	7.38	0.00	130.82	0.00	965.09	
		---	h	4,249.27	0.01	0.41	42.49	1,742.20	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	73.16	0.15	18.51	10.97	1,354.24	
		s.b	h	14.63	0.00	7.46	0.00	109.16	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	32.54	0.32	29.23	10.41	951.20	
		s.b	h	6.51	0.00	12.36	0.00	80.44	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	156.12	0.26	24.87	40.59	3,882.62	
		s.b	h	31.22	0.00	15.28	0.00	477.09	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	23.46	0.63	48.81	14.78	1,144.96	
		s.b	h	4.69	0.00	20.84	0.00	97.77	
Total to carry forward ----->>								21,140	113,147

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS III)**

**SEC 2-01
ANA 006
RC III- T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						21,140	113,147
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.68	0.00	82.94	0.00	56.19
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.68	0.14	33.45	0.09	22.66
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	10.9	do	7.38	1.73	117.13	12.76	864.09
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	2.15	1.36	134.52	2.93	289.60
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	10.9	do	7.38	0.14	13.13	1.03	96.86
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	10.9	do	7.38	0.37	34.41	2.73	253.85
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.68	2.37	278.28	1.61	188.52
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	10.9	do	7.38	0.55	55.77	4.06	411.43
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	596.61	2.31	0.00	1,378.17	0.00
3.02	Explosive, gramonite type	----	kg	5369.51	2.06	0.00	11,061.19	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2079.03	0.00	1.98	0.00	4,116.47
3.06	Blasting connection wire	----	m	813.55	0.00	0.13	0.00	105.76
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.16	0.00	459.99	0.00	535.24
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.16	0.00	808.44	0.00	940.70
3.09	Jumbo drill shank adapter	----	n.	2.01	0.00	302.37	0.00	608.52
3.10	Jumbo drill bit, 51 mm dia.	----	n.	6.40	0.00	164.35	0.00	1,051.81
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.16	0.00	586.85	0.00	95.49
3.12	Integral drill steel, 800 mm	----	n.	1.04	0.00	132.65	0.00	137.40
3.13	Integral drill steel, 1600 mm	----	n.	0.91	0.00	153.97	0.00	139.54
3.14	Integral drill steel, 2400 mm	----	n.	0.65	0.00	174.35	0.00	112.87
3.15	Breaker tool, moi point	----	n.	2.59	0.00	32.37	0.00	83.82
3.16	Pipeline supports including anchors	----	kg	1,061.78	1.38	3.22	1,465.25	3,418.92
3.17	Cable tray including supports and anchors	----	m	424.71	0.35	0.83	150.35	350.81
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	424.71	0.79	7.11	335.52	3,019.69
	Sub-total						35,555	130,047
	Missing items and construction contingencies	%		2.00%			711	2,601
	Total Direct Costs						36,267	132,648
	Overheads, risks and profit	%		52.00%			8,784	79,052
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	5,178.93			8.70	40.88
	AGGREGATE UNIT PRICE		m³					49.58

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS IV)

SEC 2-01
 ANA 006
 RC IV- T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	44.53	0.00	47.25	0.00	2,103.91	
1.02	Gang foreman	1	h	445.27	6.60	0.00	2,938.79	0.00	
1.03	Tunnel specialist	1	h	445.27	0.00	45.38	0.00	20,206.41	
1.04	Tunneling jumbo operator	1	h	445.27	5.82	0.00	2,591.48	0.00	
1.05	Loader operator	---	h	105.61	5.82	0.00	614.67	0.00	
1.06	Operator of dumpers and other units	---	h	475.38	5.82	0.00	2,766.74	0.00	
1.07	Miner	4	h	1,781.09	2.99	0.00	5,325.45	0.00	
1.08	Explosive specialist	1	h	445.27	3.69	0.00	1,643.05	0.00	
1.09	Electrician	0.33	h	148.28	3.69	0.00	547.14	0.00	
1.10	Mechanic	0.33	h	148.28	3.69	0.00	547.14	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	23.78	3.69	0.00	87.77	0.00	
1.12	Pipe fitter	0.33	h	148.28	3.69	0.00	547.14	0.00	
1.13	Helper	5	h	2,226.36	2.38	0.00	5,298.73	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.77	0.00	19,479.66	0.00	15,058.57	
		---	h	68.24	3.17	94.80	216.31	6,468.97	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.09	0.00	187.16	0.00	578.73	
		---	h	39.84	0.07	1.53	2.79	60.95	
2.03	Hand-held rock drill, medium weight type	3	m.th	2.32	0.00	130.63	0.00	302.95	
		---	h	59.76	0.04	2.03	2.39	121.31	
2.04	Hand-held breaker, medium weight type	4	m.th	3.09	0.00	46.95	0.00	145.18	
		---	h	127.48	0.03	0.91	3.82	116.01	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	445.27	0.15	24.64	66.79	10,971.49	
		s.b	h	89.05	0.00	5.46	0.00	486.24	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	88.01	0.75	70.52	66.01	6,206.54	
		s.b	h	17.60	0.00	26.87	0.00	472.97	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	285.17	1.12	114.78	319.39	32,732.06	
		s.b	h	57.03	0.00	50.07	0.00	2,855.71	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.77	0.00	856.34	0.00	661.99	
		---	h	445.27	0.38	29.58	169.20	13,171.13	
2.11	Halogen flood light, 1000 W	2	m.th	1.55	0.00	79.92	0.00	123.56	
		---	h	890.54	0.01	0.43	8.91	382.93	
2.12	Halogen flood light, 2000 W	1	m.th	0.77	0.00	92.77	0.00	71.71	
		---	h	445.27	0.01	0.48	4.45	213.73	
2.13	Ligthing line along tunnel, 100 m section	10.9	m.th	8.42	0.00	130.82	0.00	1,101.30	
		---	h	4,849.01	0.01	0.41	48.49	1,988.09	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	83.49	0.15	18.51	12.52	1,545.37	
		s.b	h	16.70	0.00	7.46	0.00	124.56	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.51	0.32	29.23	12.32	1,125.68	
		s.b	h	7.70	0.00	12.36	0.00	95.20	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	181.46	0.26	24.87	47.18	4,512.81	
		s.b	h	36.29	0.00	15.28	0.00	554.53	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	25.00	0.63	48.81	15.75	1,220.07	
		s.b	h	5.00	0.00	20.84	0.00	104.18	
Total to carry forward ----->>								23,904	125,885

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS IV)**

**SEC 2-01
ANA 006
RC IV- T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						23,904	125,885
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.77	0.00	82.94	0.00	64.12
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.77	0.14	33.45	0.11	25.86
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	10.9	do	8.42	1.73	117.13	14.56	986.05
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	2.46	1.36	134.52	3.34	330.48
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	10.9	do	8.42	0.14	13.13	1.18	110.53
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	10.9	do	8.42	0.37	34.41	3.11	289.68
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.77	2.37	278.28	1.83	215.12
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	10.9	do	8.42	0.55	55.77	4.63	469.49
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	577.92	2.31	0.00	1,334.98	0.00
3.02	Explosive, gramonite type	----	kg	5201.24	2.06	0.00	10,714.55	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2406.47	0.00	1.98	0.00	4,764.81
3.06	Blasting connection wire	----	m	962.78	0.00	0.13	0.00	125.16
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.17	0.00	459.99	0.00	537.24
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.17	0.00	808.44	0.00	944.21
3.09	Jumbo drill shank adapter	----	n.	2.02	0.00	302.37	0.00	610.80
3.10	Jumbo drill bit, 51 mm dia.	----	n.	6.42	0.00	164.35	0.00	1,055.74
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.17	0.00	586.85	0.00	97.93
3.12	Integral drill steel, 800 mm	----	n.	1.06	0.00	132.65	0.00	140.92
3.13	Integral drill steel, 1600 mm	----	n.	0.93	0.00	153.97	0.00	143.12
3.14	Integral drill steel, 2400 mm	----	n.	0.66	0.00	174.35	0.00	115.76
3.15	Breaker tool, moi point	----	n.	2.66	0.00	32.37	0.00	85.97
3.16	Pipeline supports including anchors	----	kg	1,089.00	1.38	3.22	1,502.82	3,506.58
3.17	Cable tray including supports and anchors	----	m	435.60	0.35	0.83	154.20	359.81
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	435.60	0.79	7.11	344.12	3,097.12
	Sub-total						37,984	143,961
	Missing items and construction contingencies	%		2.00%			760	2,879
	Total Direct Costs						38,744	146,841
	Overheads, risks and profit	%		52.00%			9,650	86,853
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	5,311.72			9.11	44.00
	AGGREGATE UNIT PRICE		m³					53.11

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS V)

SEC 2-01
 ANA 006
 RC V- T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	1.36	0.00	47.25	0.00	64.49	
1.02	Gang foreman	1	h	13.65	6.60	0.00	90.09	0.00	
1.03	Tunnel specialist	1	h	13.65	0.00	45.38	0.00	619.41	
1.04	Tunneling jumbo operator	1	h	13.65	5.82	0.00	79.44	0.00	
1.05	Loader operator	---	h	2.78	5.82	0.00	16.20	0.00	
1.06	Operator of dumpers and other units	---	h	12.97	5.82	0.00	75.51	0.00	
1.07	Miner	4	h	54.60	2.99	0.00	163.25	0.00	
1.08	Explosive specialist	1	h	13.65	3.69	0.00	50.37	0.00	
1.09	Electrician	0.33	h	4.55	3.69	0.00	16.77	0.00	
1.10	Mechanic	0.33	h	4.55	3.69	0.00	16.77	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	0.59	3.69	0.00	2.16	0.00	
1.12	Pipe fitter	0.33	h	4.55	3.69	0.00	16.77	0.00	
1.13	Helper	5	h	68.25	2.38	0.00	162.43	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.02	0.00	19,479.66	0.00	461.61	
		---	h	1.86	3.17	94.80	5.89	176.00	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	0.09	0.00	187.16	0.00	17.74	
		---	h	1.00	0.07	1.53	0.07	1.52	
2.03	Hand-held rock drill, light weight type	3	m.th	0.07	0.00	130.63	0.00	9.29	
		---	h	1.49	0.04	2.03	0.06	3.03	
2.04	Hand-held breaker, medium weight type	4	m.th	0.09	0.00	46.95	0.00	4.45	
		---	h	3.19	0.03	0.91	0.10	2.90	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	13.65	0.15	24.64	2.05	336.32	
		s.b	h	2.73	0.00	5.46	0.00	14.91	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	2.32	0.75	70.52	1.74	163.60	
		s.b	h	0.46	0.00	26.87	0.00	12.47	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	7.39	1.12	114.78	8.28	848.78	
		s.b	h	1.48	0.00	50.07	0.00	74.05	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.02	0.00	856.34	0.00	20.29	
		---	h	13.65	0.38	29.58	5.19	403.75	
2.11	Halogen flood light, 1000 W	2	m.th	0.05	0.00	79.92	0.00	3.79	
		---	h	27.30	0.01	0.43	0.27	11.74	
2.12	Halogen flood light, 2000 W	1	m.th	0.02	0.00	92.77	0.00	2.20	
		---	h	13.65	0.01	0.48	0.14	6.55	
2.13	Ligthing line along tunnel, 100 m section	10.9	m.th	0.26	0.00	130.82	0.00	33.76	
		---	h	148.64	0.01	0.41	1.49	60.94	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	2.56	0.15	18.51	0.38	47.37	
		s.b	h	0.51	0.00	7.46	0.00	3.82	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	1.19	0.32	29.23	0.38	34.84	
		s.b	h	0.24	0.00	12.36	0.00	2.95	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	3.07	0.26	24.87	0.80	76.35	
		s.b	h	0.61	0.00	15.28	0.00	9.38	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	0.65	0.63	48.81	0.41	31.64	
		s.b	h	0.13	0.00	20.84	0.00	2.70	
Total to carry forward ----->>								717	3,563

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL (ROCK CLASS V)**

**SEC 2-01
ANA 006
RC V- T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						717	3,563
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.02	0.00	82.94	0.00	1.97
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.02	0.14	33.45	0.00	0.79
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	10.9	do	0.26	1.73	117.13	0.45	30.23
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	0.08	1.36	134.52	0.10	10.13
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	10.9	do	0.26	0.14	13.13	0.04	3.39
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	10.9	do	0.26	0.37	34.41	0.10	8.88
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.02	2.37	278.28	0.06	6.59
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	10.9	do	0.26	0.55	55.77	0.14	14.39
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	14	2.31	0.00	31.41	0.00
3.02	Explosive, gramonite type	----	kg	122	2.06	0.00	252.11	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	73	0.00	1.98	0.00	144.18
3.06	Blasting connection wire	----	m	30	0.00	0.13	0.00	3.87
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.03	0.00	459.99	0.00	13.14
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.03	0.00	808.44	0.00	23.09
3.09	Jumbo drill shank adapter	----	n.	0.05	0.00	302.37	0.00	14.94
3.10	Jumbo drill bit, 51 mm dia.	----	n.	0.16	0.00	164.35	0.00	25.82
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.00	0.00	586.85	0.00	2.45
3.12	Integral drill steel, 800 mm	----	n.	0.03	0.00	132.65	0.00	3.52
3.13	Integral drill steel, 1600 mm	----	n.	0.02	0.00	153.97	0.00	3.58
3.14	Integral drill steel, 2400 mm	----	n.	0.02	0.00	174.35	0.00	2.89
3.15	Breaker tool, moi point	----	n.	0.07	0.00	32.37	0.00	2.15
3.16	Pipeline supports including anchors	----	kg	27.23	1.38	3.22	37.57	87.66
3.17	Cable tray including supports and anchors	----	m	10.89	0.35	0.83	3.86	9.00
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	10.89	0.79	7.11	8.60	77.43
	Sub-total						1,051	4,053
	Missing items and construction contingencies	%		2.00%			21	81
	Total Direct Costs						1,072	4,134
	Overheads, risks and profit	%		52.00%			271	2,437
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		132.79			10.11	49.48
	AGGREGATE UNIT PRICE	m³						59.59

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T6 - (ROCK CLASS I)

SEC 2-01
 ANA 007
 RC I - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	40.90	0.00	47.25	0.00	1,932.48
1.02	Gang foreman	1	h	408.99	6.60	0.00	2,699.34	0.00
1.03	Tunnel specialist	1	h	408.99	0.00	45.38	0.00	18,560.02
1.04	Tunneling jumbo operator	1	h	408.99	5.82	0.00	2,380.33	0.00
1.05	Loader operator	---	h	156.58	5.82	0.00	911.29	0.00
1.06	Operator of dumpers and other units	---	h	750.12	5.82	0.00	4,365.70	0.00
1.07	Miner	5	h	2,044.96	2.99	0.00	6,114.42	0.00
1.08	Explosive specialist	1	h	408.99	3.69	0.00	1,509.18	0.00
1.09	Electrician	0.33	h	136.19	3.69	0.00	502.56	0.00
1.10	Mechanic	0.33	h	136.19	3.69	0.00	502.56	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	46.38	3.69	0.00	171.16	0.00
1.12	Pipe fitter	0.33	h	45.40	3.69	0.00	167.52	0.00
1.13	Helper	6	h	2,453.95	2.38	0.00	5,840.39	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.71	0.00	21,868.22	0.00	15,527.62
		---	h	72.51	3.71	122.14	269.00	8,856.08
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	3.55	0.00	187.16	0.00	664.47
		---	h	84.31	0.07	1.53	5.90	128.99
2.03	Hand-held rock drill, medium weight type	4	m.th	2.84	0.00	130.63	0.00	371.02
		---	h	126.46	0.04	2.03	5.06	256.72
2.04	Hand-held breaker, medium weight type	5	m.th	3.55	0.00	46.95	0.00	166.69
		---	h	269.78	0.03	0.91	8.09	245.50
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	408.99	0.25	57.86	102.25	23,664.23
		s.b	h	81.80	0.00	9.26	0.00	757.45
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	130.48	1.05	95.46	137.01	12,455.87
		---	h	26.10	0.00	36.59	0.00	954.87
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	18.75	0.70	64.44	13.13	1,208.55
		s.b	h	3.75	0.00	40.23	0.00	150.90
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	525.30	1.12	114.78	588.34	60,294.47
		s.b	h	105.06	0.00	50.07	0.00	5,260.40
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.71	0.00	918.32	0.00	652.06
		---	h	408.99	0.55	36.86	224.95	15,075.41
2.11	Halogen flood light, 1000 W	2	m.th	1.42	0.00	79.92	0.00	113.50
		---	h	817.98	0.01	0.43	8.18	351.73
2.12	Halogen flood light, 2000 W	2	m.th	1.42	0.00	92.77	0.00	131.74
		---	h	817.98	0.01	0.48	8.18	392.63
2.13	Ligthning line along tunnel, 100 m section	9.9	m.th	7.04	0.00	130.82	0.00	920.53
		---	h	4,053.10	0.01	0.41	40.53	1,661.77
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	76.69	0.15	18.51	11.50	1,419.45
		s.b	h	15.34	0.00	7.46	0.00	114.42
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	33.79	0.32	29.23	10.81	987.80
		s.b	h	6.76	0.00	12.36	0.00	83.54
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	82.75	0.33	30.84	27.31	2,552.15
		s.b	h	16.55	0.00	19.27	0.00	318.94
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	46.14	0.63	48.81	29.07	2,252.23
		s.b	h	9.23	0.00	20.84	0.00	192.32
Total to carry forward ----->>							26,654	178,677

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T6 - (ROCK CLASS I)

SEC 2-01
 ANA 007
 RC I - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						26,654	178,677
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.71	0.00	128.05	0.00	90.92
		---	h	3.55	0.03	8.70	0.11	30.89
2.19	Integral drill steel grinder	---	h	14.05	0.01	2.29	0.14	32.18
2.20	Button bits grinder	---	h	24.60	0.04	5.32	0.98	130.88
2.21	Breakermoil point resharpeners	---	h	2.81	0.01	1.57	0.03	4.41
2.22	Steel structure for ventilation fan support	1	m.th	0.71	0.57	133.79	0.40	95.00
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	9.9	do	7.04	2.21	149.88	15.55	1,054.65
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	2.12	2.01	198.33	4.26	419.94
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	9.9	do	7.04	0.20	18.98	1.41	133.56
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	9.9	do	7.04	0.37	34.41	2.60	242.13
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.71	3.15	370.12	2.24	262.81
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	9.9	do	7.04	0.55	55.77	3.87	392.43
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	9.9	do	7.04	0.83	84.05	5.84	591.43
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	9.9	do	7.04	0.14	13.50	0.99	94.99
2.37	Control board, 10 KVA	1	do	0.71	0.24	27.23	0.17	19.33
2.38	Control board, 150 KVA	1	do	0.71	0.67	74.68	0.48	53.03
2.39	Control board, 300 KVA	1	do	0.71	0.95	105.80	0.67	75.12
2.40	Transformer cabin, 300 kVA	2	do	1.42	5.68	696.82	8.07	989.56
2.41	Transformer cabin, 450 kVA	1	do	0.71	7.43	911.23	5.28	647.02
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1,292.71	2.31	0.00	2,986.16	0.00
3.02	Explosive, gramonite type	----	kg	11,634.40	2.06	0.00	23,966.86	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2,816.18	0.00	1.98	0.00	5,576.04
3.06	Blasting connection wire	----	m	844.85	0.00	0.13	0.00	109.83
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.19	0.00	459.99	0.00	1,009.01
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.19	0.00	808.44	0.00	1,773.35
3.09	Jumbo drill shank adapter	----	ea.	3.79	0.00	302.37	0.00	1,147.15
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	12.06	0.00	164.35	0.00	1,982.80
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.24	0.00	586.85	0.00	138.82
3.12	Integral drill steel, 800 mm	----	ea.	2.25	0.00	132.65	0.00	298.22
3.13	Integral drill steel, 1600 mm	----	ea.	1.97	0.00	153.97	0.00	302.88
3.14	Integral drill steel, 2400 mm	----	ea.	1.41	0.00	174.35	0.00	244.98
3.15	Hand held breaker tool,moil point	----	ea.	5.62	0.00	32.37	0.00	181.93
3.16	Supports of pipelines including anchors	----	kg	2,477.50	1.38	3.22	3,418.95	7,977.55
3.17	Supports of power cables including anchors	----	m	991.00	0.35	0.83	350.81	818.57
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	991.00	0.79	7.11	782.89	7,046.01
	Sub-total						58,212	212,644
	Missing items and construction contingencies	%		2.00%			1,164	4,253
	Total Direct Costs						59,377	216,897
	Overheads, risks and profit	%		52.00%			14,366	129,296
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	11,241			6.56	30.80
	AGGREGATE UNIT PRICE		m³					37.36

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T7 (ROCK CLASS II)

SEC 2-01
 ANA 008
 RC II - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	150.13	0.00	47.25	0.00	7,093.47	
1.02	Gang foreman	1	hr	1,501.26	6.60	0.00	9,908.34	0.00	
1.03	Tunnel specialist	1	hr	890.17	0.00	45.38	0.00	40,396.12	
1.04	Tunneling jumbo operator	1	hr	890.17	5.82	0.00	5,180.82	0.00	
1.05	Loader operator	---	hr	280.99	5.82	0.00	1,635.36	0.00	
1.06	Operator of dumpers and other units	---	h	1,292.91	5.82	0.00	7,524.76	0.00	
1.07	Miner	5	hr	4,450.87	2.99	0.00	13,308.11	0.00	
1.08	Explosive specialist	1	hr	890.17	3.69	0.00	3,284.74	0.00	
1.09	Electrician	0.33	hr	296.43	3.69	0.00	1,093.82	0.00	
1.10	Mechanic	0.33	hr	296.43	3.69	0.00	1,093.82	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	87.00	3.69	0.00	321.04	0.00	
1.12	Pipe fitter	0.33	hr	296.43	3.69	0.00	1,093.82	0.00	
1.13	Helper	6	hr	5,341.05	2.38	0.00	12,711.69	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.55	0.00	21,868.22	0.00	33,796.06	
		---	h	137.26	3.71	122.14	509.25	16,765.31	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	7.73	0.00	187.16	0.00	1,446.22	
		---	h	147.79	0.07	1.53	10.35	226.13	
2.03	Hand-held rock drill, medium weight type	4	m.th	6.18	0.00	130.63	0.00	807.52	
		---	h	2,216.91	0.04	2.03	88.68	4,500.33	
2.04	Hand-held breaker, medium weight type	5	m.th	7.73	0.00	46.95	0.00	362.79	
		---	h	472.94	0.03	0.91	14.19	430.38	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	890.17	0.29	77.99	258.15	69,424.70	
		s.b	h	178.03	0.00	10.73	0.00	1,910.31	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	234.16	1.05	95.46	245.87	22,352.68	
		---	h	46.83	0.00	36.59	0.00	1,713.56	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	34.27	0.70	64.44	23.99	2,208.08	
		s.b	h	6.85	0.00	40.23	0.00	275.70	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	859.98	1.12	114.78	963.17	98,708.09	
		s.b	h	172.00	0.00	50.07	0.00	8,611.80	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	1.55	0.00	856.34	0.00	1,323.42	
		---	h	890.17	0.55	29.58	489.60	26,331.36	
2.11	Halogen flood light, 1000 W	2	m.th	3.09	0.00	79.92	0.00	247.02	
		---	h	1,780.35	0.01	0.43	17.80	765.55	
2.12	Halogen flood light, 2000 W	2	m.th	3.09	0.00	92.77	0.00	286.74	
		---	h	1,780.35	0.01	0.48	17.80	854.57	
2.13	Ligthing line along tunnel, 100 m section	6.1	m.th	9.36	0.00	130.82	0.00	1,224.27	
		---	h	5,390.45	0.01	0.41	53.90	2,210.09	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	166.91	0.15	18.51	25.04	3,089.46	
		s.b	h	33.38	0.00	7.46	0.00	249.03	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	66.08	0.32	29.23	21.15	1,931.51	
		s.b	h	13.22	0.00	12.36	0.00	163.35	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	321.21	0.33	30.84	106.00	9,906.24	
		s.b	h	64.24	0.00	19.27	0.00	1,237.96	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	82.41	0.63	48.81	51.92	4,022.54	
		s.b	h	16.48	0.00	20.84	0.00	343.49	
Total to carry forward ----->>								60,053	365,216

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T7 (ROCK CLASS II)**

**SEC 2-01
ANA 008
RC II - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						60,053	365,216
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.55	0.00	128.05	0.00	197.89
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.55	0.57	133.79	0.88	206.76
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	6.1	do	9.36	2.21	149.88	20.68	1,402.64
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	3.42	2.01	198.33	6.87	677.72
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	6.1	do	9.36	0.20	18.98	1.87	177.62
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.1	do	9.36	0.37	34.41	3.46	322.02
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.55	3.15	370.12	4.87	572.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	6.1	do	9.36	0.38	38.10	3.56	356.56
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	6.1	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	6.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2,026.16	2.31	0.00	4,680.43	0.00
3.02	Explosive, gramonite type	----	kg	18,235.44	2.06	0.00	37,565.01	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	6,618.31	0.00	1.98	0.00	13,104.26
3.06	Blasting connection wire	----	m	1,651.99	0.00	0.13	0.00	214.76
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.28	0.00	459.99	0.00	1,969.56
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.28	0.00	808.44	0.00	3,461.53
3.09	Jumbo drill shank adapter	----	n.	7.41	0.00	302.37	0.00	2,239.21
3.10	Jumbo drill bit, 51 mm dia.	----	n.	23.55	0.00	164.35	0.00	3,870.37
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.39	0.00	586.85	0.00	226.21
3.12	Integral drill steel, 800 mm	----	n.	3.94	0.00	132.65	0.00	522.80
3.13	Integral drill steel, 1600 mm	----	n.	3.45	0.00	153.97	0.00	530.97
3.14	Integral drill steel, 2400 mm	----	n.	2.46	0.00	174.35	0.00	429.47
3.15	Breaker tool, moi point	----	n.	9.85	0.00	32.37	0.00	318.94
3.16	Pipeline supports including anchors	----	kg	1,462.40	1.38	3.22	2,018.12	4,708.94
3.17	Cable tray including supports and anchors	----	m	584.96	0.35	0.83	207.08	483.18
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	584.96	0.79	7.11	462.12	4,159.07
Sub-total							105,028	405,368
Missing items and construction contingencies		%		2.00%	----->>		2,101	8,107
Total Direct Costs							107,129	413,476
Overheads, risks and profit		%		52.00%	----->>		27,071	243,643
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	19,706	----->>		6.81	33.35
AGGREGATE UNIT PRICE			m³	----->>				40.16

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T7 (ROCK CLASS III)

SEC 2-01
 ANA 008
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	6.41	0.00	47.25	0.00	302.87
1.02	Gang foreman	1	hr	64.10	6.60	0.00	423.06	0.00
1.03	Tunnel specialist	1	hr	38.56	0.00	45.38	0.00	1,749.67
1.04	Tunneling jumbo operator	1	hr	38.56	5.82	0.00	224.40	0.00
1.05	Loader operator	---	hr	10.45	5.82	0.00	60.79	0.00
1.06	Operator of dumpers and other units	---	h	49.24	5.82	0.00	286.56	0.00
1.07	Miner	5	hr	192.78	2.99	0.00	576.41	0.00
1.08	Explosive specialist	1	hr	38.56	3.69	0.00	142.27	0.00
1.09	Electrician	0.33	hr	12.84	3.69	0.00	47.38	0.00
1.10	Mechanic	0.33	hr	12.84	3.69	0.00	47.38	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	3.02	3.69	0.00	11.13	0.00
1.12	Pipe fitter	0.33	hr	12.84	3.69	0.00	47.38	0.00
1.13	Helper	6	hr	231.34	2.38	0.00	550.58	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.07	0.00	21,868.22	0.00	1,463.80
		---	h	5.19	3.71	122.14	19.26	634.12
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	0.33	0.00	187.16	0.00	62.64
		---	h	5.20	0.07	1.53	0.36	7.96
2.03	Hand-held rock drill, medium weight type	4	m.th	0.27	0.00	130.63	0.00	34.98
		---	h	7.80	0.04	2.03	0.31	15.84
2.04	Hand-held breaker, medium weight type	5	m.th	0.33	0.00	46.95	0.00	15.71
		---	h	16.65	0.03	0.91	0.50	15.15
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	38.56	0.29	77.99	11.18	3,006.98
		s.b	h	7.71	0.00	10.73	0.00	82.74
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	8.70	1.05	95.46	9.14	830.91
		---	h	1.74	0.00	36.59	0.00	63.70
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	1.36	0.70	64.44	0.95	87.65
		s.b	h	0.27	0.00	40.23	0.00	10.94
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	31.77	1.12	114.78	35.59	3,646.98
		s.b	h	6.35	0.00	50.07	0.00	318.18
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.07	0.00	856.34	0.00	57.32
		---	h	38.56	0.55	29.58	21.21	1,140.49
2.11	Halogen flood light, 1000 W	2	m.th	0.13	0.00	79.92	0.00	10.70
		---	h	77.11	0.01	0.43	0.77	33.16
2.12	Halogen flood light, 2000 W	2	m.th	0.13	0.00	92.77	0.00	12.42
		---	h	77.11	0.01	0.48	0.77	37.01
2.13	Ligthning line along tunnel, 100 m section	6.1	m.th	0.41	0.00	130.82	0.00	53.03
		---	h	233.48	0.01	0.41	2.33	95.72
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	7.23	0.15	18.51	1.08	133.81
		s.b	h	1.45	0.00	7.46	0.00	10.79
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	2.71	0.32	29.23	0.87	79.31
		s.b	h	0.54	0.00	12.36	0.00	6.71
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	15.06	0.33	30.84	4.97	464.50
		s.b	h	3.01	0.00	19.27	0.00	58.05
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.04	0.63	48.81	1.92	148.62
		s.b	h	0.61	0.00	20.84	0.00	12.69
Total to carry forward ----->>							2,529	14,705

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T7 (ROCK CLASS III)

SEC 2-01
 ANA 008
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						2,529	14,705
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.07	0.00	128.05	0.00	8.57
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.07	0.57	133.79	0.04	8.96
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	6.1	do	0.41	2.21	149.88	0.90	60.75
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	0.15	2.01	198.33	0.30	29.35
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	6.1	do	0.41	0.20	18.98	0.08	7.69
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	6	do	0.41	0.37	34.41	0.15	13.95
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.07	3.15	370.12	0.21	24.77
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	6.1	do	0.41	0.38	38.10	0.15	15.44
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	6.1	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	6.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	66.17	2.31	0.00	152.85	0.00
3.02	Explosive, gramonite type	----	kg	595.51	2.06	0.00	1,226.75	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	265.41	0.00	1.98	0.00	525.51
3.06	Blasting connection wire	----	m	67.84	0.00	0.13	0.00	8.82
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.15	0.00	459.99	0.00	67.73
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.15	0.00	808.44	0.00	119.03
3.09	Jumbo drill shank adapter	----	n.	0.25	0.00	302.37	0.00	77.00
3.10	Jumbo drill bit, 51 mm dia.	----	n.	0.81	0.00	164.35	0.00	133.09
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.01	0.00	586.85	0.00	7.96
3.12	Integral drill steel, 800 mm	----	n.	0.14	0.00	132.65	0.00	18.40
3.13	Integral drill steel, 1600 mm	----	n.	0.12	0.00	153.97	0.00	18.69
3.14	Integral drill steel, 2400 mm	----	n.	0.09	0.00	174.35	0.00	15.12
3.15	Breaker tool, moiil point	----	n.	0.35	0.00	32.37	0.00	11.23
3.16	Pipeline supports including anchors	----	kg	51.47	1.38	3.22	71.03	165.74
3.17	Cable tray including supports and anchors	----	m	20.59	0.35	0.83	7.29	17.01
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	20.59	0.79	7.11	16.27	146.39
Sub-total							4,005	16,206
Missing items and construction contingencies		%		2.00%	----->>		80	324
Total Direct Costs							4,085	16,530
Overheads, risks and profit		%		52.00%	----->>		1,072	9,648
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	694	----->>		7.43	37.74
AGGREGATE UNIT PRICE			m³	----->>				45.18

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T8 - (ROCK CLASS III)

SEC 2-01
 ANA 009
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	162.86	0.00	47.25	0.00	7,695.17
1.02	Gang foreman	1	h	1,628.61	6.60	0.00	10,748.81	0.00
1.03	Tunnel specialist	1	h	1,628.61	0.00	45.38	0.00	73,906.24
1.04	Tunneling jumbo operator	1	h	1,628.61	5.82	0.00	9,478.50	0.00
1.05	Loader operator	---	h	423.56	5.82	0.00	2,465.10	0.00
1.06	Operator of dumpers and other units	---	h	1,421.76	5.82	0.00	8,274.63	0.00
1.07	Miner	4	h	6,514.43	2.99	0.00	19,478.15	0.00
1.08	Explosive specialist	1	h	1,628.61	3.69	0.00	6,009.56	0.00
1.09	Electrician	0.33	h	542.33	3.69	0.00	2,001.18	0.00
1.10	Mechanic	0.33	h	542.33	3.69	0.00	2,001.18	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	109.06	3.69	0.00	402.45	0.00
1.12	Pipe fitter	0.33	h	542.33	3.69	0.00	2,001.18	0.00
1.13	Helper	5	h	8,143.04	2.38	0.00	19,380.44	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	2.83	0.00	19,479.66	0.00	55,077.66
		---	h	280.71	3.17	94.80	889.84	26,611.05
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	11.31	0.00	187.16	0.00	2,116.74
		---	h	170.87	0.07	1.53	11.96	261.44
2.03	Hand-held rock drill, medium weight type	3	m.th	8.48	0.00	130.63	0.00	1,108.05
		---	h	256.31	0.04	2.03	10.25	520.31
2.04	Hand-held breaker, medium weight type	4	m.th	11.31	0.00	46.95	0.00	530.99
		---	h	546.80	0.03	0.91	16.40	497.58
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,628.61	0.15	24.64	244.29	40,128.91
		s.b	h	325.72	0.00	5.46	0.00	1,778.44
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	352.96	0.75	70.52	264.72	24,891.06
		s.b	h	70.59	0.00	26.87	0.00	1,896.83
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	761.33	1.12	114.78	852.69	87,385.33
		s.b	h	152.27	0.00	50.07	0.00	7,623.95
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	2.83	0.00	747.05	0.00	2,112.24
		---	h	1,628.61	0.29	22.25	472.30	36,236.53
2.11	Halogen flood light, 1000 W	2	m.th	5.65	0.00	79.92	0.00	451.94
		---	h	3,257.22	0.01	0.43	32.57	1,400.60
2.12	Halogen flood light, 2000 W	1	m.th	2.83	0.00	92.77	0.00	262.30
		---	h	1,628.61	0.01	0.48	16.29	781.73
2.13	Ligthing line along tunnel, 100 m section	6.3	m.th	17.77	0.00	130.82	0.00	2,325.22
		---	h	10,237.94	0.01	0.41	102.38	4,197.55
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	305.36	0.15	18.51	45.80	5,652.29
		s.b	h	61.07	0.00	7.46	0.00	455.60
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	123.71	0.32	29.23	39.59	3,616.10
		s.b	h	24.74	0.00	12.36	0.00	305.82
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	657.06	0.26	24.87	170.83	16,341.02
		s.b	h	131.41	0.00	15.28	0.00	2,007.97
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	102.10	0.63	48.81	64.32	4,983.60
		s.b	h	20.42	0.00	20.84	0.00	425.56
Total to carry forward ----->>							85,475	413,586

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T8 - (ROCK CLASS III)

SEC 2-01
 ANA 009
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						85,475	413,586
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	2.83	0.00	82.94	0.00	234.51
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	2.83	0.31	73.58	0.88	208.04
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	6.3	do	17.77	1.93	130.66	34.30	2,322.38
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	6.38	1.36	134.52	8.68	858.54
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.3	do	17.77	0.14	13.13	2.49	233.38
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.3	do	17.77	0.37	34.41	6.58	611.61
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.83	2.37	278.28	6.70	786.82
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.3	do	17.77	0.55	55.77	9.78	991.27
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.3	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2460.58	2.31	0.00	5,683.94	0.00
3.02	Explosive, gramonite type	----	kg	22145.22	2.06	0.00	45,619.14	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	9988.92	0.00	1.98	0.00	19,778.06
3.06	Blasting connection wire	----	m	3092.80	0.00	0.13	0.00	402.06
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	5.56	0.00	459.99	0.00	2,557.99
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	5.56	0.00	808.44	0.00	4,495.71
3.09	Jumbo drill shank adapter	----	n.	9.62	0.00	302.37	0.00	2,908.20
3.10	Jumbo drill bit, 51 mm dia.	----	n.	30.59	0.00	164.35	0.00	5,026.70
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.62	0.00	586.85	0.00	363.00
3.12	Integral drill steel, 800 mm	----	n.	4.56	0.00	132.65	0.00	604.44
3.13	Integral drill steel, 1600 mm	----	n.	3.99	0.00	153.97	0.00	613.89
3.14	Integral drill steel, 2400 mm	----	n.	2.85	0.00	174.35	0.00	496.53
3.15	Breaker tool, moi point	----	n.	11.39	0.00	32.37	0.00	368.75
3.16	Pipeline supports including anchors	----	kg	1,571.57	1.38	3.22	2,168.77	5,060.46
3.17	Cable tray including supports and anchors	----	m	628.63	0.35	0.83	222.53	519.25
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	628.63	0.79	7.11	496.62	4,469.55
	Sub-total						139,736	467,497
	Missing items and construction contingencies	%		2.00%			2,795	9,350
	Total Direct Costs						142,531	476,847
	Overheads, risks and profit	%		52.00%			32,208	289,869
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		22,783			7.67	33.65
	AGGREGATE UNIT PRICE	m³						41.32

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T22 - (ROCK CLASS III)

SEC 2-01
 ANA 010
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	472.78	0.00	47.25	0.00	22,338.99
1.02	Gang foreman	1	hr	4,727.83	6.60	0.00	31,203.66	0.00
1.03	Tunnel specialist	1	hr	2,917.16	0.00	45.38	0.00	132,380.73
1.04	Tunneling jumbo operator	1	hr	2,917.16	5.82	0.00	16,977.87	0.00
1.05	Loader operator	---	hr	852.82	5.82	0.00	4,963.44	0.00
1.06	Operator of dumpers and other units	---	h	2,456.00	5.82	0.00	14,293.94	0.00
1.07	Miner	5	hr	14,585.80	2.99	0.00	43,611.54	0.00
1.08	Explosive specialist	1	hr	2,917.16	3.69	0.00	10,764.32	0.00
1.09	Electrician	0.33	hr	971.41	3.69	0.00	3,584.52	0.00
1.10	Mechanic	0.33	hr	971.41	3.69	0.00	3,584.52	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	214.97	3.69	0.00	793.23	0.00
1.12	Pipe fitter	0.33	hr	971.41	3.69	0.00	3,584.52	0.00
1.13	Helper	6	hr	17,502.96	2.38	0.00	41,657.05	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	5.06	0.00	21,868.22	0.00	110,751.91
		---	h	364.44	3.71	122.14	1,352.06	44,512.38
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	25.32	0.00	187.16	0.00	4,739.37
		---	h	425.61	0.07	1.53	29.79	651.19
2.03	Hand-held rock drill, medium weight type	4	m.th	20.26	0.00	130.63	0.00	2,646.31
		---	h	638.42	0.04	2.03	25.54	1,295.99
2.04	Hand-held breaker, medium weight type	5	m.th	25.32	0.00	46.95	0.00	1,188.89
		---	h	1,361.96	0.03	0.91	40.86	1,239.39
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	2,917.16	0.29	77.99	845.98	227,509.32
		s.b	h	583.43	0.00	10.73	0.00	6,260.23
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	710.69	1.05	95.46	746.22	67,842.18
		---	h	142.14	0.00	36.59	0.00	5,200.81
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	112.16	0.70	64.44	78.51	7,227.58
		s.b	h	22.43	0.00	40.23	0.00	902.44
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	1,215.98	1.12	114.78	1,361.90	139,570.41
		s.b	h	243.20	0.00	50.07	0.00	12,176.84
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	5.06	0.00	747.05	0.00	3,783.45
		---	h	2,917.16	0.29	22.25	845.98	64,906.81
2.11	Halogen flood light, 1000 W	2	m.th	10.13	0.00	79.92	0.00	809.51
		---	h	5,834.32	0.01	0.43	58.34	2,508.76
2.12	Halogen flood light, 2000 W	2	m.th	10.13	0.00	92.77	0.00	939.67
		---	h	5,834.32	0.01	0.48	58.34	2,800.47
2.13	Ligthning line along tunnel, 100 m section	5.3	m.th	27.05	0.00	130.82	0.00	3,539.02
		---	h	15,582.30	0.01	0.41	155.82	6,388.74
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	546.97	0.15	18.51	82.05	10,124.37
		s.b	h	109.39	0.00	7.46	0.00	816.08
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	221.14	0.32	29.23	70.77	6,464.04
		s.b	h	44.23	0.00	12.36	0.00	546.67
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	1,155.81	0.33	30.84	381.42	35,645.24
		s.b	h	231.16	0.00	19.27	0.00	4,454.50
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	248.64	0.63	48.81	156.64	12,135.98
		s.b	h	49.73	0.00	20.84	0.00	1,036.32
Total to carry forward ----->>							181,309	945,335

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T22 - (ROCK CLASS III)**

**SEC 2-01
ANA 010
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						181,309	945,335
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	5.06	0.00	128.05	0.00	648.51
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	5.06	0.31	73.58	1.57	372.65
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	5.3	do	27.05	2.21	149.88	59.79	4,054.64
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	10.48	2.01	198.33	21.05	2,077.51
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	5.3	do	27.05	0.20	18.98	5.41	513.46
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	5.3	do	27.05	0.37	34.41	10.01	930.88
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	5.06	3.15	370.12	15.95	1,874.48
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	5.3	do	27.05	0.38	38.10	10.28	1,030.70
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.3	do	27.05	0.55	55.77	14.88	1,508.72
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	5.3	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	5,822.40	2.31	0.00	13,449.74	0.00
3.02	Explosive, gramonite type	----	kg	52,401.57	2.06	0.00	107,947.24	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	17,296.78	0.00	1.98	0.00	34,247.62
3.06	Blasting connection wire	----	m	5,528.60	0.00	0.13	0.00	718.72
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	9.64	0.00	459.99	0.00	4,432.30
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	9.64	0.00	808.44	0.00	7,789.84
3.09	Jumbo drill shank adapter	----	n.	16.67	0.00	302.37	0.00	5,039.12
3.10	Jumbo drill bit, 51 mm dia.	----	n.	53.00	0.00	164.35	0.00	8,709.90
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.11	0.00	586.85	0.00	648.89
3.12	Integral drill steel, 800 mm	----	n.	11.35	0.00	132.65	0.00	1,505.54
3.13	Integral drill steel, 1600 mm	----	n.	9.93	0.00	153.97	0.00	1,529.07
3.14	Integral drill steel, 2400 mm	----	n.	7.09	0.00	174.35	0.00	1,236.76
3.15	Breaker tool, moiil point	----	n.	28.37	0.00	32.37	0.00	918.47
3.16	Pipeline supports including anchors	----	kg	1,335.40	1.38	3.22	1,842.85	4,299.99
3.17	Cable tray including supports and anchors	----	m	534.16	0.35	0.83	189.09	441.22
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	534.16	0.79	7.11	421.99	3,797.88
	Sub-total						305,299	1,033,661
	Missing items and construction contingencies	%		2.00%			6,106	20,673
	Total Direct Costs						311,405	1,054,335
	Overheads, risks and profit	%		52.00%			71,018	639,166
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		56,749			6.74	29.84
	AGGREGATE UNIT PRICE	m ³						36.58

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T37 - (ROCK CLASS III)

SEC 2-01
 ANA 011
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	182.77	0.00	47.25	0.00	8,635.80
1.02	Gang foreman	1	h	1,827.68	6.60	0.00	12,062.71	0.00
1.03	Tunnel specialist	1	h	1,827.68	0.00	45.38	0.00	82,940.24
1.04	Tunneling jumbo operator	1	h	1,827.68	5.82	0.00	10,637.11	0.00
1.05	Loader operator	---	h	432.66	5.82	0.00	2,518.11	0.00
1.06	Operator of dumpers and other units	---	h	1,534.23	5.82	0.00	8,929.21	0.00
1.07	Miner	4	h	7,310.73	2.99	0.00	21,859.09	0.00
1.08	Explosive specialist	1	h	1,827.68	3.69	0.00	6,744.15	0.00
1.09	Electrician	0.33	h	608.62	3.69	0.00	2,245.80	0.00
1.10	Mechanic	0.33	h	608.62	3.69	0.00	2,245.80	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	122.25	3.69	0.00	451.10	0.00
1.12	Pipe fitter	0.33	h	608.62	3.69	0.00	2,245.80	0.00
1.13	Helper	5	h	9,138.41	2.38	0.00	21,749.42	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	3.17	0.00	19,479.66	0.00	61,810.14
		---	h	342.30	3.17	94.80	1,085.10	32,450.20
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	12.69	0.00	187.16	0.00	2,375.48
		---	h	166.92	0.07	1.53	11.68	255.39
2.03	Hand-held rock drill, medium weight type	3	m.th	9.52	0.00	130.63	0.00	1,243.49
		---	h	250.38	0.04	2.03	10.02	508.27
2.04	Hand-held breaker, medium weight type	4	m.th	12.69	0.00	46.95	0.00	595.90
		---	h	534.14	0.03	0.91	16.02	486.07
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,827.68	0.15	24.64	274.15	45,034.10
		s.b	h	365.54	0.00	5.46	0.00	1,995.83
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	360.55	0.75	70.52	270.42	25,426.24
		s.b	h	72.11	0.00	26.87	0.00	1,937.62
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	786.42	1.12	114.78	880.78	90,264.73
		s.b	h	157.28	0.00	50.07	0.00	7,875.16
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	3.17	0.00	440.40	0.00	1,397.42
		---	h	1,827.68	0.12	9.00	219.32	16,449.14
2.11	Halogen flood light, 1000 W	2	m.th	6.35	0.00	79.92	0.00	507.18
		---	h	3,655.37	0.01	0.43	36.55	1,571.81
2.12	Halogen flood light, 2000 W	1	m.th	3.17	0.00	92.77	0.00	294.36
		---	h	1,827.68	0.01	0.48	18.28	877.29
2.13	Ligthing line along tunnel, 100 m section	7.4	m.th	23.48	0.00	130.82	0.00	3,071.74
		---	h	13,524.85	0.01	0.41	135.25	5,545.19
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	342.69	0.15	18.51	51.40	6,343.20
		s.b	h	68.54	0.00	7.46	0.00	511.29
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	163.60	0.32	29.23	52.35	4,781.97
		s.b	h	32.72	0.00	12.36	0.00	404.41
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	756.90	0.26	24.87	196.79	18,823.98
		s.b	h	151.38	0.00	15.28	0.00	2,313.07
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	102.05	0.63	48.81	64.29	4,981.08
		s.b	h	20.41	0.00	20.84	0.00	425.35
Total to carry forward ----->>							95,011	432,133

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T37 - (ROCK CLASS III)**

**SEC 2-01
ANA 011
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						95,011	432,133
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.17	0.00	82.94	0.00	263.17
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.17	0.31	73.58	0.98	233.47
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	7.4	do	23.48	1.93	130.66	45.32	3,067.98
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	7.87	1.36	134.52	10.70	1,058.56
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.4	do	23.48	0.14	13.13	3.29	308.30
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	7.4	do	23.48	0.37	34.41	8.69	807.97
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.17	2.37	278.28	7.52	883.00
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.4	do	23.48	0.55	55.77	12.91	1,309.52
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.4	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2643.99	2.31	0.00	6,107.62	0.00
3.02	Explosive, gramonite type	----	kg	23795.90	2.06	0.00	49,019.56	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	11797.06	0.00	1.98	0.00	23,358.17
3.06	Blasting connection wire	----	m	4089.95	0.00	0.13	0.00	531.69
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	6.58	0.00	459.99	0.00	3,028.34
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	6.58	0.00	808.44	0.00	5,322.35
3.09	Jumbo drill shank adapter	----	n.	11.39	0.00	302.37	0.00	3,442.94
3.10	Jumbo drill bit, 51 mm dia.	----	n.	36.21	0.00	164.35	0.00	5,950.98
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.82	0.00	586.85	0.00	480.04
3.12	Integral drill steel, 800 mm	----	n.	4.45	0.00	132.65	0.00	590.45
3.13	Integral drill steel, 1600 mm	----	n.	3.89	0.00	153.97	0.00	599.68
3.14	Integral drill steel, 2400 mm	----	n.	2.78	0.00	174.35	0.00	485.04
3.15	Breaker tool, moiil point	----	n.	11.13	0.00	32.37	0.00	360.21
3.16	Pipeline supports including anchors	----	kg	1,108.15	1.38	3.22	1,529.24	3,568.23
3.17	Cable tray including supports and anchors	----	m	443.26	0.35	0.83	156.91	366.13
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	443.26	0.79	7.11	350.17	3,151.57
	Sub-total						152,264	491,301
	Missing items and construction contingencies	%		2.00%			3,045	9,826
	Total Direct Costs						155,309	501,127
	Overheads, risks and profit	%		52.00%			34,135	307,212
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		22,256			8.51	36.32
	AGGREGATE UNIT PRICE	m³						44.83

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T37 - (ROCK CLASS IV)

SEC 2-01
 ANA 011
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	136.30	0.00	47.25	0.00	6,440.35	
1.02	Gang foreman	1	h	1,363.04	6.60	0.00	8,996.04	0.00	
1.03	Tunnel specialist	1	h	1,363.04	0.00	45.38	0.00	61,854.60	
1.04	Tunneling jumbo operator	1	h	1,363.04	5.82	0.00	7,932.87	0.00	
1.05	Loader operator	---	h	304.62	5.82	0.00	1,772.87	0.00	
1.06	Operator of dumpers and other units	---	h	1,101.74	5.82	0.00	6,412.12	0.00	
1.07	Miner	4	h	5,452.15	2.99	0.00	16,301.92	0.00	
1.08	Explosive specialist	1	h	1,363.04	3.69	0.00	5,029.60	0.00	
1.09	Electrician	0.33	h	453.89	3.69	0.00	1,674.86	0.00	
1.10	Mechanic	0.33	h	453.89	3.69	0.00	1,674.86	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	80.50	3.69	0.00	297.04	0.00	
1.12	Pipe fitter	0.33	h	453.89	3.69	0.00	1,674.86	0.00	
1.13	Helper	5	h	6,815.18	2.38	0.00	16,220.13	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	2.37	0.00	19,479.66	0.00	46,096.33	
		---	h	242.66	3.17	94.80	769.24	23,004.28	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	9.47	0.00	187.16	0.00	1,771.57	
		---	h	111.74	0.07	1.53	7.82	170.97	
2.03	Hand-held rock drill, medium weight type	3	m.th	7.10	0.00	130.63	0.00	927.36	
		---	h	167.62	0.04	2.03	6.70	340.26	
2.04	Hand-held breaker, medium weight type	4	m.th	9.47	0.00	46.95	0.00	444.41	
		---	h	357.58	0.03	0.91	10.73	325.40	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,363.04	0.15	24.64	204.46	33,585.22	
		s.b	h	272.61	0.00	5.46	0.00	1,488.44	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	253.85	0.75	70.52	190.39	17,901.27	
		s.b	h	50.77	0.00	26.87	0.00	1,364.17	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	548.47	1.12	114.78	614.28	62,953.23	
		s.b	h	109.69	0.00	50.07	0.00	5,492.37	
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	2.37	0.00	440.40	0.00	1,042.15	
		---	h	1,363.04	0.12	9.00	163.56	12,267.33	
2.11	Halogen flood light, 1000 W	2	m.th	4.73	0.00	79.92	0.00	378.24	
		---	h	2,726.07	0.01	0.43	27.26	1,172.21	
2.12	Halogen flood light, 2000 W	1	m.th	2.37	0.00	92.77	0.00	219.53	
		---	h	1,363.04	0.01	0.48	13.63	654.26	
2.13	Ligthing line along tunnel, 100 m section	7.4	m.th	17.51	0.00	130.82	0.00	2,290.82	
		---	h	10,086.47	0.01	0.41	100.86	4,135.45	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	255.57	0.15	18.51	38.34	4,730.59	
		s.b	h	51.11	0.00	7.46	0.00	381.31	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	126.37	0.32	29.23	40.44	3,693.79	
		s.b	h	25.27	0.00	12.36	0.00	312.39	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	571.51	0.26	24.87	148.59	14,213.51	
		s.b	h	114.30	0.00	15.28	0.00	1,746.54	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	71.17	0.63	48.81	44.84	3,473.95	
		s.b	h	14.23	0.00	20.84	0.00	296.65	
Total to carry forward ----->>								70,368	315,169

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSPORTATION TUNNEL T37 - (ROCK CLASS IV)

SEC 2-01
 ANA 011
 RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						70,368	315,169
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	2.37	0.00	82.94	0.00	196.27
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	2.37	0.31	73.58	0.73	174.12
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	7.4	do	17.51	1.93	130.66	33.80	2,288.02
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	5.87	1.36	134.52	7.98	789.45
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.4	do	17.51	0.14	13.13	2.45	229.92
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	7.4	do	17.51	0.37	34.41	6.48	602.56
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.37	2.37	278.28	5.61	658.52
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.4	do	17.51	0.55	55.77	9.63	976.60
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.4	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1671.68	2.31	0.00	3,861.59	0.00
3.02	Explosive, gramonite type	----	kg	15045.14	2.06	0.00	30,992.98	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	8897.70	0.00	1.98	0.00	17,617.45
3.06	Blasting connection wire	----	m	3159.24	0.00	0.13	0.00	410.70
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.31	0.00	459.99	0.00	1,980.60
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.31	0.00	808.44	0.00	3,480.94
3.09	Jumbo drill shank adapter	----	n.	7.45	0.00	302.37	0.00	2,251.77
3.10	Jumbo drill bit, 51 mm dia.	----	n.	23.68	0.00	164.35	0.00	3,892.08
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.55	0.00	586.85	0.00	321.36
3.12	Integral drill steel, 800 mm	----	n.	2.98	0.00	132.65	0.00	395.27
3.13	Integral drill steel, 1600 mm	----	n.	2.61	0.00	153.97	0.00	401.45
3.14	Integral drill steel, 2400 mm	----	n.	1.86	0.00	174.35	0.00	324.71
3.15	Breaker tool, moiil point	----	n.	7.45	0.00	32.37	0.00	241.14
3.16	Pipeline supports including anchors	----	kg	741.85	1.38	3.22	1,023.75	2,388.75
3.17	Cable tray including supports and anchors	----	m	296.74	0.35	0.83	105.05	245.11
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	296.74	0.79	7.11	234.42	2,109.82
	Sub-total						106,653	357,146
	Missing items and construction contingencies	%		2.00%			2,133	7,143
	Total Direct Costs						108,786	364,288
	Overheads, risks and profit	%		52.00%			24,600	221,399
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	14,899			8.95	39.31
	AGGREGATE UNIT PRICE		m³					48.26

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P1- (ROCK CLASS III)**

**SEC 2.02
ANA 001
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	240.79	0.00	47.25	0.00	11,377.39
1.02	Gang foreman	1	h	2,407.91	6.60	0.00	15,892.22	0.00
1.03	Tunnel specialist	1	h	2,407.91	0.00	45.38	0.00	109,271.06
1.04	Tunneling jumbo operator	1	h	2,407.91	5.82	0.00	14,014.05	0.00
1.05	Loader operator	---	h	611.27	5.82	0.00	3,557.61	0.00
1.06	Operator of dumpers and other units	---	h	1,928.69	5.82	0.00	11,224.97	0.00
1.07	Miner	4	h	9,631.65	2.99	0.00	28,798.63	0.00
1.08	Explosive specialist	1	h	2,407.91	3.69	0.00	8,885.20	0.00
1.09	Electrician	0.33	h	801.83	3.69	0.00	2,958.77	0.00
1.10	Mechanic	0.33	h	801.83	3.69	0.00	2,958.77	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	168.29	3.69	0.00	620.99	0.00
1.12	Pipe fitter	0.33	h	801.83	3.69	0.00	2,958.77	0.00
1.13	Helper	5	h	12,039.56	2.38	0.00	28,654.16	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	4.18	0.00	19,479.66	0.00	81,432.84
		---	h	450.87	3.17	94.80	1,429.25	42,742.21
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	16.72	0.00	187.16	0.00	3,129.62
		---	h	241.98	0.07	1.53	16.94	370.23
2.03	Hand-held rock drill, medium weight type	3	m.th	12.54	0.00	130.63	0.00	1,638.26
		---	h	362.97	0.04	2.03	14.52	736.84
2.04	Hand-held breaker, medium weight type	4	m.th	16.72	0.00	46.95	0.00	785.08
		---	h	774.34	0.03	0.91	23.23	704.65
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	2,407.91	0.15	24.64	361.19	59,330.96
		s.b	h	481.58	0.00	5.46	0.00	2,629.44
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	509.39	0.75	70.52	382.05	35,922.48
		s.b	h	101.88	0.00	26.87	0.00	2,737.48
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	955.12	1.12	114.78	1,069.73	109,628.47
		s.b	h	191.02	0.00	50.07	0.00	9,564.55
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	4.18	0.00	747.05	0.00	3,122.97
		---	h	2,407.91	0.29	22.25	698.29	53,576.05
2.11	Halogen flood light, 1000 W	2	m.th	8.36	0.00	79.92	0.00	668.20
		---	h	4,815.82	0.01	0.43	48.16	2,070.80
2.12	Halogen flood light, 2000 W	1	m.th	4.18	0.00	92.77	0.00	387.82
		---	h	2,407.91	0.01	0.48	24.08	1,155.80
2.13	Ligthing line along tunnel, 100 m section	8.1	m.th	33.77	0.00	130.82	0.00	4,417.26
		---	h	19,449.19	0.01	0.41	194.49	7,974.17
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	451.48	0.15	18.51	67.72	8,356.96
		s.b	h	90.30	0.00	7.46	0.00	673.61
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	200.74	0.32	29.23	64.24	5,867.62
		s.b	h	40.15	0.00	12.36	0.00	496.23
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	952.52	0.26	24.87	247.66	23,689.27
		s.b	h	190.50	0.00	15.28	0.00	2,910.91
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	146.01	0.63	48.81	91.99	7,126.86
		s.b	h	29.20	0.00	20.84	0.00	608.58
Total to carry forward ----->>							125,258	595,105

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P1- (ROCK CLASS III)**

**SEC 2.02
ANA 001
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						125,258	595,105
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	4.18	0.00	82.94	0.00	346.72
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	4.18	0.31	73.58	1.30	307.59
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	8.1	do	33.77	1.93	130.66	65.17	4,411.86
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	10.93	1.36	134.52	14.87	1,470.79
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	8.1	do	33.77	0.14	13.13	4.73	443.35
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	8.1	do	33.77	0.37	34.41	12.49	1,161.89
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	4.18	2.37	278.28	9.91	1,163.32
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	8.1	do	33.77	0.55	55.77	18.57	1,883.13
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	8.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3484.55	2.31	0.00	8,049.31	0.00
3.02	Explosive, gramonite type	----	kg	31360.95	2.06	0.00	64,603.56	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	15982.71	0.00	1.98	0.00	31,645.77
3.06	Blasting connection wire	----	m	5018.49	0.00	0.13	0.00	652.40
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	8.90	0.00	459.99	0.00	4,094.06
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	8.90	0.00	808.44	0.00	7,195.39
3.09	Jumbo drill shank adapter	----	n.	15.39	0.00	302.37	0.00	4,654.58
3.10	Jumbo drill bit, 51 mm dia.	----	n.	48.95	0.00	164.35	0.00	8,045.23
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.00	0.00	586.85	0.00	589.02
3.12	Integral drill steel, 800 mm	----	n.	6.45	0.00	132.65	0.00	855.97
3.13	Integral drill steel, 1600 mm	----	n.	5.65	0.00	153.97	0.00	869.35
3.14	Integral drill steel, 2400 mm	----	n.	4.03	0.00	174.35	0.00	703.16
3.15	Breaker tool, moi point	----	n.	16.13	0.00	32.37	0.00	522.20
3.16	Pipeline supports including anchors	----	kg	2,019.30	1.38	3.22	2,786.63	6,502.15
3.17	Cable tray including supports and anchors	----	m	807.72	0.35	0.83	285.93	667.18
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	807.72	0.79	7.11	638.10	5,742.89
	Sub-total						201,748	679,033
	Missing items and construction contingencies	%		2.00%			4,035	13,581
	Total Direct Costs						205,783	692,613
	Overheads, risks and profit	%		52.00%			46,717	420,450
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		32,264			7.83	34.50
	AGGREGATE UNIT PRICE	m³						42.32

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADITP1B - (ROCK CLASS III)

SEC 2-02
 ANA 002
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	112.38	0.00	47.25	0.00	5,309.80
1.02	Gang foreman	1	h	1,123.77	6.60	0.00	7,416.86	0.00
1.03	Tunnel specialist	1	h	1,123.77	0.00	45.38	0.00	50,996.54
1.04	Tunneling jumbo operator	1	h	1,123.77	5.82	0.00	6,540.32	0.00
1.05	Loader operator	1	h	1,123.77	5.82	0.00	6,540.32	0.00
1.06	Operator of dumper and other units	---	h	1,069.95	5.82	0.00	6,227.14	0.00
1.07	Miner	3	h	3,371.30	2.99	0.00	10,080.19	0.00
1.08	Explosive specialist	1	h	1,123.77	3.69	0.00	4,146.70	0.00
1.09	Electrician	0.33	h	374.55	3.69	0.00	1,382.10	0.00
1.10	Mechanic	0.33	h	374.55	3.69	0.00	1,382.10	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	57.34	3.69	0.00	211.57	0.00
1.12	Pipe fitter	0.33	h	374.55	3.69	0.00	1,382.10	0.00
1.13	Helper	4.0	h	4,495.07	2.38	0.00	10,698.26	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.95	0.00	12,651.92	0.00	24,683.70
		---	h	291.97	1.95	50.77	569.34	14,823.34
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	5.85	0.00	187.16	0.00	1,095.44
		---	h	54.00	0.07	1.53	3.78	82.62
2.03	Hand-held rock drill, medium weight type	2	m.th	3.90	0.00	130.63	0.00	509.71
		---	hr	81.00	0.04	2.03	3.24	164.44
2.04	Hand-held breaker, medium weight type	2	m.th	3.90	0.00	46.95	0.00	183.20
		---	h	288.01	0.03	0.91	8.64	262.09
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,123.77	0.15	24.64	168.57	27,689.62
		s.b	h	224.75	0.00	5.46	0.00	1,227.15
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	1.95	0.00	8,943.66	0.00	17,448.94
		---	h	181.17	1.30	33.65	235.52	6,096.40
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	598.98	0.63	62.22	377.36	37,268.71
		s.b	h	119.80	0.00	28.86	0.00	3,457.33
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	1.95	0.00	636.14	0.00	1,241.10
		---	h	1,123.77	0.20	14.93	224.75	16,777.84
2.11	Halogen flood light, 1000 W	1	m.th	1.95	0.00	79.92	0.00	155.92
		---	h	1,123.77	0.01	0.43	11.24	483.22
2.12	Halogen flood light, 2000 W	1	m.th	1.95	0.00	92.77	0.00	180.99
		---	h	1,123.77	0.01	0.48	11.24	539.41
2.13	Ligthing line along tunnel, 100 m section	16.6	m.th	32.39	0.00	130.82	0.00	4,236.78
		---	h	18,654.53	0.01	0.41	186.55	7,648.36
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	210.71	0.15	18.51	31.61	3,900.17
		s.b	h	42.14	0.00	7.46	0.00	314.37
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	126.88	0.32	29.23	40.60	3,708.75
		s.b	h	25.38	0.00	12.36	0.00	313.65
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	401.15	0.26	24.87	104.30	9,976.57
		s.b	h	80.23	0.00	15.28	0.00	1,225.91
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	36.12	0.63	48.81	22.75	1,762.79
		s.b	h	7.22	0.00	20.84	0.00	150.53
Total to carry forward ----->>							58,007	243,915

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADITP1B - (ROCK CLASS III)

SEC 2-02
 ANA 002
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						58,007	243,915
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.95	0.00	82.94	0.00	161.81
		---	h	9.75	0.01	4.39	0.10	42.82
2.19	Integral drill steel grinder	---	h	9.00	0.01	2.29	0.09	20.61
2.20	Button bits grinder	---	h	38.78	0.04	5.32	1.55	206.31
2.21	Breaker moil point resharpenner	---	h	3.00	0.01	1.57	0.03	4.71
2.22	Steel structure for ventilation fan support	1	m.th	1.95	0.31	73.58	0.60	143.55
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	16.6	do	32.39	1.51	102.31	48.90	3,313.45
2.24	Compressed air tank, 4 m3 capacity	4	do	8.43	1.07	105.20	9.02	886.65
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	16.6	do	32.39	0.14	13.13	4.53	425.23
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	16.6	do	32.39	0.24	22.33	7.77	723.19
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.95	2.37	278.28	4.62	542.92
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	33.2	do	64.77	0.38	38.10	24.61	2,467.84
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	16.6	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	3.90	0.24	27.23	0.94	106.25
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1166.45	2.31	0.00	2,694.50	0.00
3.02	Explosive, gramonite type	----	kg	10498.04	2.06	0.00	21,625.97	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	6040.47	0.00	1.98	0.00	11,960.12
3.06	Blasting connection wire	----	m	3172.04	0.00	0.13	0.00	412.37
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.41	0.00	459.99	0.00	1,568.63
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.41	0.00	808.44	0.00	2,756.90
3.09	Jumbo drill shank adapter	----	n.	5.90	0.00	302.37	0.00	1,783.39
3.10	Jumbo drill bit, 48 mm dia.	----	n.	18.76	0.00	150.50	0.00	2,822.75
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.63	0.00	586.85	0.00	372.30
3.12	Integral drill steel, 800 mm	----	n.	1.44	0.00	132.65	0.00	191.02
3.13	Integral drill steel, 1600 mm	----	n.	1.26	0.00	153.97	0.00	194.01
3.14	Integral drill steel, 2400 mm	----	n.	0.90	0.00	174.35	0.00	156.92
3.15	Breaker tool, moil point	----	n.	6.00	0.00	32.37	0.00	194.23
3.16	Pipeline supports including anchors	----	kg	4,150.00	1.38	3.22	5,727.00	13,363.00
3.17	Cable tray including supports and anchors	----	m	1,660.00	0.35	0.83	587.64	1,371.16
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,660.00	0.79	7.11	1,311.40	11,802.60
	Sub-total						90,056	301,910
	Missing items and construction contingencies	%		2.00%			1,801	6,038
	Total Direct Costs						91,858	307,948
	Overheads, risks and profit	%		52.00%			20,790	187,109
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	7,200			15.64	68.76
	AGGREGATE UNIT PRICE		m³					84.40

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P3 - (ROCK CLASS III)**

**SEC 2.02
ANA 003
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	124.07	0.00	47.25	0.00	5,862.12
1.02	Gang foreman	1	h	1,240.66	6.60	0.00	8,188.36	0.00
1.03	Tunnel specialist	1	h	1,240.66	0.00	45.38	0.00	56,301.20
1.04	Tunneling jumbo operator	1	h	1,240.66	5.82	0.00	7,220.65	0.00
1.05	Loader operator	1	h	1,240.66	5.82	0.00	7,220.65	0.00
1.06	Operator of dumper and other units	---	h	1,217.23	5.82	0.00	7,084.31	0.00
1.07	Miner	3	h	3,721.98	2.99	0.00	11,128.73	0.00
1.08	Explosive specialist	1	h	1,240.66	3.69	0.00	4,578.04	0.00
1.09	Electrician	0.33	h	413.51	3.69	0.00	1,525.86	0.00
1.10	Mechanic	0.33	h	413.51	3.69	0.00	1,525.86	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	66.98	3.69	0.00	247.16	0.00
1.12	Pipe fitter	0.33	h	413.51	3.69	0.00	1,525.86	0.00
1.13	Helper	4.0	h	4,962.64	2.38	0.00	11,811.09	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	2.15	0.00	12,651.92	0.00	27,251.29
		---	h	309.37	1.95	50.77	603.27	15,706.76
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	6.46	0.00	187.16	0.00	1,209.39
		---	h	79.02	0.07	1.53	5.53	120.90
2.03	Hand-held rock drill, medium weight type	2	m.th	4.31	0.00	130.63	0.00	562.73
		---	hr	118.53	0.04	2.03	4.74	240.62
2.04	Hand-held breaker, medium weight type	2	m.th	4.31	0.00	46.95	0.00	202.25
		---	h	421.45	0.03	0.91	12.64	383.52
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,240.66	0.15	24.64	186.10	30,569.89
		s.b	h	248.13	0.00	5.46	0.00	1,354.80
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	2.15	0.00	8,943.66	0.00	19,263.98
		---	h	237.97	1.30	33.65	309.36	8,007.70
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	712.41	0.63	62.22	448.82	44,325.92
		s.b	h	142.48	0.00	28.86	0.00	4,112.01
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	2.15	0.00	440.40	0.00	948.59
		---	h	1,240.66	0.12	9.00	148.88	11,165.95
2.11	Halogen flood light, 1000 W	1	m.th	2.15	0.00	79.92	0.00	172.14
		---	h	1,240.66	0.01	0.43	12.41	533.48
2.12	Halogen flood light, 2000 W	1	m.th	2.15	0.00	92.77	0.00	199.82
		---	h	1,240.66	0.01	0.48	12.41	595.52
2.13	Ligthing line along tunnel, 100 m section	4.0	m.th	8.62	0.00	130.82	0.00	1,128.29
		---	h	4,967.86	0.01	0.41	49.68	2,036.82
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	232.62	0.15	18.51	34.89	4,305.87
		s.b	h	46.52	0.00	7.46	0.00	347.07
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	111.64	0.32	29.23	35.72	3,263.24
		s.b	h	22.33	0.00	12.36	0.00	275.97
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	437.27	0.26	24.87	113.69	10,874.96
		s.b	h	87.45	0.00	15.28	0.00	1,336.30
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	49.91	0.63	48.81	31.44	2,435.95
		s.b	h	9.98	0.00	20.84	0.00	208.01
Total to carry forward ----->>							64,066	255,303

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P3 - (ROCK CLASS III)

SEC 2.02
 ANA 003
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						64,066	255,303
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	2.15	0.00	82.94	0.00	178.65
		---	h	10.77	0.01	4.39	0.11	47.28
2.19	Integral drill steel grinder	---	h	13.17	0.01	2.29	0.13	30.16
2.20	Button bits grinder	---	h	42.65	0.04	5.32	1.71	226.88
2.21	Breaker moil point resharpenner	---	h	4.39	0.01	1.57	0.04	6.89
2.22	Steel structure for ventilation fan support	1	m.th	2.15	0.14	33.45	0.30	72.05
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	4.0	do	8.62	1.51	102.31	13.02	882.40
2.24	Compressed air tank, 4 m3 capacity	2	do	3.88	1.07	105.20	4.15	408.06
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4.0	do	8.62	0.14	13.13	1.21	113.24
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	4.0	do	8.62	0.24	22.33	2.07	192.59
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.15	2.37	278.28	5.10	599.39
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	8.0	do	17.25	0.38	38.10	6.55	657.21
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	4.31	0.24	27.23	1.03	117.30
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1327.58	2.31	0.00	3,066.70	0.00
3.02	Explosive, gramonite type	----	kg	11948.19	2.06	0.00	24,613.26	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	6735.58	0.00	1.98	0.00	13,336.44
3.06	Blasting connection wire	----	m	2791.00	0.00	0.13	0.00	362.83
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.78	0.00	459.99	0.00	1,736.67
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.78	0.00	808.44	0.00	3,052.22
3.09	Jumbo drill shank adapter	----	n.	6.53	0.00	302.37	0.00	1,974.43
3.10	Jumbo drill bit, 48 mm dia.	----	n.	20.76	0.00	150.50	0.00	3,125.12
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.56	0.00	586.85	0.00	327.58
3.12	Integral drill steel, 800 mm	----	n.	2.11	0.00	132.65	0.00	279.53
3.13	Integral drill steel, 1600 mm	----	n.	1.84	0.00	153.97	0.00	283.90
3.14	Integral drill steel, 2400 mm	----	n.	1.32	0.00	174.35	0.00	229.63
3.15	Breaker tool, moil point	----	n.	8.78	0.00	32.37	0.00	284.22
3.16	Pipeline supports including anchors	----	kg	864.91	1.38	3.22	1,193.57	2,785.00
3.17	Cable tray including supports and anchors	----	m	345.96	0.35	0.83	122.47	285.77
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	345.96	0.79	7.11	273.31	2,459.80
	Sub-total						93,371	289,358
	Missing items and construction contingencies	%		2.00%			1,867	5,787
	Total Direct Costs						95,238	295,145
	Overheads, risks and profit	%		52.00%			20,300	182,700
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	10,536			10.97	45.35
	AGGREGATE UNIT PRICE		m ³					56.32

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P3 - (ROCK CLASS IV)

SEC 2.02
 ANA 003
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	8.38	0.00	47.25	0.00	396.19	
1.02	Gang foreman	1	h	83.85	6.60	0.00	553.40	0.00	
1.03	Tunnel specialist	1	h	83.85	0.00	45.38	0.00	3,805.07	
1.04	Tunneling jumbo operator	1	h	83.85	5.82	0.00	488.00	0.00	
1.05	Loader operator	1	h	83.85	5.82	0.00	488.00	0.00	
1.06	Operator of dumper and other units	---	h	79.96	5.82	0.00	465.35	0.00	
1.07	Miner	3	h	251.55	2.99	0.00	752.13	0.00	
1.08	Explosive specialist	1	h	83.85	3.69	0.00	309.40	0.00	
1.09	Electrician	0.33	h	27.95	3.69	0.00	103.12	0.00	
1.10	Mechanic	0.33	h	27.95	3.69	0.00	103.12	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	4.04	3.69	0.00	14.91	0.00	
1.12	Pipe fitter	0.33	h	27.95	3.69	0.00	103.12	0.00	
1.13	Helper	4.0	h	335.40	2.38	0.00	798.24	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.15	0.00	12,651.92	0.00	1,841.76	
		---	h	19.92	1.95	50.77	38.84	1,011.33	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.44	0.00	187.16	0.00	81.74	
		---	h	4.85	0.07	1.53	0.34	7.42	
2.03	Hand-held rock drill, medium weight type	2	m.th	0.29	0.00	130.63	0.00	38.03	
		---	hr	7.27	0.04	2.03	0.29	14.76	
2.04	Hand-held breaker, medium weight type	2	m.th	0.29	0.00	46.95	0.00	13.67	
		---	h	25.85	0.03	0.91	0.78	23.53	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	83.85	0.15	24.64	12.58	2,066.04	
		s.b	h	16.77	0.00	5.46	0.00	91.56	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.15	0.00	8,943.66	0.00	1,301.94	
		---	h	15.46	1.30	33.65	20.09	520.08	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	45.85	0.63	62.22	28.89	2,852.94	
		s.b	h	9.17	0.00	28.86	0.00	264.66	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.15	0.00	440.40	0.00	64.11	
		---	h	83.85	0.12	9.00	10.06	754.64	
2.11	Halogen flood light, 1000 W	1	m.th	0.15	0.00	79.92	0.00	11.63	
		---	h	83.85	0.01	0.43	0.84	36.06	
2.12	Halogen flood light, 2000 W	1	m.th	0.15	0.00	92.77	0.00	13.50	
		---	h	83.85	0.01	0.48	0.84	40.25	
2.13	Ligthing line along tunnel, 100 m section	4.0	m.th	0.58	0.00	130.82	0.00	76.25	
		---	h	335.75	0.01	0.41	3.36	137.66	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	15.72	0.15	18.51	2.36	291.01	
		s.b	h	3.14	0.00	7.46	0.00	23.46	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	7.90	0.32	29.23	2.53	230.97	
		s.b	h	1.58	0.00	12.36	0.00	19.53	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	30.19	0.26	24.87	7.85	750.86	
		s.b	h	6.04	0.00	15.28	0.00	92.26	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.21	0.63	48.81	2.02	156.78	
		s.b	h	0.64	0.00	20.84	0.00	13.39	
Total to carry forward ----->>								4,310	17,043

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P3 - (ROCK CLASS IV)**

**SEC 2.02
ANA 003
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						4,310	17,043
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.15	0.00	82.94	0.00	12.07
		---	h	0.73	0.01	4.39	0.01	3.20
2.19	Integral drill steel grinder	---	h	0.81	0.01	2.29	0.01	1.85
2.20	Button bits grinder	---	h	2.56	0.04	5.32	0.10	13.61
2.21	Breaker moil point resharpenner	---	h	0.27	0.01	1.57	0.00	0.42
2.22	Steel structure for ventilation fan support	1	m.th	0.15	0.14	33.45	0.02	4.87
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	4.0	do	0.58	1.51	102.31	0.88	59.64
2.24	Compressed air tank, 4 m3 capacity	2	do	0.26	1.07	105.20	0.28	27.58
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4.0	do	0.58	0.14	13.13	0.08	7.65
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	4.0	do	0.58	0.24	22.33	0.14	13.02
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.15	2.37	278.28	0.35	40.51
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	8.0	do	1.17	0.38	38.10	0.44	44.42
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.29	0.24	27.23	0.07	7.93
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	76.91	2.31	0.00	177.7	0.0
3.02	Explosive, gramonite type	----	kg	692.21	2.06	0.00	1,426.0	0.0
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.0	0.0
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.0	0.0
3.05	Electric type detonators	----	n.	465.68	0.00	1.98	0.0	922.0
3.06	Blasting connection wire	----	m	197.55	0.00	0.13	0.0	25.7
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.23	0.00	459.99	0.0	104.1
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.23	0.00	808.44	0.0	183.0
3.09	Jumbo drill shank adapter	----	n.	0.39	0.00	302.37	0.0	118.4
3.10	Jumbo drill bit, 48 mm dia.	----	n.	1.25	0.00	150.50	0.0	187.4
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.03	0.00	586.85	0.0	20.1
3.12	Integral drill steel, 800 mm	----	n.	0.13	0.00	132.65	0.0	17.1
3.13	Integral drill steel, 1600 mm	----	n.	0.11	0.00	153.97	0.0	17.4
3.14	Integral drill steel, 2400 mm	----	n.	0.08	0.00	174.35	0.0	14.1
3.15	Breaker tool, moil point	----	n.	0.54	0.00	32.37	0.0	17.4
3.16	Pipeline supports including anchors	----	kg	53.06	1.38	3.22	73.2	170.8
3.17	Cable tray including supports and anchors	----	m	21.22	0.35	0.83	7.5	17.5
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	21.22	0.79	7.11	16.8	150.9
	Sub-total						6,014	19,246
	Missing items and construction contingencies	%		2.00%			120	385
	Total Direct Costs						6,134	19,631
	Overheads, risks and profit	%		52.00%			1,340	12,058
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	646			11.56	49.03
	AGGREGATE UNIT PRICE		m³					60.59

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P3 - (ROCK CLASS V)

SEC 2.02
 ANA 003
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	15.67	0.00	47.25	0.00	740.63
1.02	Gang foreman	1	h	156.75	6.60	0.00	1,034.53	0.00
1.03	Tunnel specialist	1	h	156.75	0.00	45.38	0.00	7,113.17
1.04	Tunneling jumbo operator	1	h	156.75	5.82	0.00	912.27	0.00
1.05	Loader operator	1	h	156.75	5.82	0.00	912.27	0.00
1.06	Operator of dumper and other units	---	h	137.66	5.82	0.00	801.20	0.00
1.07	Miner	3	h	470.24	2.99	0.00	1,406.02	0.00
1.08	Explosive specialist	1	h	156.75	3.69	0.00	578.40	0.00
1.09	Electrician	0.33	h	52.24	3.69	0.00	192.78	0.00
1.10	Mechanic	0.33	h	52.24	3.69	0.00	192.78	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	6.22	3.69	0.00	22.95	0.00
1.12	Pipe fitter	0.33	h	52.24	3.69	0.00	192.78	0.00
1.13	Helper	4.0	h	626.99	2.38	0.00	1,492.23	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.27	0.00	12,651.92	0.00	3,442.97
		---	h	33.27	1.95	50.77	64.88	1,689.28
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.82	0.00	187.16	0.00	152.80
		---	h	7.59	0.07	1.53	0.53	11.61
2.03	Hand-held rock drill, light weight type	2	m.th	0.54	0.00	130.63	0.00	71.10
		---	hr	11.39	0.04	2.03	0.46	23.12
2.04	Hand-held breaker, medium weight type	2	m.th	0.54	0.00	46.95	0.00	25.55
		---	h	40.49	0.03	0.91	1.21	36.84
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	156.75	0.15	24.64	23.51	3,862.24
		s.b	h	31.35	0.00	5.46	0.00	171.17
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	19.59	0.20	40.08	3.92	785.30
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.27	0.00	8,943.66	0.00	2,433.84
		---	h	25.80	1.30	33.65	33.54	868.11
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	75.17	0.63	62.22	47.36	4,677.12
		s.b	h	15.03	0.00	28.86	0.00	433.89
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.27	0.00	440.40	0.00	119.85
		---	h	156.75	0.12	9.00	18.81	1,410.72
2.11	Halogen flood light, 1000 W	1	m.th	0.27	0.00	79.92	0.00	21.75
		---	h	156.75	0.01	0.43	1.57	67.40
2.12	Halogen flood light, 2000 W	1	m.th	0.27	0.00	92.77	0.00	25.25
		---	h	156.75	0.01	0.48	1.57	75.24
2.13	Ligthing line along tunnel, 100 m section	4.0	m.th	1.09	0.00	130.82	0.00	142.55
		---	h	627.65	0.01	0.41	6.28	257.33
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	29.39	0.15	18.51	4.41	544.01
		s.b	h	5.88	0.00	7.46	0.00	43.85
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	15.32	0.32	29.23	4.90	447.83
		s.b	h	3.06	0.00	12.36	0.00	37.87
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	34.94	0.26	24.87	9.09	869.05
		s.b	h	6.99	0.00	15.28	0.00	106.79
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	5.27	0.63	48.81	3.32	257.03
		s.b	h	1.05	0.00	20.84	0.00	21.95
Total to carry forward ----->>							7,964	30,987

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P3 - (ROCK CLASS V)**

**SEC 2.02
ANA 003
RC V - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						7,964	30,987
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.27	0.00	82.94	0.00	22.57
		---	h	1.36	0.01	4.39	0.01	5.97
2.19	Integral drill steel grinder	---	h	1.27	0.01	2.29	0.01	2.90
2.20	Button bits grinder	---	h	3.92	0.04	5.32	0.16	20.84
2.21	Breaker moil point resharpenner	---	h	0.42	0.01	1.57	0.00	0.66
2.22	Steel structure for ventilation fan support	1.0	m.th	0.27	0.14	33.45	0.04	9.10
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	4.0	do	1.09	1.51	102.31	1.65	111.48
2.24	Compressed air tank, 4 m3 capacity	2	do	0.49	1.07	105.20	0.52	51.55
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4.0	do	1.09	0.14	13.13	0.15	14.31
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	4.0	do	1.09	0.24	22.33	0.26	24.33
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.27	2.37	278.28	0.64	75.73
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	8.0	do	2.18	0.38	38.10	0.83	83.03
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.54	0.24	27.23	0.13	14.82
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	113.36	2.31	0.00	261.87	0.00
3.02	Explosive, gramonite type	----	kg	1020.27	2.06	0.00	2,101.75	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	881.46	0.00	1.98	0.00	1,745.29
3.06	Blasting connection wire	----	m	383.02	0.00	0.13	0.00	49.79
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.35	0.00	459.99	0.00	159.30
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.35	0.00	808.44	0.00	279.97
3.09	Jumbo drill shank adapter	----	n.	0.60	0.00	302.37	0.00	181.11
3.10	Jumbo drill bit, 48 mm dia.	----	n.	1.90	0.00	150.50	0.00	286.66
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.05	0.00	586.85	0.00	31.47
3.12	Integral drill steel, 800 mm	----	n.	0.20	0.00	132.65	0.00	26.85
3.13	Integral drill steel, 1600 mm	----	n.	0.18	0.00	153.97	0.00	27.27
3.14	Integral drill steel, 2400 mm	----	n.	0.13	0.00	174.35	0.00	22.06
3.15	Breaker tool, moil point	----	n.	0.84	0.00	32.37	0.00	27.30
3.16	Pipeline supports including anchors	----	kg	83.09	1.38	3.22	114.66	267.54
3.17	Cable tray including supports and anchors	----	m	33.23	0.35	0.83	11.77	27.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	33.23	0.79	7.11	26.26	236.30
	Sub-total						10,484	34,793
	Missing items and construction contingencies	%		2.00%			210	696
	Total Direct Costs						10,694	35,489
	Overheads, risks and profit	%		52.00%			2,401	21,613
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	1,012			12.94	56.42
	AGGREGATE UNIT PRICE		m³					69.35

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P11 - (ROCK CLASS III)**

**SEC 2.02
ANA 004
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	191.17	0.00	47.25	0.00	9,032.92
1.02	Gang foreman	1	hr	1,911.73	6.60	0.00	12,617.41	0.00
1.03	Tunnel specialist	1	hr	1,162.79	0.00	45.38	0.00	52,767.33
1.04	Tunneling jumbo operator	1	hr	1,162.79	5.82	0.00	6,767.43	0.00
1.05	Loader operator	---	hr	312.56	5.82	0.00	1,819.10	0.00
1.06	Operator of dumpers and other units	---	h	1,280.22	5.82	0.00	7,450.89	0.00
1.07	Miner	5	hr	5,813.94	2.99	0.00	17,383.68	0.00
1.08	Explosive specialist	1	hr	1,162.79	3.69	0.00	4,290.69	0.00
1.09	Electrician	0.33	hr	387.21	3.69	0.00	1,428.80	0.00
1.10	Mechanic	0.33	hr	387.21	3.69	0.00	1,428.80	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	83.85	3.69	0.00	309.40	0.00
1.12	Pipe fitter	0.33	hr	387.21	3.69	0.00	1,428.80	0.00
1.13	Helper	6	hr	6,976.73	2.38	0.00	16,604.62	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	2.02	0.00	21,868.22	0.00	44,146.02
		---	h	150.31	3.71	122.14	557.66	18,359.04
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	10.09	0.00	187.16	0.00	1,889.13
		---	h	153.30	0.07	1.53	10.73	234.54
2.03	Hand-held rock drill, medium weight type	4	m.th	8.07	0.00	130.63	0.00	1,054.83
		---	h	229.95	0.04	2.03	9.20	466.79
2.04	Hand-held breaker, medium weight type	5	m.th	10.09	0.00	46.95	0.00	473.90
		---	h	490.55	0.03	0.91	14.72	446.40
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,162.79	0.29	77.99	337.21	90,685.86
		s.b	h	232.56	0.00	10.73	0.00	2,495.34
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	260.47	1.05	95.46	273.49	24,864.14
		---	h	52.09	0.00	36.59	0.00	1,906.09
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	46.54	0.70	64.44	32.58	2,999.16
		s.b	h	9.31	0.00	40.23	0.00	374.48
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	763.04	1.12	114.78	854.61	87,582.22
		s.b	h	152.61	0.00	50.07	0.00	7,641.12
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	2.02	0.00	636.14	0.00	1,284.19
		---	h	1,162.79	0.20	14.93	232.56	17,360.43
2.11	Halogen flood light, 1000 W	2	m.th	4.04	0.00	79.92	0.00	322.67
		---	h	2,325.58	0.01	0.43	23.26	1,000.00
2.12	Halogen flood light, 2000 W	2	m.th	4.04	0.00	92.77	0.00	374.56
		---	h	2,325.58	0.01	0.48	23.26	1,116.28
2.13	Ligthing line along tunnel, 100 m section	2.9	m.th	5.85	0.00	130.82	0.00	765.86
		---	h	3,372.09	0.01	0.41	33.72	1,382.56
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	218.02	0.15	18.51	32.70	4,035.60
		s.b	h	43.60	0.00	7.46	0.00	325.29
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	92.47	0.32	29.23	29.59	2,702.99
		s.b	h	18.49	0.00	12.36	0.00	228.59
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	447.03	0.33	30.84	147.52	13,786.38
		s.b	h	89.41	0.00	19.27	0.00	1,722.85
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	90.30	0.63	48.81	56.89	4,407.46
		s.b	h	18.06	0.00	20.84	0.00	376.36
Total to carry forward ----->>>							74,199	398,611

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P11 - (ROCK CLASS III)**

**SEC 2.02
ANA 004
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						74,199	398,611
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	2.02	0.00	128.05	0.00	258.50
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moil point resharpeners	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	2.02	0.14	33.45	0.28	67.53
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	2.9	do	5.85	1.93	130.66	11.30	764.93
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	3.19	2.01	198.33	6.41	632.59
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	2.9	do	5.85	0.20	18.98	1.17	111.11
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3	do	5.85	0.37	34.41	2.17	201.45
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	2.02	3.15	370.12	6.36	747.17
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	2.9	do	5.85	0.55	55.77	3.22	326.50
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	2.9	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	2.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 350 kVA	1	do	0.00	6.29	771.86	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2,207.48	2.31	0.00	5,099.28	0.00
3.02	Explosive, gramonite type	----	kg	19,867.31	2.06	0.00	40,926.66	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	7,079.13	0.00	1.98	0.00	14,016.67
3.06	Blasting connection wire	----	m	2,311.83	0.00	0.13	0.00	300.54
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.95	0.00	459.99	0.00	1,814.85
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.95	0.00	808.44	0.00	3,189.63
3.09	Jumbo drill shank adapter	----	n.	6.82	0.00	302.37	0.00	2,063.32
3.10	Jumbo drill bit, 51 mm dia.	----	n.	21.70	0.00	164.35	0.00	3,566.35
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.46	0.00	586.85	0.00	271.34
3.12	Integral drill steel, 800 mm	----	n.	4.09	0.00	132.65	0.00	542.26
3.13	Integral drill steel, 1600 mm	----	n.	3.58	0.00	153.97	0.00	550.74
3.14	Integral drill steel, 2400 mm	----	n.	2.55	0.00	174.35	0.00	445.46
3.15	Breaker tool, moil point	----	n.	10.22	0.00	32.37	0.00	330.82
3.16	Pipeline supports including anchors	----	kg	725.00	1.38	3.22	1,000.50	2,334.50
3.17	Cable tray including supports and anchors	----	m	290.00	0.35	0.83	102.66	239.54
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	290.00	0.79	7.11	229.10	2,061.90
	Sub-total						121,588	433,449
	Missing items and construction contingencies	%		2.00%			2,432	8,669
	Total Direct Costs						124,020	442,118
	Overheads, risks and profit	%		52.00%			29,439	264,953
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	20,440			7.51	34.59
	AGGREGATE UNIT PRICE		m³					42.10

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS AQDIT P13 - (ROCK CLASS IV)

SEC 2.02
 ANA 005
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	96.20	0.00	47.25	0.00	4,545.63
1.02	Gang foreman	1	h	962.04	6.60	0.00	6,349.46	0.00
1.03	Tunnel specialist	1	h	962.04	0.00	45.38	0.00	43,657.33
1.04	Tunneling jumbo operator	1	h	962.04	5.82	0.00	5,599.07	0.00
1.05	Loader operator	---	h	2.00	5.82	0.00	11.66	0.00
1.06	Operator of dumpers and other units	---	h	803.91	5.82	0.00	4,678.76	0.00
1.07	Miner	4	h	3,848.16	2.99	0.00	11,505.99	0.00
1.08	Explosive specialist	1	h	962.04	3.69	0.00	3,549.92	0.00
1.09	Electrician	0.33	h	320.36	3.69	0.00	1,182.12	0.00
1.10	Mechanic	0.33	h	320.36	3.69	0.00	1,182.12	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	51.70	3.69	0.00	190.79	0.00
1.12	Pipe fitter	0.33	h	320.36	3.69	0.00	1,182.12	0.00
1.13	Helper	5	h	4,810.20	2.38	0.00	11,448.26	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.67	0.00	19,479.66	0.00	32,535.06
		---	h	161.58	3.17	94.80	512.22	15,318.15
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	6.68	0.00	187.16	0.00	1,250.38
		---	h	69.58	0.07	1.53	4.87	106.45
2.03	Hand-held rock drill, medium weight type	3	m.th	5.01	0.00	130.63	0.00	654.54
		---	h	104.37	0.04	2.03	4.17	211.86
2.04	Hand-held breaker, medium weight type	4	m.th	6.68	0.00	46.95	0.00	313.66
		---	h	222.65	0.03	0.91	6.68	202.61
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	962.04	0.15	24.64	144.31	23,704.64
		s.b	h	192.41	0.00	5.46	0.00	1,050.55
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	1.67	0.00	12,874.72	0.00	21,503.44
		---	h	140.77	1.95	55.22	274.50	7,773.19
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	415.55	1.12	114.78	465.42	47,697.25
		s.b	h	83.11	0.00	50.07	0.00	4,161.35
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	1.67	0.00	747.05	0.00	1,247.73
		---	h	962.04	0.29	22.25	278.99	21,405.37
2.11	Halogen flood light, 1000 W	2	m.th	3.34	0.00	79.92	0.00	266.97
		---	h	1,924.08	0.01	0.43	19.24	827.35
2.12	Halogen flood light, 2000 W	1	m.th	1.67	0.00	92.77	0.00	154.95
		---	h	962.04	0.01	0.48	9.62	461.78
2.13	Ligthing line along tunnel, 100 m section	5.0	m.th	8.35	0.00	130.82	0.00	1,092.48
		---	h	4,810.20	0.01	0.41	48.10	1,972.18
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	180.38	0.15	18.51	27.06	3,338.88
		s.b	h	36.08	0.00	7.46	0.00	269.13
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	89.33	0.32	29.23	28.59	2,611.12
		s.b	h	17.87	0.00	12.36	0.00	220.82
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	414.93	0.26	24.87	107.88	10,319.27
		s.b	h	82.99	0.00	15.28	0.00	1,268.02
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	45.56	0.63	48.81	28.70	2,223.90
		s.b	h	9.11	0.00	20.84	0.00	189.90
Total to carry forward ----->>							48,841	252,556

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS AQDIT P13 - (ROCK CLASS IV)**

**SEC 2.02
ANA 005
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						48,841	252,556
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.67	0.00	82.94	0.00	138.53
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.67	0.31	73.58	0.52	122.89
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.0	do	8.35	1.51	102.31	12.61	854.40
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	3.34	1.36	134.52	4.54	449.35
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.0	do	8.35	0.14	13.13	1.17	109.65
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.0	do	8.35	0.37	34.41	3.09	287.36
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.67	2.37	278.28	3.96	464.79
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.0	do	8.35	0.55	55.77	4.59	465.74
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1064.53	2.31	0.00	2,459.05	0.00
3.02	Explosive, gramonite type	----	kg	9580.73	2.06	0.00	19,736.31	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5758.24	0.00	1.98	0.00	11,401.32
3.06	Blasting connection wire	----	m	2233.25	0.00	0.13	0.00	290.32
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.79	0.00	459.99	0.00	1,284.50
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.79	0.00	808.44	0.00	2,257.54
3.09	Jumbo drill shank adapter	----	n.	4.83	0.00	302.37	0.00	1,460.36
3.10	Jumbo drill bit, 51 mm dia.	----	n.	15.36	0.00	164.35	0.00	2,524.17
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.39	0.00	586.85	0.00	227.17
3.12	Integral drill steel, 800 mm	----	n.	1.86	0.00	132.65	0.00	246.12
3.13	Integral drill steel, 1600 mm	----	n.	1.62	0.00	153.97	0.00	249.96
3.14	Integral drill steel, 2400 mm	----	n.	1.16	0.00	174.35	0.00	202.18
3.15	Breaker tool, moi point	----	n.	4.64	0.00	32.37	0.00	150.15
3.16	Pipeline supports including anchors	----	kg	1,250.00	1.38	3.22	1,725.00	4,024.99
3.17	Cable tray including supports and anchors	----	m	500.00	0.35	0.83	177.00	413.00
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	500.00	0.79	7.11	395.00	3,554.99
	Sub-total						73,363	283,735
	Missing items and construction contingencies	%		2.00%			1,467	5,675
	Total Direct Costs						74,831	289,410
	Overheads, risks and profit	%		52.00%			18,941	170,465
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		9,277			10.11	49.57
	AGGREGATE UNIT PRICE	m³						59.68

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P16 - (ROCK CLASS IV)

SEC 2.02
 ANA 006
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	103.05	0.00	47.25	0.00	4,869.29	
1.02	Gang foreman	1	h	1,030.54	6.60	0.00	6,801.55	0.00	
1.03	Tunnel specialist	1	h	1,030.54	0.00	45.38	0.00	46,765.84	
1.04	Tunneling jumbo operator	1	h	1,030.54	5.82	0.00	5,997.73	0.00	
1.05	Loader operator	1	h	1,030.54	5.82	0.00	5,997.73	0.00	
1.06	Operator of dumper and other units	---	h	1,065.06	5.82	0.00	6,198.65	0.00	
1.07	Miner	3	h	3,091.62	2.99	0.00	9,243.93	0.00	
1.08	Explosive specialist	1	h	1,030.54	3.69	0.00	3,802.69	0.00	
1.09	Electrician	0.33	h	343.48	3.69	0.00	1,267.44	0.00	
1.10	Mechanic	0.33	h	343.48	3.69	0.00	1,267.44	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	48.17	3.69	0.00	177.76	0.00	
1.12	Pipe fitter	0.33	h	343.48	3.69	0.00	1,267.44	0.00	
1.13	Helper	4.0	h	4,122.15	2.38	0.00	9,810.73	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.79	0.00	12,651.92	0.00	22,635.92	
		---	h	248.92	1.95	50.77	485.39	12,637.45	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	5.37	0.00	187.16	0.00	1,004.56	
		---	h	52.69	0.07	1.53	3.69	80.62	
2.03	Hand-held rock drill, medium weight type	2	m.th	3.58	0.00	130.63	0.00	467.43	
		---	hr	79.04	0.04	2.03	3.16	160.44	
2.04	Hand-held breaker, medium weight type	2	m.th	3.58	0.00	46.95	0.00	168.00	
		---	h	281.01	0.03	0.91	8.43	255.72	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,030.54	0.15	24.64	154.58	25,392.47	
		s.b	h	206.11	0.00	5.46	0.00	1,125.35	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.79	0.00	8,943.66	0.00	16,001.37	
		---	h	176.92	1.30	33.65	229.99	5,953.31	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	630.82	0.63	62.22	397.42	39,249.68	
		s.b	h	126.16	0.00	28.86	0.00	3,641.10	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	1.79	0.00	440.40	0.00	787.93	
		---	h	1,030.54	0.12	9.00	123.66	9,274.85	
2.11	Halogen flood light, 1000 W	1	m.th	1.79	0.00	79.92	0.00	142.99	
		---	h	1,030.54	0.01	0.43	10.31	443.13	
2.12	Halogen flood light, 2000 W	1	m.th	1.79	0.00	92.77	0.00	165.98	
		---	h	1,030.54	0.01	0.48	10.31	494.66	
2.13	Ligthing line along tunnel, 100 m section	3.1	m.th	5.51	0.00	130.82	0.00	721.03	
		---	h	3,174.68	0.01	0.41	31.75	1,301.62	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	193.23	0.15	18.51	28.98	3,576.61	
		s.b	h	38.65	0.00	7.46	0.00	288.29	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	108.22	0.32	29.23	34.63	3,163.22	
		s.b	h	21.64	0.00	12.36	0.00	267.52	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	358.38	0.26	24.87	93.18	8,912.97	
		s.b	h	71.68	0.00	15.28	0.00	1,095.22	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	35.97	0.63	48.81	22.66	1,755.77	
		s.b	h	7.19	0.00	20.84	0.00	149.93	
Total to carry forward ----->>								53,471	212,950

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P16 - (ROCK CLASS IV)**

**SEC 2.02
ANA 006
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						53,471	212,950
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.79	0.00	82.94	0.00	148.39
		---	h	8.95	0.01	4.39	0.09	39.27
2.19	Integral drill steel grinder	---	h	8.78	0.01	2.29	0.09	20.11
2.20	Button bits grinder	---	h	31.36	0.04	5.32	1.25	166.85
2.21	Breaker moil point resharpenner	---	h	2.93	0.01	1.57	0.03	4.60
2.22	Steel structure for ventilation fan support	1	m.th	1.79	0.14	33.45	0.25	59.85
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	3.1	do	5.51	1.31	89.04	7.22	490.75
2.24	Compressed air tank, 4 m3 capacity	2	do	2.89	1.07	105.20	3.09	304.18
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.1	do	5.51	0.14	13.13	0.77	72.37
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	3.1	do	5.51	0.24	22.33	1.32	123.07
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.79	2.37	278.28	4.24	497.88
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	6.2	do	11.02	0.38	38.10	4.19	419.98
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	3.58	0.24	27.23	0.86	97.44
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	955.45	2.31	0.00	2,207.1	0.0
3.02	Explosive, gramonite type	----	kg	8599.02	2.06	0.00	17,714.0	0.0
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.0	0.0
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.0	0.0
3.05	Electric type detonators	----	n.	5670.49	0.00	1.98	0.0	11,227.6
3.06	Blasting connection wire	----	m	2705.46	0.00	0.13	0.0	351.7
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.77	0.00	459.99	0.0	1,272.3
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.77	0.00	808.44	0.0	2,236.0
3.09	Jumbo drill shank adapter	----	n.	4.78	0.00	302.37	0.0	1,446.5
3.10	Jumbo drill bit, 48 mm dia.	----	n.	15.21	0.00	150.50	0.0	2,289.4
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.47	0.00	586.85	0.0	275.2
3.12	Integral drill steel, 800 mm	----	n.	1.41	0.00	132.65	0.0	186.4
3.13	Integral drill steel, 1600 mm	----	n.	1.23	0.00	153.97	0.0	189.3
3.14	Integral drill steel, 2400 mm	----	n.	0.88	0.00	174.35	0.0	153.1
3.15	Breaker tool, moil point	----	n.	5.85	0.00	32.37	0.0	189.5
3.16	Pipeline supports including anchors	----	kg	770.15	1.38	3.22	1,062.8	2,479.9
3.17	Cable tray including supports and anchors	----	m	308.06	0.35	0.83	109.1	254.5
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	308.06	0.79	7.11	243.4	2,190.3
	Sub-total						74,831	240,137
	Missing items and construction contingencies	%		2.00%			1,497	4,803
	Total Direct Costs						76,328	244,939
	Overheads, risks and profit	%		52.00%			16,706	150,353
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	7,025			13.24	56.27
	AGGREGATE UNIT PRICE		m³					69.51

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P16B - (ROCK CLASS III)**

**SEC 2.02
ANA 007
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	62.38	0.00	47.25	0.00	2,947.58	
1.02	Gang foreman	1	h	623.83	6.60	0.00	4,117.25	0.00	
1.03	Tunnel specialist	1	h	623.83	0.00	45.38	0.00	28,309.23	
1.04	Tunneling jumbo operator	1	h	623.83	5.82	0.00	3,630.67	0.00	
1.05	Loader operator	1	h	623.83	5.82	0.00	3,630.67	0.00	
1.06	Operator of dumper and other units	---	h	488.85	5.82	0.00	2,845.12	0.00	
1.07	Miner	3	h	1,871.48	2.99	0.00	5,595.72	0.00	
1.08	Explosive specialist	1	h	623.83	3.69	0.00	2,301.92	0.00	
1.09	Electrician	0.33	h	207.92	3.69	0.00	767.23	0.00	
1.10	Mechanic	0.33	h	207.92	3.69	0.00	767.23	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	40.76	3.69	0.00	150.39	0.00	
1.12	Pipe fitter	0.33	h	207.92	3.69	0.00	767.23	0.00	
1.13	Helper	4.0	h	2,495.30	2.38	0.00	5,938.82	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.08	0.00	19,475.66	0.00	21,092.75	
		---	h	95.73	3.17	94.80	303.45	9,074.73	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	3.25	0.00	187.16	0.00	608.10	
		---	h	60.76	0.07	1.53	4.25	92.96	
2.03	Hand-held rock drill, medium weight type	2	m.th	2.17	0.00	130.63	0.00	282.95	
		---	hr	91.13	0.04	2.03	3.65	185.00	
2.04	Hand-held breaker, medium weight type	2	m.th	2.17	0.00	46.95	0.00	101.70	
		---	h	324.04	0.03	0.91	9.72	294.87	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	623.83	0.15	24.64	93.57	15,371.08	
		s.b	h	124.77	0.00	5.46	0.00	681.22	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric, 165 diesel Kw)	1	m.th	1.08	0.00	12,874.72	0.00	13,943.73	
		---	h	109.41	1.95	55.22	213.34	6,041.47	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	243.93	1.12	114.78	273.20	27,998.36	
		s.b	h	48.79	0.00	50.07	0.00	2,442.72	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	1.08	0.00	440.40	0.00	476.97	
		---	h	623.83	0.12	9.00	74.86	5,614.44	
2.11	Halogen flood light, 1000 W	1	m.th	1.08	0.00	79.92	0.00	86.56	
		---	h	623.83	0.01	0.43	6.24	268.25	
2.12	Halogen flood light, 2000 W	1	m.th	1.08	0.00	92.77	0.00	100.47	
		---	h	623.83	0.01	0.48	6.24	299.44	
2.13	Ligthing line along tunnel, 100 m section	1.8	m.th	1.93	0.00	130.82	0.00	252.19	
		---	h	1,110.41	0.01	0.41	11.10	455.27	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	116.97	0.15	18.51	17.55	2,165.07	
		s.b	h	23.39	0.00	7.46	0.00	174.52	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	46.45	0.32	29.23	14.86	1,357.78	
		s.b	h	9.29	0.00	12.36	0.00	114.83	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	264.37	0.26	24.87	68.74	6,574.77	
		s.b	h	52.87	0.00	15.28	0.00	807.90	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	37.06	0.63	48.81	23.35	1,808.98	
		s.b	h	7.41	0.00	20.84	0.00	154.47	
Total to carry forward ----->>								31,636	150,180

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P16B - (ROCK CLASS III)

SEC 2.02
 ANA 007
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						31,636	150,180
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.08	0.00	82.94	0.00	89.83
		---	h	5.42	0.01	4.39	0.05	23.77
2.19	Integral drill steel grinder	---	h	10.13	0.01	2.29	0.10	23.19
2.20	Button bits grinder	---	h	23.84	0.04	5.32	0.95	126.82
2.21	Breaker moil point resharpenner	---	h	3.38	0.01	1.57	0.03	5.30
2.22	Steel structure for ventilation fan support	1	m.th	1.08	0.14	33.45	0.15	36.23
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	1.8	do	1.93	1.73	117.13	3.34	225.80
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	1.4	do	1.47	1.36	134.52	2.00	197.55
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	1.8	do	1.93	0.14	13.13	0.27	25.31
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	1.8	do	1.93	0.24	22.33	0.46	43.05
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.08	2.37	278.28	2.57	301.39
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	1.8	do	1.93	0.38	38.10	0.73	73.45
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	1.8	do	1.93	0.55	55.77	1.06	107.51
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	1.8	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	2.17	0.24	27.23	0.52	58.98
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.41	Transformer cabin, 200 kVA	2	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	925.93	2.31	0.00	2,138.90	0.00
3.02	Explosive, gramonite type	----	kg	8333.38	2.06	0.00	17,166.76	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3818.22	0.00	1.98	0.00	7,560.08
3.06	Blasting connection wire	----	m	1161.29	0.00	0.13	0.00	150.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.12	0.00	459.99	0.00	977.43
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.12	0.00	808.44	0.00	1,717.85
3.09	Jumbo drill shank adapter	----	n.	3.68	0.00	302.37	0.00	1,111.25
3.10	Jumbo drill bit, 48 mm dia.	----	n.	11.69	0.00	150.50	0.00	1,758.88
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.23	0.00	586.85	0.00	136.30
3.12	Integral drill steel, 800 mm	----	n.	1.62	0.00	132.65	0.00	214.92
3.13	Integral drill steel, 1600 mm	----	n.	1.42	0.00	153.97	0.00	218.28
3.14	Integral drill steel, 2400 mm	----	n.	1.01	0.00	174.35	0.00	176.55
3.15	Breaker tool, moil point	----	n.	6.75	0.00	32.37	0.00	218.52
3.16	Pipeline supports including anchors	----	kg	445.00	1.38	3.22	614.10	1,432.90
3.17	Cable tray including supports and anchors	----	m	178.00	0.35	0.83	63.01	147.03
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	178.00	0.79	7.11	140.62	1,265.58
	Sub-total						51,772	168,605
	Missing items and construction contingencies	%		2.00%			1,035	3,372
	Total Direct Costs						52,807	171,977
	Overheads, risks and profit	%		52.00%			11,689	105,199
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	8,101			7.96	34.22
	AGGREGATE UNIT PRICE		m³					42.18

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P21 - (ROCK CLASS IV)**

**SEC 2.02
ANA 008
RC IV - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	112.14	0.00	47.25	0.00	5,298.74	
1.02	Gang foreman	1	h	1,121.43	6.60	0.00	7,401.42	0.00	
1.03	Tunnel specialist	1	h	1,121.43	0.00	45.38	0.00	50,890.35	
1.04	Tunneling jumbo operator	1	h	1,121.43	5.82	0.00	6,526.70	0.00	
1.05	Loader operator	1	h	1,121.43	5.82	0.00	6,526.70	0.00	
1.06	Operator of dumper and other units	---	h	1,239.57	5.82	0.00	7,214.30	0.00	
1.07	Miner	3	h	3,364.28	2.99	0.00	10,059.20	0.00	
1.08	Explosive specialist	1	h	1,121.43	3.69	0.00	4,138.07	0.00	
1.09	Electrician	0.33	h	373.77	3.69	0.00	1,379.22	0.00	
1.10	Mechanic	0.33	h	373.77	3.69	0.00	1,379.22	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	50.98	3.69	0.00	188.10	0.00	
1.12	Pipe fitter	0.33	h	373.77	3.69	0.00	1,379.22	0.00	
1.13	Helper	4.0	h	4,485.71	2.38	0.00	10,675.98	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.95	0.00	12,651.92	0.00	24,632.30	
		---	h	257.36	1.95	50.77	501.85	13,066.24	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	5.84	0.00	187.16	0.00	1,093.16	
		---	h	61.95	0.07	1.53	4.34	94.79	
2.03	Hand-held rock drill, medium weight type	2	m.th	3.89	0.00	130.63	0.00	508.65	
		---	hr	92.93	0.04	2.03	3.72	188.65	
2.04	Hand-held breaker, medium weight type	2	m.th	3.89	0.00	46.95	0.00	182.82	
		---	h	330.42	0.03	0.91	9.91	300.68	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,121.43	0.15	24.64	168.21	27,631.96	
		s.b	h	224.29	0.00	5.46	0.00	1,224.60	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.95	0.00	8,943.66	0.00	17,412.60	
		---	h	203.95	1.30	33.65	265.13	6,862.84	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	758.63	0.63	62.22	477.94	47,202.06	
		s.b	h	151.73	0.00	28.86	0.00	4,378.82	
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	1.95	0.00	747.05	0.00	1,454.45	
		---	h	1,121.43	0.29	22.25	325.21	24,951.75	
2.11	Halogen flood light, 1000 W	1	m.th	1.95	0.00	79.92	0.00	155.60	
		---	h	1,121.43	0.01	0.43	11.21	482.21	
2.12	Halogen flood light, 2000 W	1	m.th	1.95	0.00	92.77	0.00	180.62	
		---	h	1,121.43	0.01	0.48	11.21	538.28	
2.13	Ligthing line along tunnel, 100 m section	12.0	m.th	23.36	0.00	130.82	0.00	3,056.36	
		---	h	13,457.12	0.01	0.41	134.57	5,517.42	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	210.27	0.15	18.51	31.54	3,892.05	
		s.b	h	42.05	0.00	7.46	0.00	313.72	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	116.13	0.32	29.23	37.16	3,394.45	
		s.b	h	23.23	0.00	12.36	0.00	287.07	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	393.24	0.26	24.87	102.24	9,779.84	
		s.b	h	78.65	0.00	15.28	0.00	1,201.74	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	41.85	0.63	48.81	26.37	2,042.89	
		s.b	h	8.37	0.00	20.84	0.00	174.45	
Total to carry forward ----->>								58,979	258,392

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE
UNDERGROUND EXCAVATION - TUNNELS - (ROCK CLASS IV)**

**SEC 2.02
ANA 008
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						58,979	258,392	
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.95	0.00	82.94	0.00	161.48	
		---	h	9.73	0.01	4.39	0.10	42.73	
2.19	Integral drill steel grinder	---	h	10.33	0.01	2.29	0.10	23.65	
2.20	Button bits grinder	---	h	32.15	0.04	5.32	1.29	171.06	
2.21	Breaker moil point resharpenner	---	h	3.44	0.01	1.57	0.03	5.40	
2.22	Steel structure for ventilation fan support	1	m.th	1.95	0.31	73.58	0.60	143.25	
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	12.0	do	23.36	1.51	102.31	35.28	2,390.27	
2.24	Compressed air tank, 4 m3 capacity	3	do	6.62	1.07	105.20	7.08	696.37	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12.0	do	23.36	0.14	13.13	3.27	306.76	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	12.0	do	23.36	0.24	22.33	5.61	521.70	
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	1.95	2.37	278.28	4.61	541.79	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	24.0	do	46.73	0.38	38.10	17.76	1,780.27	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12.0	do	0.00	0.14	13.50	0.00	0.00	
2.37	Control board, 10 KVA	2	do	3.89	0.24	27.23	0.93	106.03	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00	
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	1053.20	2.31	0.00	2,432.9	0.0	
3.02	Explosive, gramonite type	----	kg	9478.83	2.06	0.00	19,526.4	0.0	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.0	0.0	
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.0	0.0	
3.05	Electric type detonators	----	n.	5796.44	0.00	1.98	0.0	11,476.9	
3.06	Blasting connection wire	----	m	2903.23	0.00	0.13	0.0	377.4	
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.83	0.00	459.99	0.0	1,302.5	
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.83	0.00	808.44	0.0	2,289.2	
3.09	Jumbo drill shank adapter	----	n.	4.90	0.00	302.37	0.0	1,480.8	
3.10	Jumbo drill bit, 48 mm dia.	----	n.	15.57	0.00	150.50	0.0	2,343.9	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.50	0.00	586.85	0.0	295.3	
3.12	Integral drill steel, 800 mm	----	n.	1.65	0.00	132.65	0.0	219.1	
3.13	Integral drill steel, 1600 mm	----	n.	1.45	0.00	153.97	0.0	222.6	
3.14	Integral drill steel, 2400 mm	----	n.	1.03	0.00	174.35	0.0	180.0	
3.15	Breaker tool, moil point	----	n.	6.88	0.00	32.37	0.0	222.8	
3.16	Pipeline supports including anchors	----	kg	3,000.00	1.38	3.22	4,140.0	9,660.0	
3.17	Cable tray including supports and anchors	----	m	1,200.00	0.35	0.83	424.8	991.2	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,200.00	0.79	7.11	948.0	8,532.0	
Sub-total							86,528	304,877	
Missing items and construction contingencies		%		2.00%	----->>		1,731	6,098	
Total Direct Costs							88,258	310,974	
Overheads, risks and profit		%		52.00%	----->>		20,760	186,841	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	8,260	----->>		13.20	60.27
AGGREGATE UNIT PRICE				m³	----->>		73.46		

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE
UNDERGROUND EXCAVATION - ACCESS ADIT P23 - (ROCK CLASS IV)**

**SEC 2.02
ANA 009
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	219.04	0.00	47.25	0.00	10,349.66
1.02	Gang foreman	1	h	2,190.41	6.60	0.00	14,456.67	0.00
1.03	Tunnel specialist	1	h	2,190.41	0.00	45.38	0.00	99,400.58
1.04	Tunneling jumbo operator	1	h	2,190.41	5.82	0.00	12,748.16	0.00
1.05	Loader operator	1	h	2,190.41	5.82	0.00	12,748.16	0.00
1.06	Operator of dumper and other units	---	h	2,323.35	5.82	0.00	13,521.88	0.00
1.07	Miner	3	h	6,571.22	2.99	0.00	19,647.93	0.00
1.08	Explosive specialist	1	h	2,190.41	3.69	0.00	8,082.59	0.00
1.09	Electrician	0.33	h	730.06	3.69	0.00	2,693.93	0.00
1.10	Mechanic	0.33	h	730.06	3.69	0.00	2,693.93	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	105.24	3.69	0.00	388.33	0.00
1.12	Pipe fitter	0.33	h	730.06	3.69	0.00	2,693.93	0.00
1.13	Helper	4.0	h	8,761.62	2.38	0.00	20,852.66	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	3.80	0.00	12,651.92	0.00	48,112.55
		---	h	526.37	1.95	50.77	1,026.43	26,724.01
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	11.41	0.00	187.16	0.00	2,135.19
		---	h	122.55	0.07	1.53	8.58	187.50
2.03	Hand-held rock drill, medium weight type	2	m.th	7.61	0.00	130.63	0.00	993.52
		---	hr	183.82	0.04	2.03	7.35	373.15
2.04	Hand-held breaker, medium weight type	2	m.th	7.61	0.00	46.95	0.00	357.08
		---	h	653.58	0.03	0.91	19.61	594.76
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	2,190.41	0.15	24.64	328.56	53,971.58
		s.b	h	438.08	0.00	5.46	0.00	2,391.92
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	3.80	0.00	8,943.66	0.00	34,010.83
		---	h	397.15	1.30	33.65	516.30	13,364.10
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	1,405.40	0.63	62.22	885.40	87,444.23
		s.b	h	281.08	0.00	28.86	0.00	8,111.99
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	3.80	0.00	636.14	0.00	2,419.10
		---	h	2,190.41	0.20	14.93	438.08	32,702.75
2.11	Halogen flood light, 1000 W	1	m.th	3.80	0.00	79.92	0.00	303.92
		---	h	2,190.41	0.01	0.43	21.90	941.87
2.12	Halogen flood light, 2000 W	1	m.th	3.80	0.00	92.77	0.00	352.78
		---	h	2,190.41	0.01	0.48	21.90	1,051.39
2.13	Ligthing line along tunnel, 100 m section	8.6	m.th	32.75	0.00	130.82	0.00	4,284.15
		---	h	18,863.11	0.01	0.41	188.63	7,733.88
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	410.70	0.15	18.51	61.61	7,602.07
		s.b	h	82.14	0.00	7.46	0.00	612.77
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	213.98	0.32	29.23	68.47	6,254.64
		s.b	h	42.80	0.00	12.36	0.00	528.96
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	799.78	0.26	24.87	207.94	19,890.49
		s.b	h	159.96	0.00	15.28	0.00	2,444.12
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	82.05	0.63	48.81	51.69	4,004.78
		s.b	h	16.41	0.00	20.84	0.00	341.98
Total to carry forward ----->>							114,381	479,992

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE
UNDERGROUND EXCAVATION - ACCESS ADIT P23 - (ROCK CLASS IV)**

**SEC 2.02
ANA 009
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						114,381	479,992
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	3.80	0.00	82.94	0.00	315.40
		---	h	19.01	0.01	4.39	0.19	83.47
2.19	Integral drill steel grinder	---	h	20.42	0.01	2.29	0.20	46.77
2.20	Button bits grinder	---	h	67.28	0.04	5.32	2.69	357.90
2.21	Breaker moil point resharpenner	---	h	6.81	0.01	1.57	0.07	10.69
2.22	Steel structure for ventilation fan support	1	m.th	3.80	0.31	73.58	1.18	279.81
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	8.6	do	32.75	1.51	102.31	49.45	3,350.49
2.24	Compressed air tank, 4 m3 capacity	3	do	10.35	1.07	105.20	11.08	1,089.08
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	8.6	do	32.75	0.14	13.13	4.58	429.99
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	8.6	do	32.75	0.24	22.33	7.86	731.27
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.80	2.37	278.28	9.01	1,058.24
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	17.2	do	65.50	0.38	38.10	24.89	2,495.43
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	8.6	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	7.61	0.24	27.23	1.83	207.10
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1999.96	2.31	0.00	4,619.9	0.0
3.02	Explosive, gramonite type	----	kg	17999.64	2.06	0.00	37,079.3	0.0
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.0	0.0
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.0	0.0
3.05	Electric type detonators	----	n.	12224.23	0.00	1.98	0.0	24,204.0
3.06	Blasting connection wire	----	m	5349.50	0.00	0.13	0.0	695.4
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	5.95	0.00	459.99	0.0	2,735.7
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	5.95	0.00	808.44	0.0	4,808.1
3.09	Jumbo drill shank adapter	----	n.	10.29	0.00	302.37	0.0	3,110.3
3.10	Jumbo drill bit, 48 mm dia.	----	n.	32.71	0.00	150.50	0.0	4,922.9
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.93	0.00	586.85	0.0	544.2
3.12	Integral drill steel, 800 mm	----	n.	3.27	0.00	132.65	0.0	433.5
3.13	Integral drill steel, 1600 mm	----	n.	2.86	0.00	153.97	0.0	440.3
3.14	Integral drill steel, 2400 mm	----	n.	2.04	0.00	174.35	0.0	356.1
3.15	Breaker tool, moil point	----	n.	13.62	0.00	32.37	0.0	440.8
3.16	Pipeline supports including anchors	----	kg	2,152.92	1.38	3.22	2,971.0	6,932.4
3.17	Cable tray including supports and anchors	----	m	861.17	0.35	0.83	304.9	711.3
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	861.17	0.79	7.11	680.3	6,122.9
	Sub-total						160,149	546,906
	Missing items and construction contingencies	%		2.00%			3,203	10,938
	Total Direct Costs						163,352	557,844
	Overheads, risks and profit	%		52.00%			37,502	337,520
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	16,340			12.29	54.80
	AGGREGATE UNIT PRICE		m³					67.09

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADITS P25 &25' - (ROCK CLASS III)**

**SEC 2.02
ANA 010
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	252.95	0.00	47.25	0.00	11,952.00	
1.02	Gang foreman	1	h	2,529.52	6.60	0.00	16,694.86	0.00	
1.03	Tunnel specialist	1	h	2,529.52	0.00	45.38	0.00	114,789.83	
1.04	Tunneling jumbo operator	1	h	2,529.52	5.82	0.00	14,721.83	0.00	
1.05	Loader operator	1	h	2,529.52	5.82	0.00	14,721.83	0.00	
1.06	Operator of dumper and other units	---	h	2,188.30	5.82	0.00	12,735.88	0.00	
1.07	Miner	3	h	7,588.57	2.99	0.00	22,689.84	0.00	
1.08	Explosive specialist	1	h	2,529.52	3.69	0.00	9,333.95	0.00	
1.09	Electrician	0.33	h	843.09	3.69	0.00	3,111.00	0.00	
1.10	Mechanic	0.33	h	843.09	3.69	0.00	3,111.00	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	180.60	3.69	0.00	666.43	0.00	
1.12	Pipe fitter	0.33	h	843.09	3.69	0.00	3,111.00	0.00	
1.13	Helper	4.0	h	10,118.10	2.38	0.00	24,081.08	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	4.39	0.00	19,475.66	0.00	85,528.06	
		---	h	448.10	3.17	94.80	1,420.48	42,480.09	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	13.17	0.00	187.16	0.00	2,465.76	
		---	h	254.99	0.07	1.53	17.85	390.14	
2.03	Hand-held rock drill, medium weight type	2	m.th	8.78	0.00	130.63	0.00	1,147.33	
		---	hr	382.49	0.04	2.03	15.30	776.46	
2.04	Hand-held breaker, medium weight type	2	m.th	8.78	0.00	46.95	0.00	412.37	
		---	h	1,359.97	0.03	0.91	40.80	1,237.57	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	2,529.52	0.15	24.64	379.43	62,327.49	
		s.b	h	505.90	0.00	5.46	0.00	2,762.24	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric, 165 diesel Kw)	1	m.th	4.39	0.00	12,874.72	0.00	56,539.80	
		---	h	467.37	1.95	55.22	911.37	25,808.25	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	1,119.38	1.12	114.78	1,253.70	128,482.17	
		s.b	h	223.88	0.00	50.07	0.00	11,209.45	
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	4.39	0.00	747.05	0.00	3,280.70	
		---	h	2,529.52	0.29	22.25	733.56	56,281.92	
2.11	Halogen flood light, 1000 W	1	m.th	4.39	0.00	79.92	0.00	350.97	
		---	h	2,529.52	0.01	0.43	25.30	1,087.70	
2.12	Halogen flood light, 2000 W	1	m.th	4.39	0.00	92.77	0.00	407.40	
		---	h	2,529.52	0.01	0.48	25.30	1,214.17	
2.13	Ligthing line along tunnel, 100 m section	7.2	m.th	31.57	0.00	130.82	0.00	4,130.09	
		---	h	18,184.75	0.01	0.41	181.85	7,455.75	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	474.29	0.15	18.51	71.14	8,779.03	
		s.b	h	94.86	0.00	7.46	0.00	707.63	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	240.39	0.32	29.23	76.92	7,026.51	
		s.b	h	48.08	0.00	12.36	0.00	594.24	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	1,123.28	0.26	24.87	292.05	27,935.98	
		s.b	h	224.66	0.00	15.28	0.00	3,432.74	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	155.31	0.63	48.81	97.84	7,580.65	
		s.b	h	31.06	0.00	20.84	0.00	647.33	
Total to carry forward ----->>								130,522	679,222

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADITS P25 &25' - (ROCK CLASS III)**

**SEC 2.02
ANA 010
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						130,522	679,222
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	4.39	0.00	82.94	0.00	364.23
		---	h	21.96	0.01	4.39	0.22	96.39
2.19	Integral drill steel grinder	---	h	42.50	0.01	2.29	0.42	97.32
2.20	Button bits grinder	---	h	108.00	0.04	5.32	4.32	574.58
2.21	Breaker moil point resharpenner	---	h	14.17	0.01	1.57	0.14	22.24
2.22	Steel structure for ventilation fan support	1	m.th	4.39	0.31	73.58	1.36	323.13
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	7.2	do	31.57	1.73	117.13	54.62	3,697.88
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2.4	do	10.71	1.36	134.52	14.56	1,440.13
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.2	do	31.57	0.14	13.13	4.42	414.52
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	7.2	do	31.57	0.24	22.33	7.58	704.97
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	4.39	2.37	278.28	10.41	1,222.08
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7.2	do	31.57	0.38	38.10	12.00	1,202.85
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.2	do	31.57	0.55	55.77	17.36	1,760.70
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	8.78	0.24	27.23	2.11	239.16
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 350 kVA	0	do	0.00	6.29	771.86	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3977.90	2.31	0.00	9,188.95	0.00
3.02	Explosive, gramonite type	----	kg	35801.12	2.06	0.00	73,750.31	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	17199.36	0.00	1.98	0.00	34,054.73
3.06	Blasting connection wire	----	m	6009.68	0.00	0.13	0.00	781.26
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	9.60	0.00	459.99	0.00	4,415.90
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	9.60	0.00	808.44	0.00	7,761.03
3.09	Jumbo drill shank adapter	----	n.	16.60	0.00	302.37	0.00	5,020.48
3.10	Jumbo drill bit, 48 mm dia.	----	n.	52.80	0.00	150.50	0.00	7,946.40
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.20	0.00	586.85	0.00	705.36
3.12	Integral drill steel, 800 mm	----	n.	6.80	0.00	132.65	0.00	902.00
3.13	Integral drill steel, 1600 mm	----	n.	5.95	0.00	153.97	0.00	916.10
3.14	Integral drill steel, 2400 mm	----	n.	4.25	0.00	174.35	0.00	740.97
3.15	Breaker tool, moil point	----	n.	28.33	0.00	32.37	0.00	917.13
3.16	Pipeline supports including anchors	----	kg	1,797.25	1.38	3.22	2,480.20	5,787.14
3.17	Cable tray including supports and anchors	----	m	718.90	0.35	0.83	254.49	593.81
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	718.90	0.79	7.11	567.93	5,111.38
	Sub-total						216,893	767,036
	Missing items and construction contingencies	%		2.00%			4,338	15,341
	Total Direct Costs						221,231	782,376
	Overheads, risks and profit	%		52.00%			52,188	469,688
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	33,999			8.04	36.83
	AGGREGATE UNIT PRICE		m³					44.87

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P25A - (ROCK CLASS III)

SEC 2.02
 ANA 011
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	110.23	0.00	47.25	0.00	5,208.31	
1.02	Gang foreman	1	hr	1,102.29	6.60	0.00	7,275.10	0.00	
1.03	Tunnel specialist	1	hr	674.10	0.00	45.38	0.00	30,590.61	
1.04	Tunneling jumbo operator	1	hr	674.10	5.82	0.00	3,923.26	0.00	
1.05	Loader operator	---	hr	181.99	5.82	0.00	1,059.21	0.00	
1.06	Operator of dumpers and other units	---	h	683.02	5.82	0.00	3,975.19	0.00	
1.07	Miner	5	hr	3,370.49	2.99	0.00	10,077.78	0.00	
1.08	Explosive specialist	1	hr	674.10	3.69	0.00	2,487.42	0.00	
1.09	Electrician	0.33	hr	224.47	3.69	0.00	828.31	0.00	
1.10	Mechanic	0.33	hr	224.47	3.69	0.00	828.31	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	47.06	3.69	0.00	173.64	0.00	
1.12	Pipe fitter	0.33	hr	224.47	3.69	0.00	828.31	0.00	
1.13	Helper	6	hr	4,044.59	2.38	0.00	9,626.13	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.17	0.00	21,868.22	0.00	25,592.61	
		---	h	81.38	3.71	122.14	301.92	9,939.91	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	5.85	0.00	187.16	0.00	1,095.18	
		---	h	90.33	0.07	1.53	6.32	138.21	
2.03	Hand-held rock drill, medium weight type	4	m.th	4.68	0.00	130.63	0.00	611.51	
		---	h	135.50	0.04	2.03	5.42	275.07	
2.04	Hand-held breaker, medium weight type	5	m.th	5.85	0.00	46.95	0.00	274.73	
		---	h	289.07	0.03	0.91	8.67	263.05	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	674.10	0.29	77.99	195.49	52,572.97	
		s.b	h	134.82	0.00	10.73	0.00	1,446.62	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	151.66	1.05	95.46	159.24	14,477.64	
		---	h	30.33	0.00	36.59	0.00	1,109.86	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	24.88	0.70	64.44	17.42	1,603.49	
		s.b	h	4.98	0.00	40.23	0.00	200.21	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	392.24	1.12	114.78	439.31	45,021.10	
		s.b	h	78.45	0.00	50.07	0.00	3,927.87	
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	1.17	0.00	747.05	0.00	874.28	
		---	h	674.10	0.29	22.25	195.49	14,998.70	
2.11	Halogen flood light, 1000 W	2	m.th	2.34	0.00	79.92	0.00	187.06	
		---	h	1,348.20	0.01	0.43	13.48	579.73	
2.12	Halogen flood light, 2000 W	2	m.th	2.34	0.00	92.77	0.00	217.14	
		---	h	1,348.20	0.01	0.48	13.48	647.13	
2.13	Ligthing line along tunnel, 100 m section	5.7	m.th	6.73	0.00	130.82	0.00	880.10	
		---	h	3,875.06	0.01	0.41	38.75	1,588.77	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	126.39	0.15	18.51	18.96	2,339.54	
		s.b	h	25.28	0.00	7.46	0.00	188.58	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	49.40	0.32	29.23	15.81	1,443.90	
		s.b	h	9.88	0.00	12.36	0.00	122.11	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	251.08	0.33	30.84	82.86	7,743.37	
		s.b	h	50.22	0.00	19.27	0.00	967.67	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	52.90	0.63	48.81	33.33	2,582.04	
		s.b	h	10.58	0.00	20.84	0.00	220.49	
Total to carry forward ----->>>								42,629	229,930

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P25A - (ROCK CLASS III)

SEC 2.02
 ANA 011
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						42,629	229,930
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.17	0.00	128.05	0.00	149.86
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moil point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.17	0.31	73.58	0.36	86.11
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	5.7	do	6.73	2.21	149.88	14.87	1,008.32
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	2.52	2.01	198.33	5.06	498.96
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	5.7	do	6.73	0.20	18.98	1.35	127.69
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6	do	6.73	0.37	34.41	2.49	231.49
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.17	3.15	370.12	3.69	433.16
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	5.7	do	6.73	0.38	38.10	2.56	256.32
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.7	do	6.73	0.55	55.77	3.70	375.19
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	5.7	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	833.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1,246.62	2.31	0.00	2,879.69	0.00
3.02	Explosive, gramonite type	----	kg	11,219.58	2.06	0.00	23,112.34	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3,861.83	0.00	1.98	0.00	7,646.43
3.06	Blasting connection wire	----	m	1,234.95	0.00	0.13	0.00	160.54
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.15	0.00	459.99	0.00	989.61
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.15	0.00	808.44	0.00	1,739.25
3.09	Jumbo drill shank adapter	----	n.	3.72	0.00	302.37	0.00	1,125.09
3.10	Jumbo drill bit, 51 mm dia.	----	n.	11.83	0.00	164.35	0.00	1,944.67
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.25	0.00	586.85	0.00	144.95
3.12	Integral drill steel, 800 mm	----	n.	2.41	0.00	132.65	0.00	319.54
3.13	Integral drill steel, 1600 mm	----	n.	2.11	0.00	153.97	0.00	324.54
3.14	Integral drill steel, 2400 mm	----	n.	1.51	0.00	174.35	0.00	262.50
3.15	Breaker tool, moil point	----	n.	6.02	0.00	32.37	0.00	194.94
3.16	Pipeline supports including anchors	----	kg	1,437.12	1.38	3.22	1,983.23	4,627.54
3.17	Cable tray including supports and anchors	----	m	574.85	0.35	0.83	203.50	474.83
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	574.85	0.79	7.11	454.13	4,087.18
Sub-total							71,296	257,138
Missing items and construction contingencies		%	2.00%				1,426	5,143
Total Direct Costs							72,721	262,281
Overheads, risks and profit		%	52.00%				17,420	156,781
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	12,045		7.48	34.79
AGGREGATE UNIT PRICE				m³				42.28

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P28 - (ROCK CLASS III)

SEC 2.02
 ANA 012
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	108.29	0.00	47.25	0.00	5,116.50	
1.02	Gang foreman	1	h	1,082.86	6.60	0.00	7,146.86	0.00	
1.03	Tunnel specialist	1	h	1,082.86	0.00	45.38	0.00	49,140.09	
1.04	Tunneling jumbo operator	1	h	1,082.86	5.82	0.00	6,302.23	0.00	
1.05	Loader operator	1	h	1,082.86	5.82	0.00	6,302.23	0.00	
1.06	Operator of dumper and other units	---	h	1,278.72	5.82	0.00	7,442.13	0.00	
1.07	Miner	3	h	3,248.57	2.99	0.00	9,713.23	0.00	
1.08	Explosive specialist	1	h	1,082.86	3.69	0.00	3,995.75	0.00	
1.09	Electrician	0.33	h	360.92	3.69	0.00	1,331.78	0.00	
1.10	Mechanic	0.33	h	360.92	3.69	0.00	1,331.78	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	61.98	3.69	0.00	228.72	0.00	
1.12	Pipe fitter	0.33	h	360.92	3.69	0.00	1,331.78	0.00	
1.13	Helper	4.0	h	4,331.43	2.38	0.00	10,308.81	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.88	0.00	12,651.92	0.00	23,785.12	
		---	h	276.34	1.95	50.77	538.86	14,029.64	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	5.64	0.00	187.16	0.00	1,055.56	
		---	h	80.23	0.07	1.53	5.62	122.75	
2.03	Hand-held rock drill, medium weight type	2	m.th	3.76	0.00	130.63	0.00	491.16	
		---	hr	120.34	0.04	2.03	4.81	244.30	
2.04	Hand-held breaker, medium weight type	2	m.th	3.76	0.00	46.95	0.00	176.53	
		---	h	427.89	0.03	0.91	12.84	389.38	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,082.86	0.15	24.64	162.43	26,681.62	
		s.b	h	216.57	0.00	5.46	0.00	1,182.48	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	1.88	0.00	12,874.72	0.00	24,203.98	
		---	h	154.84	1.95	55.22	301.93	8,550.05	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	812.28	0.63	62.22	511.74	50,540.15	
		s.b	h	162.46	0.00	28.86	0.00	4,688.49	
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	1.88	0.00	747.05	0.00	1,404.43	
		---	h	1,082.86	0.29	22.25	314.03	24,093.59	
2.11	Halogen flood light, 1000 W	1	m.th	1.88	0.00	79.92	0.00	150.25	
		---	h	1,082.86	0.01	0.43	10.83	465.63	
2.12	Halogen flood light, 2000 W	1	m.th	1.88	0.00	92.77	0.00	174.40	
		---	h	1,082.86	0.01	0.48	10.83	519.77	
2.13	Ligthing line along tunnel, 100 m section	7.6	m.th	14.22	0.00	130.82	0.00	1,860.24	
		---	h	8,190.63	0.01	0.41	81.91	3,358.16	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	203.04	0.15	18.51	30.46	3,758.19	
		s.b	h	40.61	0.00	7.46	0.00	302.93	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	96.94	0.32	29.23	31.02	2,833.61	
		s.b	h	19.39	0.00	12.36	0.00	239.64	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	413.97	0.26	24.87	107.63	10,295.55	
		s.b	h	82.79	0.00	15.28	0.00	1,265.11	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	50.21	0.63	48.81	31.63	2,450.77	
		s.b	h	10.04	0.00	20.84	0.00	209.28	
Total to carry forward ----->>								57,592	263,779

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P28 - (ROCK CLASS III)**

**SEC 2.02
ANA 012
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						57,592	263,779
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.88	0.00	82.94	0.00	155.92
		---	h	9.40	0.01	4.39	0.09	41.27
2.19	Integral drill steel grinder	---	h	13.37	0.01	2.29	0.13	30.62
2.20	Button bits grinder	---	h	38.28	0.04	5.32	1.53	203.66
2.21	Breaker moil point resharpen	---	h	4.46	0.01	1.57	0.04	7.00
2.22	Steel structure for ventilation fan support	1	m.th	1.88	0.31	73.58	0.58	138.33
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	7.6	do	14.22	1.51	102.31	21.47	1,454.83
2.24	Compressed air tank, 4 m3 capacity	3	do	4.72	1.07	105.20	5.05	496.96
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.6	do	14.22	0.14	13.13	1.99	186.71
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	7.6	do	14.22	0.24	22.33	3.41	317.53
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.88	2.37	278.28	4.46	523.16
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	15.1	do	28.44	0.38	38.10	10.81	1,083.55
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.6	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	3.76	0.24	27.23	0.90	102.38
2.38	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 100 KVA	0	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	1	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1299.71	2.31	0.00	3,002.32	0.00
3.02	Explosive, gramonite type	----	kg	11697.35	2.06	0.00	24,096.53	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	6057.19	0.00	1.98	0.00	11,993.23
3.06	Blasting connection wire	----	m	2423.55	0.00	0.13	0.00	315.06
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.39	0.00	459.99	0.00	1,560.31
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.39	0.00	808.44	0.00	2,742.27
3.09	Jumbo drill shank adapter	----	n.	5.87	0.00	302.37	0.00	1,773.93
3.10	Jumbo drill bit, 48 mm dia.	----	n.	18.66	0.00	150.50	0.00	2,807.77
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.48	0.00	586.85	0.00	284.45
3.12	Integral drill steel, 800 mm	----	n.	2.14	0.00	132.65	0.00	283.80
3.13	Integral drill steel, 1600 mm	----	n.	1.87	0.00	153.97	0.00	288.23
3.14	Integral drill steel, 2400 mm	----	n.	1.34	0.00	174.35	0.00	233.13
3.15	Breaker tool, moil point	----	n.	8.91	0.00	32.37	0.00	288.56
3.16	Pipeline supports including anchors	----	kg	1,890.97	1.38	3.22	2,609.55	6,088.94
3.17	Cable tray including supports and anchors	----	m	756.39	0.35	0.83	267.76	624.78
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	756.39	0.79	7.11	597.55	5,377.93
	Sub-total						88,216	303,184
	Missing items and construction contingencies	%		2.00%			1,764	6,064
	Total Direct Costs						89,980	309,247
	Overheads, risks and profit	%		52.00%			20,760	186,839
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	10,697			10.35	46.38
	AGGREGATE UNIT PRICE		m³					56.73

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P35 - (ROCK CLASS IV)

SEC 2.02
 ANA 013
 RC IV-T A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	94.81	0.00	47.25	0.00	4,479.58
1.02	Gang foreman	1	h	948.06	6.60	0.00	6,257.19	0.00
1.03	Tunnel specialist	1	h	948.06	0.00	45.38	0.00	43,022.91
1.04	Tunneling jumbo operator	1	h	948.06	5.82	0.00	5,517.70	0.00
1.05	Loader operator	---	h	1.98	5.82	0.00	11.50	0.00
1.06	Operator of dumpers and other units	---	h	727.01	5.82	0.00	4,231.19	0.00
1.07	Miner	4	h	3,792.24	2.99	0.00	11,338.78	0.00
1.08	Explosive specialist	1	h	948.06	3.69	0.00	3,498.34	0.00
1.09	Electrician	0.33	h	315.70	3.69	0.00	1,164.95	0.00
1.10	Mechanic	0.33	h	315.70	3.69	0.00	1,164.95	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	52.50	3.69	0.00	193.72	0.00
1.12	Pipe fitter	0.33	h	315.70	3.69	0.00	1,164.95	0.00
1.13	Helper	5	h	4,740.29	2.38	0.00	11,281.90	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.65	0.00	19,479.66	0.00	32,062.26
		---	h	160.42	3.17	94.80	508.52	15,207.41
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	6.58	0.00	187.16	0.00	1,232.21
		---	h	70.83	0.07	1.53	4.96	108.37
2.03	Hand-held rock drill, medium weight type	3	m.th	4.94	0.00	130.63	0.00	645.03
		---	h	106.25	0.04	2.03	4.25	215.69
2.04	Hand-held breaker, medium weight type	4	m.th	6.58	0.00	46.95	0.00	309.11
		---	h	226.67	0.03	0.91	6.80	206.27
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	948.06	0.15	24.64	142.21	23,360.17
		s.b	h	189.61	0.00	5.46	0.00	1,035.28
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.65	0.00	12,874.72	0.00	21,190.96
		---	h	141.08	1.95	55.22	275.11	7,790.60
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	352.96	1.12	114.78	395.32	40,512.82
		s.b	h	70.59	0.00	50.07	0.00	3,534.55
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	1.65	0.00	440.40	0.00	724.87
		---	h	948.06	0.12	9.00	113.77	8,532.53
2.11	Halogen flood light, 1000 W	2	m.th	3.29	0.00	79.92	0.00	263.09
		---	h	1,896.12	0.01	0.43	18.96	815.33
2.12	Halogen flood light, 2000 W	1	m.th	1.65	0.00	92.77	0.00	152.69
		---	h	948.06	0.01	0.48	9.48	455.07
2.13	Ligthing line along tunnel, 100 m section	1.9	m.th	3.12	0.00	130.82	0.00	408.14
		---	h	1,797.05	0.01	0.41	17.97	736.79
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	177.76	0.15	18.51	26.66	3,290.36
		s.b	h	35.55	0.00	7.46	0.00	265.22
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	84.14	0.32	29.23	26.93	2,459.53
		s.b	h	16.83	0.00	12.36	0.00	208.00
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	405.88	0.26	24.87	105.53	10,094.32
		s.b	h	81.18	0.00	15.28	0.00	1,240.38
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	46.05	0.63	48.81	29.01	2,247.75
		s.b	h	9.21	0.00	20.84	0.00	191.94
Total to carry forward ----->>							47,511	226,999

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P35 - (ROCK CLASS IV)

SEC 2.02
 ANA 013
 RC IV-T B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						47,511	226,999
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.65	0.00	82.94	0.00	136.51
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.65	0.14	33.45	0.23	55.06
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	1.9	do	3.12	1.51	130.66	4.71	407.64
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	1	do	2.27	1.36	134.52	3.09	305.35
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	1.9	do	3.12	0.14	13.13	0.44	40.96
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	1.9	do	3.12	0.37	34.41	1.15	107.36
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.65	2.37	278.28	3.90	458.03
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	1.9	do	3.12	0.55	55.77	1.72	174.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	1.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1059.66	2.31	0.00	2,447.81	0.00
3.02	Explosive, gramonite type	----	kg	9536.93	2.06	0.00	19,646.08	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5862.55	0.00	1.98	0.00	11,607.86
3.06	Blasting connection wire	----	m	2103.60	0.00	0.13	0.00	273.47
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.84	0.00	459.99	0.00	1,305.31
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.84	0.00	808.44	0.00	2,294.10
3.09	Jumbo drill shank adapter	----	n.	4.91	0.00	302.37	0.00	1,484.02
3.10	Jumbo drill bit, 51 mm dia.	----	n.	15.61	0.00	164.35	0.00	2,565.05
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.36	0.00	586.85	0.00	213.98
3.12	Integral drill steel, 800 mm	----	n.	1.89	0.00	132.65	0.00	250.56
3.13	Integral drill steel, 1600 mm	----	n.	1.65	0.00	153.97	0.00	254.48
3.14	Integral drill steel, 2400 mm	----	n.	1.18	0.00	174.35	0.00	205.83
3.15	Breaker tool, moi point	----	n.	4.72	0.00	32.37	0.00	152.86
3.16	Pipeline supports including anchors	----	kg	473.87	1.38	3.22	653.95	1,525.88
3.17	Cable tray including supports and anchors	----	m	189.55	0.35	0.83	67.10	156.57
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	189.55	0.79	7.11	149.74	1,347.70
	Sub-total						70,491	252,322
	Missing items and construction contingencies	%		2.00%			1,410	5,046
	Total Direct Costs						71,900	257,368
	Overheads, risks and profit	%		52.00%			17,122	154,098
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		9,444			9.43	43.57
	AGGREGATE UNIT PRICE	m ³						52.99

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P40 (ROCK CLASS V)

SEC 2.02
 ANA 014
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	105.92	0.00	47.25	0.00	5,004.65	
1.02	Gang foreman	1	h	1,059.19	6.60	0.00	6,990.62	0.00	
1.03	Tunnel specialist	1	h	1,059.19	0.00	45.38	0.00	48,065.83	
1.04	Tunneling jumbo operator	1	h	1,059.19	5.82	0.00	6,164.46	0.00	
1.05	Loader operator	1	h	1,059.19	5.82	0.00	6,164.46	0.00	
1.06	Operator of dumper and other units	---	h	837.86	5.82	0.00	4,876.32	0.00	
1.07	Miner	3	h	3,177.56	2.99	0.00	9,500.89	0.00	
1.08	Explosive specialist	1	h	1,059.19	3.69	0.00	3,908.39	0.00	
1.09	Electrician	0.33	h	353.03	3.69	0.00	1,302.67	0.00	
1.10	Mechanic	0.33	h	353.03	3.69	0.00	1,302.67	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	38.42	3.69	0.00	141.78	0.00	
1.12	Pipe fitter	0.33	h	353.03	3.69	0.00	1,302.67	0.00	
1.13	Helper	4.0	h	4,236.74	2.38	0.00	10,083.44	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.84	0.00	12,651.92	0.00	23,265.15	
		---	h	231.31	1.95	50.77	451.06	11,743.73	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	5.52	0.00	187.16	0.00	1,032.48	
		---	h	37.31	0.07	1.53	2.61	57.08	
2.03	Hand-held rock drill, light weight type	2	m.th	3.68	0.00	130.63	0.00	480.42	
		---	hr	55.96	0.04	2.03	2.24	113.60	
2.04	Hand-held breaker, medium weight type	2	m.th	3.68	0.00	46.95	0.00	172.67	
		---	h	198.97	0.03	0.91	5.97	181.06	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,059.19	0.15	24.64	158.88	26,098.33	
		s.b	h	211.84	0.00	5.46	0.00	1,156.63	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	132.40	0.20	40.08	26.48	5,306.52	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.84	0.00	8,943.66	0.00	16,446.17	
		---	h	147.75	1.30	33.65	192.08	4,971.91	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	404.55	0.63	62.22	254.87	25,171.34	
		s.b	h	80.91	0.00	28.86	0.00	2,335.09	
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	1.84	0.00	636.14	0.00	1,169.77	
		---	h	1,059.19	0.20	14.93	211.84	15,813.64	
2.11	Halogen flood light, 1000 W	1	m.th	1.84	0.00	79.92	0.00	146.96	
		---	h	1,059.19	0.01	0.43	10.59	455.45	
2.12	Halogen flood light, 2000 W	1	m.th	1.84	0.00	92.77	0.00	170.59	
		---	h	1,059.19	0.01	0.48	10.59	508.41	
2.13	Ligthing line along tunnel, 100 m section	10.1	m.th	18.61	0.00	130.82	0.00	2,434.56	
		---	h	10,719.38	0.01	0.41	107.19	4,394.95	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	198.60	0.15	18.51	29.79	3,676.03	
		s.b	h	39.72	0.00	7.46	0.00	296.31	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	130.29	0.32	29.23	41.69	3,808.25	
		s.b	h	26.06	0.00	12.36	0.00	322.07	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	243.85	0.26	24.87	63.40	6,064.57	
		s.b	h	48.77	0.00	15.28	0.00	745.21	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	28.25	0.63	48.81	17.80	1,378.92	
		s.b	h	5.65	0.00	20.84	0.00	117.75	
Total to carry forward ----->>>								53,325	213,106

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P40 (ROCK CLASS V)**

**SEC 2.02
ANA 014
RC V - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						53,325	213,106
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.84	0.00	82.94	0.00	152.52
		---	h	9.19	0.01	4.39	0.09	40.36
2.19	Integral drill steel grinder	---	h	6.22	0.01	2.29	0.06	14.24
2.20	Button bits grinder	---	h	25.80	0.04	5.32	1.03	137.26
2.21	Breaker moil point resharpenner	---	h	2.07	0.01	1.57	0.02	3.25
2.22	Steel structure for ventilation fan support	1.0	m.th	1.84	0.14	33.45	0.26	61.51
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	10.1	do	18.61	1.31	89.04	24.38	1,657.04
2.24	Compressed air tank, 4 m3 capacity	3	do	5.56	1.07	105.20	5.95	585.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	10.1	do	18.61	0.14	13.13	2.61	244.35
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	10.1	do	18.61	0.24	22.33	4.47	415.56
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.84	2.37	278.28	4.36	511.72
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	20.2	do	37.22	0.38	38.10	14.14	1,418.08
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	3.68	0.24	27.23	0.88	100.14
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	775.98	2.31	0.00	1,792.52	0.00
3.02	Explosive, gramonite type	----	kg	6983.86	2.06	0.00	14,386.76	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5708.78	0.00	1.98	0.00	11,303.38
3.06	Blasting connection wire	----	m	3257.14	0.00	0.13	0.00	423.43
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.26	0.00	459.99	0.00	1,040.78
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.26	0.00	808.44	0.00	1,829.20
3.09	Jumbo drill shank adapter	----	n.	3.91	0.00	302.37	0.00	1,183.28
3.10	Jumbo drill bit, 48 mm dia.	----	n.	12.44	0.00	150.50	0.00	1,872.89
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.46	0.00	586.85	0.00	267.60
3.12	Integral drill steel, 800 mm	----	n.	0.99	0.00	132.65	0.00	131.97
3.13	Integral drill steel, 1600 mm	----	n.	0.87	0.00	153.97	0.00	134.03
3.14	Integral drill steel, 2400 mm	----	n.	0.62	0.00	174.35	0.00	108.41
3.15	Breaker tool, moil point	----	n.	4.15	0.00	32.37	0.00	134.18
3.16	Pipeline supports including anchors	----	kg	2530.10	1.38	3.22	3,491.54	8,146.92
3.17	Cable tray including supports and anchors	----	m	1012.04	0.35	0.83	358.26	835.95
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1012.04	0.79	7.11	799.51	7,195.60
	Sub-total						74,212	253,055
	Missing items and construction contingencies	%		2.00%			1,484	5,061
	Total Direct Costs						75,697	258,116
	Overheads, risks and profit	%		52.00%			17,358	156,224
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	4,974			18.71	83.30
	AGGREGATE UNIT PRICE		m³					102.00

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P80 - (ROCK CLASS IV)**

**SEC 2.02
ANA 015
RC IV - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	53.22	0.00	47.25	0.00	2,514.62	
1.02	Gang foreman	1	h	532.20	6.60	0.00	3,512.49	0.00	
1.03	Tunnel specialist	1	h	532.20	0.00	45.38	0.00	24,151.04	
1.04	Tunneling jumbo operator	1	h	532.20	5.82	0.00	3,097.38	0.00	
1.05	Loader operator	---	h	123.42	5.82	0.00	718.33	0.00	
1.06	Operator of dumpers and other units	---	h	418.69	5.82	0.00	2,436.79	0.00	
1.07	Miner	4	h	2,128.78	2.99	0.00	6,365.06	0.00	
1.08	Explosive specialist	1	h	532.20	3.69	0.00	1,963.80	0.00	
1.09	Electrician	0.33	h	177.22	3.69	0.00	653.95	0.00	
1.10	Mechanic	0.33	h	177.22	3.69	0.00	653.95	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	31.47	3.69	0.00	116.12	0.00	
1.12	Pipe fitter	0.33	h	177.22	3.69	0.00	653.95	0.00	
1.13	Helper	5	h	2,660.98	2.38	0.00	6,333.13	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.92	0.00	19,479.66	0.00	17,998.25	
		---	h	91.22	3.17	94.80	289.18	8,648.08	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.70	0.00	187.16	0.00	691.71	
		---	h	46.40	0.07	1.53	3.25	70.99	
2.03	Hand-held rock drill, medium weight type	3	m.th	2.77	0.00	130.63	0.00	362.09	
		---	h	69.60	0.04	2.03	2.78	141.29	
2.04	Hand-held breaker, medium weight type	4	m.th	3.70	0.00	46.95	0.00	173.52	
		---	h	148.48	0.03	0.91	4.45	135.11	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	532.20	0.15	24.64	79.83	13,113.30	
		s.b	h	106.44	0.00	5.46	0.00	581.16	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	102.85	0.75	70.52	77.14	7,253.27	
		s.b	h	20.57	0.00	26.87	0.00	552.74	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	205.99	1.12	114.78	230.71	23,643.23	
		s.b	h	41.20	0.00	50.07	0.00	2,062.76	
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.92	0.00	636.14	0.00	587.76	
		---	h	532.20	0.20	14.93	106.44	7,945.68	
2.11	Halogen flood light, 1000 W	2	m.th	1.85	0.00	79.92	0.00	147.68	
		---	h	1,064.39	0.01	0.43	10.64	457.69	
2.12	Halogen flood light, 2000 W	1	m.th	0.92	0.00	92.77	0.00	85.71	
		---	h	532.20	0.01	0.48	5.32	255.45	
2.13	Ligthing line along tunnel, 100 m section	6.9	m.th	6.37	0.00	130.82	0.00	833.51	
		---	h	3,669.92	0.01	0.41	36.70	1,504.67	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	99.79	0.15	18.51	14.97	1,847.05	
		s.b	h	19.96	0.00	7.46	0.00	148.88	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	45.68	0.32	29.23	14.62	1,335.33	
		s.b	h	9.14	0.00	12.36	0.00	112.93	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	220.51	0.26	24.87	57.33	5,484.17	
		s.b	h	44.10	0.00	15.28	0.00	673.89	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	29.17	0.63	48.81	18.38	1,423.84	
		s.b	h	5.83	0.00	20.84	0.00	121.59	
Total to carry forward ----->>								27,457	125,059

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P80 - (ROCK CLASS IV)**

**SEC 2.02
ANA 015
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						27,457	125,059
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.92	0.00	82.94	0.00	76.63
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.92	0.31	73.58	0.29	67.98
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	6.9	do	6.37	1.93	130.66	12.30	832.49
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	2.20	1.36	134.52	2.99	295.71
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.9	do	6.37	0.14	13.13	0.89	83.66
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.9	do	6.37	0.37	34.41	2.36	219.24
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.92	2.37	278.28	2.19	257.12
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.9	do	6.37	0.55	55.77	3.50	355.33
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	683.62	2.31	0.00	1,579.15	0.00
3.02	Explosive, gramonite type	----	kg	6152.54	2.06	0.00	12,674.24	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3403.55	0.00	1.98	0.00	6,739.02
3.06	Blasting connection wire	----	m	1142.09	0.00	0.13	0.00	148.47
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.64	0.00	459.99	0.00	756.66
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.64	0.00	808.44	0.00	1,329.84
3.09	Jumbo drill shank adapter	----	n.	2.85	0.00	302.37	0.00	860.25
3.10	Jumbo drill bit, 51 mm dia.	----	n.	9.05	0.00	164.35	0.00	1,486.90
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.20	0.00	586.85	0.00	116.17
3.12	Integral drill steel, 800 mm	----	n.	1.24	0.00	132.65	0.00	164.13
3.13	Integral drill steel, 1600 mm	----	n.	1.08	0.00	153.97	0.00	166.70
3.14	Integral drill steel, 2400 mm	----	n.	0.77	0.00	174.35	0.00	134.83
3.15	Breaker tool, moi point	----	n.	3.09	0.00	32.37	0.00	100.13
3.16	Pipeline supports including anchors	----	kg	441.33	1.38	3.22	609.04	1,421.08
3.17	Cable tray including supports and anchors	----	m	176.53	0.35	0.83	62.49	145.82
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	176.53	0.79	7.11	139.46	1,255.14
	Sub-total						42,546	142,072
	Missing items and construction contingencies	%		2.00%			851	2,841
	Total Direct Costs						43,396	144,914
	Overheads, risks and profit	%		52.00%			9,792	88,129
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		6,187			8.60	37.67
	AGGREGATE UNIT PRICE	m ³						46.27

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - ACCESS ADIT P80 - (ROCK CLASS V)

SEC 2.02
 ANA 015
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	189.30	0.00	47.25	0.00	8,944.32	
1.02	Gang foreman	1	h	1,892.98	6.60	0.00	12,493.65	0.00	
1.03	Tunnel specialist	1	h	1,892.98	0.00	45.38	0.00	85,903.31	
1.04	Tunneling jumbo operator	1	h	1,892.98	5.82	0.00	11,017.13	0.00	
1.05	Loader operator	---	h	378.40	5.82	0.00	2,202.30	0.00	
1.06	Operator of dumpers and other units	---	h	1,351.28	5.82	0.00	7,864.46	0.00	
1.07	Miner	4	h	7,571.91	2.99	0.00	22,640.01	0.00	
1.08	Explosive specialist	1	h	1,892.98	3.69	0.00	6,985.09	0.00	
1.09	Electrician	0.33	h	630.36	3.69	0.00	2,326.03	0.00	
1.10	Mechanic	0.33	h	630.36	3.69	0.00	2,326.03	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	89.96	3.69	0.00	331.96	0.00	
1.12	Pipe fitter	0.33	h	630.36	3.69	0.00	2,326.03	0.00	
1.13	Helper	5	h	9,464.89	2.38	0.00	22,526.43	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	3.29	0.00	19,479.66	0.00	64,018.32	
		---	h	286.59	3.17	94.80	908.49	27,168.74	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	13.15	0.00	187.16	0.00	2,460.34	
		---	h	134.85	0.07	1.53	9.44	206.32	
2.03	Hand-held rock drill, light weight type	3	m.th	9.86	0.00	130.63	0.00	1,287.91	
		---	h	202.27	0.04	2.03	8.09	410.61	
2.04	Hand-held breaker, medium weight type	4	m.th	13.15	0.00	46.95	0.00	617.19	
		---	h	431.51	0.03	0.91	12.95	392.68	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,892.98	0.15	24.64	283.95	46,642.96	
		s.b	h	378.60	0.00	5.46	0.00	2,067.13	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	315.33	0.75	70.52	236.50	22,237.40	
		s.b	h	63.07	0.00	26.87	0.00	1,694.61	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	621.16	1.12	114.78	695.70	71,296.59	
		s.b	h	124.23	0.00	50.07	0.00	6,220.28	
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	3.29	0.00	636.14	0.00	2,090.62	
		---	h	1,892.98	0.20	14.93	378.60	28,262.15	
2.11	Halogen flood light, 1000 W	2	m.th	6.57	0.00	79.92	0.00	525.30	
		---	h	3,785.95	0.01	0.43	37.86	1,627.96	
2.12	Halogen flood light, 2000 W	1	m.th	3.29	0.00	92.77	0.00	304.88	
		---	h	1,892.98	0.01	0.48	18.93	908.63	
2.13	Ligthing line along tunnel, 100 m section	6.9	m.th	22.66	0.00	130.82	0.00	2,964.71	
		---	h	#####	0.01	0.41	130.54	5,351.98	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	354.93	0.15	18.51	53.24	6,569.81	
		s.b	h	70.99	0.00	7.46	0.00	529.56	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	164.38	0.32	29.23	52.60	4,804.81	
		s.b	h	32.88	0.00	12.36	0.00	406.35	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	442.21	0.26	24.87	114.97	10,997.68	
		s.b	h	88.44	0.00	15.28	0.00	1,351.38	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	87.97	0.63	48.81	55.42	4,293.62	
		s.b	h	17.59	0.00	20.84	0.00	366.64	
Total to carry forward ----->>								96,036	412,925

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - ACCESS ADIT P80 - (ROCK CLASS V)**

**SEC 2.02
ANA 015
RC V - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						96,036	412,925
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.29	0.00	82.94	0.00	272.58
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.29	0.31	73.58	1.02	241.81
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	6.9	do	22.66	1.93	130.66	43.74	2,961.09
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	7.82	1.36	134.52	10.63	1,051.80
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.9	do	22.66	0.14	13.13	3.17	297.56
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.9	do	22.66	0.37	34.41	8.39	779.82
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.29	2.37	278.28	7.79	914.54
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.9	do	22.66	0.55	55.77	12.46	1,263.89
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1870	2.31	0.00	4,319.45	0.00
3.02	Explosive, gramonite type	----	kg	16829	2.06	0.00	34,667.78	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	11951	0.00	1.98	0.00	23,662.60
3.06	Blasting connection wire	----	m	4109	0.00	0.13	0.00	534.23
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.67	0.00	459.99	0.00	2,147.07
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.67	0.00	808.44	0.00	3,773.51
3.09	Jumbo drill shank adapter	----	n.	8.07	0.00	302.37	0.00	2,441.02
3.10	Jumbo drill bit, 51 mm dia.	----	n.	25.67	0.00	164.35	0.00	4,219.20
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.58	0.00	586.85	0.00	337.63
3.12	Integral drill steel, 800 mm	----	n.	3.60	0.00	132.65	0.00	477.00
3.13	Integral drill steel, 1600 mm	----	n.	3.15	0.00	153.97	0.00	484.46
3.14	Integral drill steel, 2400 mm	----	n.	2.25	0.00	174.35	0.00	391.85
3.15	Breaker tool, moiil point	----	n.	8.99	0.00	32.37	0.00	291.00
3.16	Pipeline supports including anchors	----	kg	1,282.62	1.38	3.22	1,770.01	4,130.03
3.17	Cable tray including supports and anchors	----	m	513.05	0.35	0.83	181.62	423.78
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	513.05	0.79	7.11	405.31	3,647.76
	Sub-total						137,468	467,669
	Missing items and construction contingencies	%		2.00%			2,749	9,353
	Total Direct Costs						140,217	477,022
	Overheads, risks and profit	%		52.00%			32,096	288,868
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		17,980			9.58	42.60
	AGGREGATE UNIT PRICE	m ³						52.18

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 001

UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION TUNNEL - PRESSURE STRETCH - ARCH (ROCK CLASS III)

RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	263.07	0.00	47.25	0.00	12,430.13	
1.02	Gang foreman	1	hr	2,630.72	6.60	0.00	17,362.72	0.00	
1.03	Tunnel specialist	1	hr	1,636.52	0.00	45.38	0.00	74,265.27	
1.04	Tunneling jumbo operator	1	hr	1,636.52	5.82	0.00	9,524.55	0.00	
1.05	Loader operator	---	hr	393.51	5.82	0.00	2,290.21	0.00	
1.06	Operator of dumpers and other units	---	h	1,254.28	5.82	0.00	7,299.90	0.00	
1.07	Miner	5	hr	8,182.60	2.99	0.00	24,465.97	0.00	
1.08	Explosive specialist	1	hr	1,636.52	3.69	0.00	6,038.76	0.00	
1.09		0.33	hr	544.96	3.69	0.00	2,010.91	0.00	
1.10	Mechanic	0.33	hr	544.96	3.69	0.00	2,010.91	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	113.21	3.69	0.00	417.75	0.00	
1.12	Pipe fitter	0.33	hr	544.96	3.69	0.00	2,010.91	0.00	
1.13	Helper	6	hr	9,819.12	2.38	0.00	23,369.50	0.00	
2	Equipment								
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	2.84	0.00	21,868.22	0.00	62,131.56	
		---	h	224.99	3.71	122.14	834.70	27,479.96	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	14.21	0.00	187.16	0.00	2,658.78	
		---	h	182.80	0.07	1.53	12.80	279.68	
2.03	Hand-held rock drill, medium weight type	4	m.th	11.36	0.00	130.63	0.00	1,484.57	
		---	h	274.20	0.04	2.03	10.97	556.63	
2.04	Hand-held breaker, medium weight type	5	m.th	14.21	0.00	46.95	0.00	666.97	
		---	h	584.96	0.03	0.91	17.55	532.32	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,636.52	0.29	77.99	474.59	127,632.18	
		s.b	h	327.30	0.00	10.73	0.00	3,511.97	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	327.92	1.05	95.46	344.32	31,303.44	
		---	h	65.58	0.00	36.59	0.00	2,399.73	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	64.43	0.70	64.44	45.10	4,152.13	
		s.b	h	12.89	0.00	40.23	0.00	518.44	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	573.39	1.12	114.78	642.19	65,813.35	
		s.b	h	114.68	0.00	50.07	0.00	5,741.90	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	2.84	0.00	440.40	0.00	1,251.26	
		---	h	1,636.52	0.12	9.00	196.38	14,728.68	
2.11	Halogen flood light, 1000 W	2	m.th	5.68	0.00	79.92	0.00	454.13	
		---	h	3,273.04	0.01	0.43	32.73	1,407.41	
2.12	Halogen flood light, 2000 W	2	m.th	5.68	0.00	92.77	0.00	527.15	
		---	h	3,273.04	0.01	0.48	32.73	1,571.06	
2.13	Ligthing line along tunnel, 100 m section	4.3	m.th	12.27	0.00	130.82	0.00	1,605.08	
		---	h	7,067.15	0.01	0.41	70.67	2,897.53	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	306.85	0.15	18.51	46.03	5,679.75	
		s.b	h	61.37	0.00	7.46	0.00	457.82	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	148.67	0.32	29.23	47.57	4,345.62	
		s.b	h	29.73	0.00	12.36	0.00	367.51	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	668.32	0.33	30.84	220.55	20,610.97	
		s.b	h	133.66	0.00	19.27	0.00	2,575.70	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	111.35	0.63	48.81	70.15	5,434.93	
		s.b	h	22.27	0.00	20.84	0.00	464.10	
Total to carry forward ----->>								99,901	487,938

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 001

UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION TUNNEL - PRESSURE STRETCH - ARCH (ROCK CLASS III)

RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						99,901	487,938
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	2.84	0.00	128.05	0.00	363.81
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	2.84	0.14	33.45	0.40	95.04
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	4.3	do	12.27	1.93	130.66	23.68	1,603.11
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	5.30	2.01	198.33	10.64	1,050.17
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4.3	do	12.27	0.20	18.98	2.45	232.87
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	4	do	12.27	0.37	34.41	4.54	422.19
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	2.84	3.15	370.12	8.95	1,051.58
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4.3	do	12.27	0.38	38.10	4.66	467.46
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.3	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	4.3	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 350 kVA	1	do	0.00	6.29	771.86	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2,742.29	2.31	0.00	6,334.69	0.00
3.02	Explosive, gramonite type	----	kg	24,680.61	2.06	0.00	50,842.05	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	10,149.40	0.00	1.98	0.00	20,095.81
3.06	Blasting connection wire	----	m	3,716.75	0.00	0.13	0.00	483.18
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	5.67	0.00	459.99	0.00	2,608.96
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	5.67	0.00	808.44	0.00	4,585.29
3.09	Jumbo drill shank adapter	----	n.	9.81	0.00	302.37	0.00	2,966.15
3.10	Jumbo drill bit, 51 mm dia.	----	n.	31.19	0.00	164.35	0.00	5,126.86
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.74	0.00	586.85	0.00	436.28
3.12	Integral drill steel, 800 mm	----	n.	4.87	0.00	132.65	0.00	646.63
3.13	Integral drill steel, 1600 mm	----	n.	4.27	0.00	153.97	0.00	656.74
3.14	Integral drill steel, 2400 mm	----	n.	3.05	0.00	174.35	0.00	531.19
3.15	Breaker tool, moi point	----	n.	12.19	0.00	32.37	0.00	394.48
3.16	Pipeline supports including anchors	----	kg	906.11	1.38	3.22	1,250.43	2,917.67
3.17	Cable tray including supports and anchors	----	m	362.44	0.35	0.83	128.30	299.38
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	362.44	0.79	7.11	286.33	2,576.97
	Sub-total						158,798	537,549
	Missing items and construction contingencies	%		2.00%			3,176	10,751
	Total Direct Costs						161,974	548,300
	Overheads, risks and profit	%		52.00%			36,934	332,409
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		24,373			8.16	36.13
	AGGREGATE UNIT PRICE	m ³						44.29

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 001

UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION TUNNEL - PRESSURE STRETCH - ARCH (ROCK CLASS IV) RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	56.67	0.00	47.25	0.00	2,677.60
1.02	Gang foreman	1	hr	566.69	6.60	0.00	3,740.14	0.00
1.03	Tunnel specialist	1	hr	353.83	0.00	45.38	0.00	16,056.97
1.04	Tunneling jumbo operator	1	hr	353.83	5.82	0.00	2,059.31	0.00
1.05	Loader operator	---	hr	79.16	5.82	0.00	460.71	0.00
1.06	Operator of dumpers and other units	---	h	259.24	5.82	0.00	1,508.77	0.00
1.07	Miner	5	hr	1,769.17	2.99	0.00	5,289.81	0.00
1.08	Explosive specialist	1	hr	353.83	3.69	0.00	1,305.65	0.00
1.09	Electrician	0.33	hr	117.83	3.69	0.00	434.78	0.00
1.10	Mechanic	0.33	hr	117.83	3.69	0.00	434.78	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	21.33	3.69	0.00	78.72	0.00
1.12	Pipe fitter	0.33	hr	117.83	3.69	0.00	434.78	0.00
1.13	Helper	6	hr	2,123.00	2.38	0.00	5,052.75	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.61	0.00	21,868.22	0.00	13,433.53
		---	h	45.95	3.71	122.14	170.49	5,612.75
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	3.07	0.00	187.16	0.00	574.86
		---	h	35.00	0.07	1.53	2.45	53.55
2.03	Hand-held rock drill, medium weight type	4	m.th	2.46	0.00	130.63	0.00	320.98
		---	h	52.50	0.04	2.03	2.10	106.58
2.04	Hand-held breaker, medium weight type	5	m.th	3.07	0.00	46.95	0.00	144.21
		---	h	112.00	0.03	0.91	3.36	101.92
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	353.83	0.29	77.99	102.61	27,595.49
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	65.97	1.05	95.46	69.26	6,297.12
		---	h	13.19	0.00	36.59	0.00	482.74
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	13.82	0.70	64.44	9.68	890.84
		s.b	h	2.76	0.00	40.23	0.00	111.23
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	114.29	1.12	114.78	128.00	13,118.09
		s.b	h	22.86	0.00	50.07	0.00	1,144.49
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.61	0.00	440.40	0.00	270.54
		---	h	353.83	0.12	9.00	42.46	3,184.50
2.11	Halogen flood light, 1000 W	2	m.th	1.23	0.00	79.92	0.00	98.19
		---	h	707.67	0.01	0.43	7.08	304.30
2.12	Halogen flood light, 2000 W	2	m.th	1.23	0.00	92.77	0.00	113.98
		---	h	707.67	0.01	0.48	7.08	339.68
2.13	Ligthning line along tunnel, 100 m section	4.3	m.th	2.65	0.00	130.82	0.00	347.04
		---	h	1,528.00	0.01	0.41	15.28	626.48
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	66.34	0.15	18.51	9.95	1,228.02
		s.b	h	13.27	0.00	7.46	0.00	98.98
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	32.85	0.32	29.23	10.51	960.06
		s.b	h	6.57	0.00	12.36	0.00	81.19
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	147.25	0.33	30.84	48.59	4,541.05
		s.b	h	29.45	0.00	19.27	0.00	567.48
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	22.19	0.63	48.81	13.98	1,083.30
		s.b	h	4.44	0.00	20.84	0.00	92.51
Total to carry forward ----->>							21,443	102,660

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 001

UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION TUNNEL - PRESSURE STRETCH - ARCH (ROCK CLASS IV) RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						21,443	102,660
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.61	0.00	128.05	0.00	78.66
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.61	0.14	33.45	0.09	20.55
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	4.3	do	2.65	1.93	130.66	5.12	346.61
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	1.14	2.01	198.33	2.30	227.06
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4.3	do	2.65	0.20	18.98	0.53	50.35
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	4	do	2.65	0.37	34.41	0.98	91.28
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.61	3.15	370.12	1.94	227.36
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4.3	do	2.65	0.38	38.10	1.01	101.07
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.3	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	4.3	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 350 kVA	1	do	0.00	6.29	771.86	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	496.11	2.31	0.00	1,146.01	0.00
3.02	Explosive, gramonite type	----	kg	4,464.97	2.06	0.00	9,197.85	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2,186.45	0.00	1.98	0.00	4,329.17
3.06	Blasting connection wire	----	m	821.13	0.00	0.13	0.00	106.75
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.06	0.00	459.99	0.00	487.61
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.06	0.00	808.44	0.00	856.98
3.09	Jumbo drill shank adapter	----	n.	1.83	0.00	302.37	0.00	554.37
3.10	Jumbo drill bit, 51 mm dia.	----	n.	5.83	0.00	164.35	0.00	958.20
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.14	0.00	586.85	0.00	83.57
3.12	Integral drill steel, 800 mm	----	n.	0.93	0.00	132.65	0.00	123.81
3.13	Integral drill steel, 1600 mm	----	n.	0.82	0.00	153.97	0.00	125.74
3.14	Integral drill steel, 2400 mm	----	n.	0.58	0.00	174.35	0.00	101.71
3.15	Breaker tool, moi point	----	n.	2.33	0.00	32.37	0.00	75.53
3.16	Pipeline supports including anchors	----	kg	173.49	1.38	3.22	239.42	558.64
3.17	Cable tray including supports and anchors	----	m	69.40	0.35	0.83	24.57	57.32
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	69.40	0.79	7.11	54.82	493.41
	Sub-total						32,118	112,716
	Missing items and construction contingencies	%		2.00%			642	2,254
	Total Direct Costs						32,760	114,970
	Overheads, risks and profit	%		52.00%			7,682	69,138
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		4,667			8.67	39.45
	AGGREGATE UNIT PRICE		m³					48.12

**ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION T. - FREEFLOW STRETCH L.B. - ARCH (ROCK CLASS III)**

**SEC 2.03
 ANA 002
 RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	hr	315.17	0.00	47.25	0.00	14,891.59	
1.02	Gang foreman	1	hr	3,151.66	6.60	0.00	20,800.95	0.00	
1.03	Tunnel specialist	1	hr	1,938.29	0.00	45.38	0.00	87,959.39	
1.04	Tunneling jumbo operator	1	hr	1,938.29	5.82	0.00	11,280.82	0.00	
1.05	Loader operator	---	hr	555.16	5.82	0.00	3,231.03	0.00	
1.06	Operator of dumpers and other units	---	h	1,747.71	5.82	0.00	10,171.69	0.00	
1.07	Miner	5	hr	9,691.43	2.99	0.00	28,977.37	0.00	
1.08	Explosive specialist	1	hr	1,938.29	3.69	0.00	7,152.27	0.00	
1.09	Electrician	0.33	hr	645.45	3.69	0.00	2,381.71	0.00	
1.10	Mechanic	0.33	hr	645.45	3.69	0.00	2,381.71	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	hr	141.37	3.69	0.00	521.66	0.00	
1.12	Pipe fitter	0.33	hr	645.45	3.69	0.00	2,381.71	0.00	
1.13	Helper	6	hr	11,629.71	2.38	0.00	27,678.71	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo (2 units)	1	m.th	3.37	0.00	38,959.32	0.00	131,101.17	
		---	h	204.66	6.34	189.60	1,297.54	38,803.39	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	16.83	0.00	187.16	0.00	3,149.04	
		---	h	273.34	0.07	1.53	19.13	418.21	
2.03	Hand-held rock drill, medium weight type	4	m.th	13.46	0.00	130.63	0.00	1,758.32	
		---	h	410.01	0.04	2.03	16.40	832.31	
2.04	Hand-held breaker, medium weight type	5	m.th	16.83	0.00	46.95	0.00	789.95	
		---	h	874.68	0.03	0.91	26.24	795.96	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00	
		s.b	h	0.00	0.00	9.26	0.00	0.00	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,938.29	0.29	77.99	562.10	151,166.87	
		s.b	h	387.66	0.00	10.73	0.00	4,159.56	
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	462.63	1.05	95.46	485.76	44,162.95	
		---	h	92.53	0.00	36.59	0.00	3,385.55	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	72.72	0.70	64.44	50.91	4,686.28	
		s.b	h	14.54	0.00	40.23	0.00	585.13	
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	915.46	1.12	114.78	1,025.31	105,075.97	
		s.b	h	183.09	0.00	50.07	0.00	9,167.37	
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	3.37	0.00	918.32	0.00	3,090.22	
		---	h	1,938.29	0.46	36.86	891.61	71,445.20	
2.11	Halogen flood light, 1000 W	2	m.th	6.73	0.00	79.92	0.00	537.87	
		---	h	3,876.57	0.01	0.43	38.77	1,666.93	
2.12	Halogen flood light, 2000 W	2	m.th	6.73	0.00	92.77	0.00	624.36	
		---	h	3,876.57	0.01	0.48	38.77	1,860.75	
2.13	Ligthning line along tunnel, 100 m section	9.8	m.th	33.02	0.00	130.82	0.00	4,319.39	
		---	h	19,018.26	0.01	0.41	190.18	7,797.49	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	363.43	0.15	18.51	54.51	6,727.06	
		s.b	h	72.69	0.00	7.46	0.00	542.24	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	148.41	0.32	29.23	47.49	4,338.06	
		s.b	h	29.68	0.00	12.36	0.00	366.87	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	810.19	0.33	30.84	267.36	24,986.38	
		s.b	h	162.04	0.00	19.27	0.00	3,122.49	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	161.53	0.63	48.81	101.77	7,884.49	
		s.b	h	32.31	0.00	20.84	0.00	673.28	
Total to carry forward ----->>								122,073.48	742,872.08

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION T. - FREEFLOW STRETCH L.B. - ARCH (ROCK CLASS III)**

**SEC 2.03
ANA 002
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						122,073.48	742,872.08
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	3.37	0.00	128.05	0.00	430.90
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.37	0.57	133.79	1.92	450.21
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	9.8	do	33.02	1.93	130.66	63.72	4,314.11
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	9.97	2.01	198.33	20.04	1,977.08
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	9.8	do	33.02	0.20	18.98	6.60	626.68
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	9.8	do	33.02	0.44	41.32	14.53	1,364.30
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	3.37	3.15	370.12	10.60	1,245.48
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	9.8	do	33.02	0.38	38.10	12.55	1,257.98
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	19.6	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	9.8	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 150 KVA	1	do	0.00	0.67	74.68	0.00	0.00
2.39	Control board, 400 KVA	1	do	0.00	1.17	129.66	0.00	0.00
2.40	Transformer cabin, 400 kVA	2	do	0.00	6.80	833.80	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3,772.32	2.31	0.00	8,714.06	0.00
3.02	Explosive, gramonite type	----	kg	33,950.87	2.06	0.00	69,938.80	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	11,546.79	0.00	1.98	0.00	22,862.65
3.06	Blasting connection wire	----	m	3,710.28	0.00	0.13	0.00	482.34
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	6.43	0.00	459.99	0.00	2,959.40
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	6.43	0.00	808.44	0.00	5,201.19
3.09	Jumbo drill shank adapter	----	n.	11.13	0.00	302.37	0.00	3,364.57
3.10	Jumbo drill bit, 51 mm dia.	----	n.	35.38	0.00	164.35	0.00	5,815.50
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.74	0.00	586.85	0.00	435.51
3.12	Integral drill steel, 800 mm	----	n.	7.29	0.00	132.65	0.00	966.89
3.13	Integral drill steel, 1600 mm	----	n.	6.38	0.00	153.97	0.00	982.00
3.14	Integral drill steel, 2400 mm	----	n.	4.56	0.00	174.35	0.00	794.27
3.15	Breaker tool, moiil point	----	n.	18.22	0.00	32.37	0.00	589.86
3.16	Pipeline supports including anchors	----	kg	1,541.20	1.38	3.22	2,126.86	4,962.68
3.17	Cable tray including supports and anchors	----	m	616.48	0.35	0.83	218.23	509.21
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	616.48	0.79	7.11	487.02	4,383.18
	Sub-total						203,688.40	808,848.06
	Missing items and construction contingencies	%		2.00%			4,073.77	16,176.96
	Total Direct Costs						207,762.17	825,025.02
	Overheads, risks and profit	%		52.00%			53,704.93	483,344.41
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	36,445			7.17	35.90
	AGGREGATE UNIT PRICE		m ³					43.07

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - LEVEL 1 D. TUNNEL - FREEFLOW STRETCH L.B. - ARCH (ROCK CLASS IV)

SEC 2.03
 ANA 002
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	209.64	0.00	47.25	0.00	9,905.30
1.02	Gang foreman	1	hr	2,096.36	6.60	0.00	13,835.97	0.00
1.03	Tunnel specialist	1	hr	1,295.82	0.00	45.38	0.00	58,804.19
1.04	Tunneling jumbo operator	1	hr	1,295.82	5.82	0.00	7,541.66	0.00
1.05	Loader operator	---	hr	341.97	5.82	0.00	1,990.28	0.00
1.06	Operator of dumpers and other units	---	h	1,103.23	5.82	0.00	6,420.82	0.00
1.07	Miner	5	hr	6,479.09	2.99	0.00	19,372.47	0.00
1.08	Explosive specialist	1	hr	1,295.82	3.69	0.00	4,781.57	0.00
1.09	Electrician	0.33	hr	431.51	3.69	0.00	1,592.26	0.00
1.10	Mechanic	0.33	hr	431.51	3.69	0.00	1,592.26	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	82.42	3.69	0.00	304.12	0.00
1.12	Pipe fitter	0.33	hr	431.51	3.69	0.00	1,592.26	0.00
1.13	Helper	6	hr	7,774.90	2.38	0.00	18,504.27	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo (2 units)	1	m.th	2.25	0.00	38,959.32	0.00	87,646.12
		---	h	129.60	6.34	189.60	821.68	24,572.76
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	11.25	0.00	187.16	0.00	2,105.25
		---	h	161.71	0.07	1.53	11.32	247.41
2.03	Hand-held rock drill, medium weight type	4	m.th	9.00	0.00	130.63	0.00	1,175.50
		---	h	242.56	0.04	2.03	9.70	492.39
2.04	Hand-held breaker, medium weight type	5	m.th	11.25	0.00	46.95	0.00	528.11
		---	h	517.46	0.03	0.91	15.52	470.89
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,295.82	0.29	77.99	375.79	101,060.80
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	284.98	1.05	95.46	299.23	27,203.93
		---	h	57.00	0.00	36.59	0.00	2,085.46
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	48.09	0.70	64.44	33.66	3,098.98
		s.b	h	9.62	0.00	40.23	0.00	386.94
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	559.88	1.12	114.78	627.06	64,262.47
		s.b	h	111.98	0.00	50.07	0.00	5,606.59
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	2.25	0.00	918.32	0.00	2,065.93
		---	h	1,295.82	0.46	36.86	596.08	47,763.83
2.11	Halogen flood light, 1000 W	2	m.th	4.50	0.00	79.92	0.00	359.59
		---	h	2,591.63	0.01	0.43	25.92	1,114.40
2.12	Halogen flood light, 2000 W	2	m.th	4.50	0.00	92.77	0.00	417.41
		---	h	2,591.63	0.01	0.48	25.92	1,243.98
2.13	Ligthing line along tunnel, 100 m section	9.8	m.th	22.07	0.00	130.82	0.00	2,887.68
		---	h	12,714.43	0.01	0.41	127.14	5,212.92
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	242.97	0.15	18.51	36.44	4,497.30
		s.b	h	48.59	0.00	7.46	0.00	362.50
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	101.31	0.32	29.23	32.42	2,961.21
		s.b	h	20.26	0.00	12.36	0.00	250.43
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	554.30	0.33	30.84	182.92	17,094.73
		s.b	h	110.86	0.00	19.27	0.00	2,136.29
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	98.79	0.63	48.81	62.24	4,822.01
		s.b	h	19.76	0.00	20.84	0.00	411.76
Total to carry forward ----->>							80,810.98	483,255.07

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 002
RC IV - T. B

UNDERGROUND EXCAVATION - LEVEL 1 D. TUNNEL - FREEFLOW STRETCH L.B. - ARCH (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						80,810.98	483,255.07
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	2.25	0.00	128.05	0.00	288.07
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	2.25	0.57	133.79	1.28	300.99
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	9.8	do	22.07	1.93	130.66	42.60	2,884.14
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	6.66	2.01	198.33	13.40	1,321.75
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	9.8	do	22.07	0.20	18.98	4.41	418.96
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	9.8	do	22.07	0.44	41.32	9.71	912.08
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	2.25	3.15	370.12	7.09	832.65
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	9.8	do	22.07	0.38	38.10	8.39	841.01
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	19.6	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	9.8	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 150 KVA	1	do	0.00	0.67	74.68	0.00	0.00
2.39	Control board, 400 KVA	1	do	0.00	1.17	129.66	0.00	0.00
2.40	Transformer cabin, 400 kVA	2	do	0.00	6.80	833.80	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2,107.81	2.31	0.00	4,869.03	0.00
3.02	Explosive, gramonite type	----	kg	18,970.27	2.06	0.00	39,078.75	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	7,686.25	0.00	1.98	0.00	15,218.77
3.06	Blasting connection wire	----	m	2,532.68	0.00	0.13	0.00	329.25
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.71	0.00	459.99	0.00	1,708.29
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.71	0.00	808.44	0.00	3,002.34
3.09	Jumbo drill shank adapter	----	n.	6.42	0.00	302.37	0.00	1,942.17
3.10	Jumbo drill bit, 51 mm dia.	----	n.	20.43	0.00	164.35	0.00	3,356.95
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.44	0.00	586.85	0.00	257.66
3.12	Integral drill steel, 800 mm	----	n.	4.31	0.00	132.65	0.00	572.01
3.13	Integral drill steel, 1600 mm	----	n.	3.77	0.00	153.97	0.00	580.95
3.14	Integral drill steel, 2400 mm	----	n.	2.70	0.00	174.35	0.00	469.89
3.15	Breaker tool, moiil point	----	n.	10.78	0.00	32.37	0.00	348.96
3.16	Pipeline supports including anchors	----	kg	911.77	1.38	3.22	1,258.24	2,935.90
3.17	Cable tray including supports and anchors	----	m	364.71	0.35	0.83	129.11	301.25
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	364.71	0.79	7.11	288.12	2,593.08
	Sub-total						126,521	524,672
	Missing items and construction contingencies	%		2.00%			2,530	10,493
	Total Direct Costs						129,052	535,166
	Overheads, risks and profit	%		52.00%			34,539	310,854
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		21,561			7.59	39.24
	AGGREGATE UNIT PRICE	m ³						46.83

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 003

UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION TUNNEL - RIGTH BANK - ARCH (ROCK CLASS IV)

RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	314.74	0.00	47.25	0.00	14,871.64
1.02	Gang foreman	1	hr	3,147.44	6.60	0.00	20,773.08	0.00
1.03	Tunnel specialist	1	hr	1,917.25	0.00	45.38	0.00	87,004.71
1.04	Tunneling jumbo operator	1	hr	1,917.25	5.82	0.00	11,158.38	0.00
1.05	Loader operator	---	hr	499.91	5.82	0.00	2,909.46	0.00
1.06	Operator of dumpers and other units	---	h	2,097.18	5.82	0.00	12,205.61	0.00
1.07	Miner	5	hr	9,586.24	2.99	0.00	28,662.86	0.00
1.08	Explosive specialist	1	hr	1,917.25	3.69	0.00	7,074.65	0.00
1.09	Electrician	0.33	hr	638.44	3.69	0.00	2,355.86	0.00
1.10	Mechanic	0.33	hr	638.44	3.69	0.00	2,355.86	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	120.47	3.69	0.00	444.54	0.00
1.12	Pipe fitter	0.33	hr	638.44	3.69	0.00	2,355.86	0.00
1.13	Helper	6	hr	11,503.49	2.38	0.00	27,378.30	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo (2 units)	1	m.th	3.33	0.00	38,959.32	0.00	129,678.26
		---	h	189.46	6.34	189.60	1,201.15	35,920.81
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	16.64	0.00	187.16	0.00	3,114.86
		---	h	236.38	0.07	1.53	16.55	361.66
2.03	Hand-held rock drill, medium weight type	4	m.th	13.31	0.00	130.63	0.00	1,739.24
		---	h	354.57	0.04	2.03	14.18	719.77
2.04	Hand-held breaker, medium weight type	5	m.th	16.64	0.00	46.95	0.00	781.38
		---	h	756.41	0.03	0.91	22.69	688.34
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	1,917.25	0.29	77.99	556.00	149,526.17
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	416.59	1.05	95.46	437.42	39,767.66
		---	h	83.32	0.00	36.59	0.00	3,048.60
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	70.30	0.70	64.44	49.21	4,530.05
		s.b	h	14.06	0.00	40.23	0.00	565.62
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	1,254.55	1.12	114.78	1,405.10	143,997.32
		s.b	h	250.91	0.00	50.07	0.00	12,563.07
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	3.33	0.00	440.40	0.00	1,465.90
		---	h	1,917.25	0.12	9.00	230.07	17,255.23
2.11	Halogen flood light, 1000 W	2	m.th	6.66	0.00	79.92	0.00	532.04
		---	h	3,834.50	0.01	0.43	38.34	1,648.83
2.12	Halogen flood light, 2000 W	2	m.th	6.66	0.00	92.77	0.00	617.58
		---	h	3,834.50	0.01	0.48	38.34	1,840.56
2.13	Ligthing line along tunnel, 100 m section	3.2	m.th	10.60	0.00	130.82	0.00	1,386.45
		---	h	6,104.52	0.01	0.41	61.05	2,502.85
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	359.48	0.15	18.51	53.92	6,654.05
		s.b	h	71.90	0.00	7.46	0.00	536.35
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	148.09	0.32	29.23	47.39	4,328.65
		s.b	h	29.62	0.00	12.36	0.00	366.08
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	810.28	0.33	30.84	267.39	24,988.98
		s.b	h	162.06	0.00	19.27	0.00	3,122.81
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	144.41	0.63	48.81	90.98	7,048.52
		s.b	h	28.88	0.00	20.84	0.00	601.89
Total to carry forward ----->>							122,204	703,776

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - LEVEL 1 DIVERSION TUNNEL - RIGTH BANK - ARCH (ROCK CLASS IV)**

**SEC 2.03
ANA 003
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						122,204	703,776
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	3.33	0.00	128.05	0.00	426.22
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.33	0.14	33.45	0.47	111.34
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	3.2	do	10.60	1.93	130.66	20.45	1,384.75
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	5.45	2.01	198.33	10.95	1,080.54
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	3.2	do	10.60	0.20	18.98	2.12	201.15
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	3	do	10.60	0.37	34.41	3.92	364.68
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	3.33	3.15	370.12	10.48	1,231.96
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	3.2	do	10.60	0.38	38.10	4.03	403.79
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	3.2	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	3.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 400 KVA	1	do	0.00	1.17	129.66	0.00	0.00
2.40	Transformer cabin, 400 kVA	2	do	0.00	6.80	833.80	0.00	0.00
2.41	Transformer cabin, 350 kVA	0	do	0.00	6.29	771.86	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3,081.05	2.31	0.00	7,117.22	0.00
3.02	Explosive, gramonite type	----	kg	27,729.44	2.06	0.00	57,122.65	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	11,235.64	0.00	1.98	0.00	22,246.57
3.06	Blasting connection wire	----	m	3,702.23	0.00	0.13	0.00	481.29
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	5.43	0.00	459.99	0.00	2,497.06
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	5.43	0.00	808.44	0.00	4,388.62
3.09	Jumbo drill shank adapter	----	n.	9.39	0.00	302.37	0.00	2,838.93
3.10	Jumbo drill bit, 51 mm dia.	----	n.	29.86	0.00	164.35	0.00	4,906.96
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.64	0.00	586.85	0.00	376.62
3.12	Integral drill steel, 800 mm	----	n.	6.30	0.00	132.65	0.00	836.15
3.13	Integral drill steel, 1600 mm	----	n.	5.52	0.00	153.97	0.00	849.22
3.14	Integral drill steel, 2400 mm	----	n.	3.94	0.00	174.35	0.00	686.88
3.15	Breaker tool, moiil point	----	n.	15.76	0.00	32.37	0.00	510.11
3.16	Pipeline supports including anchors	----	kg	796.00	1.38	3.22	1,098.48	2,563.12
3.17	Cable tray including supports and anchors	----	m	318.40	0.35	0.83	112.71	263.00
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	318.40	0.79	7.11	251.54	2,263.82
	Sub-total						187,959	754,689
	Missing items and construction contingencies	%		2.00%			3,759	15,094
	Total Direct Costs						191,718	769,782
	Overheads, risks and profit	%		52.00%			49,998	449,982
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		31,517			7.67	38.70
	AGGREGATE UNIT PRICE		m³					46.37

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - LEVEL 1 DIV. TUNNEL - PRESSURE STRETCH - UPPER BENCH - (ROCK CLASS III)

SEC 2.03
 ANA 004
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	95.81	0.00	47.25	0.00	4,527
1.02	Gang foreman	1	h	958.07	6.60	0.00	6,323	0.00
1.03	Tunnel specialist	1	h	958.07	3.69	0.00	3,535	0.00
1.04	Tunneling jumbo operator	1	h	958.07	5.82	0.00	5,576	0.00
1.05	Loader operator	---	h	124.23	5.82	0.00	723	0.00
1.06	Operator of dumpers and other units	---	h	904.25	5.82	0.00	5,263	0.00
1.07	Miner	4	h	3,832.29	2.99	0.00	11,459	0.00
1.08	Explosive specialist	0.33	h	319.04	3.69	0.00	1,177	0.00
1.09	Electrician	0.33	h	319.04	3.69	0.00	1,177	0.00
1.10	Mechanic	0.33	h	319.04	3.69	0.00	1,177	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	74.98	3.69	0.00	277	0.00
1.12	Pipe fitter	0.33	h	319.04	3.69	0.00	1,177	0.00
1.13	Helper	5	h	4,790.36	2.38	0.00	11,401	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.66	0.00	21,868.22	0.00	36,373.82
		---	h	198.86	3.71	122.14	737.79	24,289.29
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	8.32	0.00	187.16	0.00	1,556.53
		---	h	10.42	0.07	1.53	0.73	15.94
2.03	Hand-held rock drill, medium weighth type	4	m.th	6.65	0.00	130.63	0.00	869.12
		---	h	15.63	0.04	2.03	0.63	31.73
2.04	Hand-held breaker, medium weight type	5	m.th	8.32	0.00	46.95	0.00	390.46
		---	h	277.91	0.03	0.91	8.34	252.90
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	958.07	0.25	57.86	239.52	55,434.03
		s.b.	h	191.61	0.00	9.26	0.00	1,774.35
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00
		s.b.	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 375 kW (5.50 m3 heaped)	Op.	h	103.53	1.35	135.08	139.76	13,984.37
		s.b.	h	20.71	0.00	44.63	0.00	924.08
2.08	Mechanized pick scaler, 120 kW, 9.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b.	h	0.00	0.00	40.23	0.00	0.00
2.09	Dump truck, 36.60 t pay load capacity	Op.	h	330.81	1.32	98.59	436.67	32,614.55
		s.b.	h	66.16	0.00	33.74	0.00	2,232.31
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	1.66	0.00	747.05	0.00	1,242.58
		---	h	958.07	0.29	22.25	277.84	21,317.09
2.11	Halogen flood light, 1000 W	2	m.th	3.33	0.00	79.92	0.00	265.86
		---	h	1,916.14	0.01	0.43	19.16	823.94
2.12	Halogen flood light, 2000 W	2	m.th	3.33	0.00	92.77	0.00	308.61
		---	h	1,916.14	0.01	0.48	19.16	919.75
2.13	Ligthing line along tunnel, 100 m section	4.3	m.th	7.18	0.00	130.82	0.00	939.66
		---	h	4,137.34	0.01	0.41	41.37	1,696.31
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	239.52	0.15	18.51	35.93	4,433.48
		s.b.	h	47.90	0.00	7.46	0.00	357.36
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	185.84	0.32	29.23	59.47	5,432.02
		s.b.	h	37.17	0.00	12.36	0.00	459.39
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	435.73	0.33	30.84	143.79	13,438.04
		s.b.	h	87.15	0.00	19.27	0.00	1,679.32
2.17	Bulldozer in disposal area, Kw 72 n. power	Op.	h	65.88	0.63	48.81	41.51	3,215.84
		s.b.	h	13.18	0.00	20.84	0.00	274.61
Total to carry forward ----->>							51,467	232,074

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 004
RC III - T. B

UNDERGROUND EXCAV. - LEVEL 1 DIV. TUNNEL - PRESSURE STRETCH - UPPER BENCH - (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						51,467	232,074	
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.66	0.00	128.05	0.00	212.99	
		---	h	8.32	0.03	8.70	0.25	72.35	
2.19	Integral drill steel grinder	---	h	1.25	0.01	2.29	0.01	2.86	
2.20	Button bits grinder	---	h	61.23	0.04	5.32	2.45	325.75	
2.21	Breaker moil point resharpenner	---	h	1.39	0.01	1.57	0.01	2.18	
2.22	Steel structure for ventilation fan support	1	m.th	1.66			0.00	0.00	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	4.3	do	7.18			0.00	0.00	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	2	do	3.10	2.01	198.33	6.23	614.80	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4.3	do	7.18	0.20	18.98	1.44	136.33	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	4.3	do	7.18	0.44	41.32	3.16	296.80	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	1.66	3.15	370.12	5.24	615.63	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.3	do	7.18	0.83	84.05	5.96	603.72	
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	4.3	do	7.18	0.14	13.50	1.01	96.97	
2.37	Control board, 10 KVA	1	do	1.66	0.24	27.23	0.40	45.29	
2.38	Control board, 150 KVA	1	do	1.66	0.67	74.68	1.11	124.22	
2.39	Control board, 300 KVA	1	do	1.66	0.95	105.80	1.58	175.98	
2.40	Transformer cabin, 300 kVA	2	do	3.33	5.68	696.82	18.90	2,318.07	
2.41	Transformer cabin, 450 kVA	1	do	1.66	7.43	911.23	12.36	1,515.67	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	750.35	2.31	0.00	1,733.32	0.00	
3.02	Explosive, gramonite type	----	kg	6,753.18	2.06	0.00	13,911.54	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	7,916.38	0.00	1.98	0.00	15,674.44	
3.06	Blasting connection wire	----	m	3,716.75	0.00	0.13	0.00	483.18	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	5.94	0.00	459.99	0.00	2,731.09	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	5.94	0.00	808.44	0.00	4,799.94	
3.09	Jumbo drill shank adapter	----	ea.	9.50	0.00	302.37	0.00	2,872.41	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	29.69	0.00	164.35	0.00	4,878.97	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.93	0.00	586.85	0.00	545.29	
3.12	Integral drill steel, 800 mm	----	ea.	0.33	0.00	132.65	0.00	44.24	
3.13	Integral drill steel, 1600 mm	----	ea.	0.29	0.00	153.97	0.00	44.93	
3.14	Integral drill steel, 2400 mm	----	ea.	0.21	0.00	174.35	0.00	36.34	
3.15	Hand held breaker tool, moil point	----	ea.	0.00	0.00	32.37	0.00	0.00	
3.16	Supports of pipelines including anchors	----	kg	906.11	1.38	3.22	1,250.43	2,917.67	
3.17	Supports of power cables including anchors	----	m	362.44	0.35	0.83	128.30	299.38	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	362.44	0.79	7.11	286.33	2,576.97	
Sub-total								68,837	277,139
Missing items and construction contingencies		%	2.00%				1,377	5,543	
Total Direct Costs								70,214	282,681
Overheads, risks and profit		%	52.00%				18,351	165,155	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	13,895			6.37	32.23
AGGREGATE UNIT PRICE				m³					38.60

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - LEVEL 1 DIV. TUNNEL - PRESSURE STRETCH - UPPER BENCH - (ROCK CLASS IV)

SEC 2.03
 ANA 004
 RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	20.65	0.00	47.25	0.00	975.71
1.02	Gang foreman	1	h	206.50	6.60	0.00	1,362.90	0.00
1.03	Tunnel specialist	1	h	206.50	3.69	0.00	761.99	0.00
1.04	Tunneling jumbo operator	1	h	206.50	5.82	0.00	1,201.83	0.00
1.05	Loader operator	---	h	25.44	5.82	0.00	148.08	0.00
1.06	Operator of dumpers and other units	---	h	188.86	5.82	0.00	1,099.17	0.00
1.07	Miner	4	h	826.00	2.99	0.00	2,469.74	0.00
1.08	Explosive specialist	0.33	h	68.76	3.69	0.00	253.74	0.00
1.09	Electrician	0.33	h	68.76	3.69	0.00	253.74	0.00
1.10	Mechanic	0.33	h	68.76	3.69	0.00	253.74	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	14.04	3.69	0.00	51.80	0.00
1.12	Pipe fitter	0.33	h	68.76	3.69	0.00	253.74	0.00
1.13	Helper	5	h	1,032.50	2.38	0.00	2,457.35	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.36	0.00	21,868.22	0.00	7,839.91
		---	h	40.94	3.71	122.14	151.87	4,999.97
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	1.79	0.00	187.16	0.00	335.49
		---	h	2.00	0.07	1.53	0.14	3.05
2.03	Hand-held rock drill, medium weigth type	4	m.th	1.43	0.00	130.63	0.00	187.33
		---	h	2.99	0.04	2.03	0.12	6.08
2.04	Hand-held breaker, medium weight type	5	m.th	1.79	0.00	46.95	0.00	84.16
		---	h	53.21	0.03	0.91	1.60	48.42
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	206.50	0.25	57.86	51.63	11,948.10
		s.b.	h	41.30	0.00	9.26	0.00	382.44
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00
		s.b.	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 375 kW (5.50 m3 heaped)	Op.	h	21.20	1.35	135.08	28.62	2,864.16
		s.b.	h	4.24	0.00	44.63	0.00	189.26
2.08	Mechanized pick scaler, 120 kW, 9.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b.	h	0.00	0.00	40.23	0.00	0.00
2.09	Dump truck, 36.60 t pay load capacity	Op.	h	65.89	1.32	98.59	86.97	6,495.85
		s.b.	h	13.18	0.00	33.74	0.00	444.61
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.36	0.00	747.05	0.00	267.82
		---	h	206.50	0.29	22.25	59.89	4,594.63
2.11	Halogen flood light, 1000 W	2	m.th	0.72	0.00	79.92	0.00	57.30
		---	h	413.00	0.01	0.43	4.13	177.59
2.12	Halogen flood light, 2000 W	2	m.th	0.72	0.00	92.77	0.00	66.52
		---	h	413.00	0.01	0.48	4.13	198.24
2.13	Ligthing line along tunnel, 100 m section	4.3	m.th	1.55	0.00	130.82	0.00	202.53
		---	h	891.75	0.01	0.41	8.92	365.62
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	51.63	0.15	18.51	7.74	955.58
		s.b.	h	10.33	0.00	7.46	0.00	77.02
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	41.06	0.32	29.23	13.14	1,200.07
		s.b.	h	8.21	0.00	12.36	0.00	101.49
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	96.47	0.33	30.84	31.84	2,975.14
		s.b.	h	19.29	0.00	19.27	0.00	371.80
2.17	Bulldozer in disposal area, Kw 72 n. power	Op.	h	13.12	0.63	48.81	8.27	640.50
		s.b.	h	2.62	0.00	20.84	0.00	54.69
Total to carry forward ----->>							11,027	49,111

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAV. - LEVEL 1 DIV. TUNNEL - PRESSURE STRETCH - UPPER BENCH - (ROCK CLASS IV)**

**SEC 2.03
ANA 004
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						11,027	49,111
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.36	0.00	128.05	0.00	45.91
		---	h	1.79	0.03	8.70	0.05	15.60
2.19	Integral drill steel grinder	---	h	0.24	0.01	2.29	0.00	0.55
2.20	Button bits grinder	---	h	11.46	0.04	5.32	0.46	60.96
2.21	Breaker moil point resharpenner	---	h	0.27	0.01	1.57	0.00	0.42
2.22	Steel structure for ventilation fan support	1	m.th	0.36			0.00	0.00
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	4.3	do	1.55			0.00	0.00
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	0.67	2.01	198.33	1.34	132.51
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4.3	do	1.55	0.20	18.98	0.31	29.38
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	4.3	do	1.55	0.44	41.32	0.68	63.97
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.36	3.15	370.12	1.13	132.69
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.3	do	1.55	0.83	84.05	1.28	130.12
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	4.3	do	1.55	0.14	13.50	0.22	20.90
2.37	Control board, 10 KVA	1	do	0.36	0.24	27.23	0.09	9.76
2.38	Control board, 150 KVA	1	do	0.36	0.67	74.68	0.24	26.77
2.39	Control board, 300 KVA	1	do	0.36	0.95	105.80	0.34	37.93
2.40	Transformer cabin, 300 kVA	2	do	0.72	5.68	696.82	4.07	499.63
2.41	Transformer cabin, 450 kVA	1	do	0.36	7.43	911.23	2.66	326.68
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	135.69	2.31	0.00	313.44	0.00
3.02	Explosive, gramonite type	----	kg	1,221.19	2.06	0.00	2,515.65	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,708.04	0.00	1.98	0.00	3,381.92
3.06	Blasting connection wire	----	m	821.13	0.00	0.13	0.00	106.75
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	1.11	0.00	459.99	0.00	510.69
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	1.11	0.00	808.44	0.00	897.55
3.09	Jumbo drill shank adapter	----	ea.	1.78	0.00	302.37	0.00	537.12
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	5.55	0.00	164.35	0.00	912.33
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.18	0.00	586.85	0.00	104.41
3.12	Integral drill steel, 800 mm	----	ea.	0.06	0.00	132.65	0.00	8.47
3.13	Integral drill steel, 1600 mm	----	ea.	0.06	0.00	153.97	0.00	8.60
3.14	Integral drill steel, 2400 mm	----	ea.	0.04	0.00	174.35	0.00	6.96
3.15	Hand held breaker tool, moil point	----	ea.	0.53	0.00	32.37	0.00	17.22
3.16	Supports of pipelines including anchors	----	kg	173.49	1.38	3.22	239.42	558.64
3.17	Supports of power cables including anchors	----	m	69.40	0.35	0.83	24.57	57.32
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	69.40	0.79	7.11	54.82	493.41
Sub-total							14,188	58,246
Missing items and construction contingencies		%		2.00%			284	1,165
Total Direct Costs							14,471	59,411
Overheads, risks and profit		%		52.00%			3,842	34,577
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³		2,661			6.88	35.33
AGGREGATE UNIT PRICE		m³						42.21

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 005
RC III - T. A

UNDERGROUND EXCAV. - L1 DIV. TUNNEL - FREEFLOW STRETCH - LEFT BANK - UPPER BENCH (R. CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	104.26	0.00	47.25	0.00	4,926	
1.02	Gang foreman	1	h	1,042.63	6.60	0.00	6,881	0.00	
1.03	Tunnel specialist	1	h	1,042.63	3.69	0.00	3,847	0.00	
1.04	Tunneling jumbo operator	1	h	1,042.63	5.82	0.00	6,068	0.00	
1.05	Loader operator	---	h	143.51	5.82	0.00	835	0.00	
1.06	Operator of dumpers and other units	---	h	1,050.93	5.82	0.00	6,116	0.00	
1.07	Miner	4	h	4,170.50	2.99	0.00	12,470	0.00	
1.08	Explosive specialist	0.33	h	347.19	3.69	0.00	1,281	0.00	
1.09	Electrician	0.33	h	347.19	3.69	0.00	1,281	0.00	
1.10	Mechanic	0.33	h	347.19	3.69	0.00	1,281	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	80.86	3.69	0.00	298	0.00	
1.12	Pipe fitter	0.33	h	347.19	3.69	0.00	1,281	0.00	
1.13	Helper	5	h	5,213.13	2.38	0.00	12,407	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.81	0.00	19,475.66	0.00	35,253.16	
		---	h	255.61	3.17	94.80	810.29	24,231.91	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	9.05	0.00	187.16	0.00	1,693.90	
		---	h	12.73	0.07	1.53	0.89	19.48	
2.03	Hand-held rock drill, medium weigth type	4	m.th	7.24	0.00	130.63	0.00	945.82	
		---	h	19.10	0.04	2.03	0.76	38.77	
2.04	Hand-held breaker, medium weight type	5	m.th	9.05	0.00	46.95	0.00	424.92	
		---	h	339.54	0.03	0.91	10.19	308.98	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	1,042.63	0.25	57.86	260.66	60,326.31	
		s.b.	h	208.53	0.00	9.26	0.00	1,930.94	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00	
		s.b.	h	0.00	0.00	10.73	0.00	0.00	
2.07	Wheel loader, 375 kW (5.50 m3 heaped)	Op.	h	119.59	1.35	135.08	161.44	16,153.91	
		s.b.	h	23.92	0.00	44.63	0.00	1,067.44	
2.08	Mechanized pick scaler, 120 kW, 9.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b.	h	0.00	0.00	40.23	0.00	0.00	
2.09	Dump truck, 36.60 t pay load capacity	Op.	h	429.50	1.32	98.59	566.94	42,344.36	
		s.b.	h	85.90	0.00	33.74	0.00	2,898.26	
2.10	Sound-proof axial tunnel fan, 175 kW	1	m.th	1.81	0.00	1,027.61	0.00	1,860.09	
		---	h	1,042.63	0.64	51.43	667.28	53,622.23	
2.11	Halogen flood light, 1000 W	2	m.th	3.62	0.00	79.92	0.00	289.33	
		---	h	2,085.25	0.01	0.43	20.85	896.66	
2.12	Halogen flood light, 2000 W	2	m.th	3.62	0.00	92.77	0.00	335.85	
		---	h	2,085.25	0.01	0.48	20.85	1,000.92	
2.13	Ligthing line along tunnel, 100 m section	8.2	m.th	14.78	0.00	130.82	0.00	1,933.20	
		---	h	8,511.89	0.01	0.41	85.12	3,489.87	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	260.66	0.15	18.51	39.10	4,824.75	
		s.b.	h	52.13	0.00	7.46	0.00	388.90	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	185.51	0.32	29.23	59.36	5,422.57	
		s.b.	h	37.10	0.00	12.36	0.00	458.59	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	445.49	0.33	30.84	147.01	13,738.76	
		s.b.	h	89.10	0.00	19.27	0.00	1,716.90	
2.17	Bulldozer in disposal area, Kw 72 n. power	Op.	h	79.72	0.63	48.81	50.23	3,891.34	
		s.b.	h	15.94	0.00	20.84	0.00	332.29	
Total to carry forward ----->>								56,949	286,767

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 005

UNDERGROUND EXCAV. - DIV. TUNNEL - FREEFLOW STRETCH - LEFT BANK - UPPER BENCH (ROCK CLASS III) RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						56,949	286,767
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.81	0.00	128.05	0.00	231.79
		---	h	9.05	0.03	8.70	0.27	78.74
2.19	Integral drill steel grinder	---	h	1.53	0.01	2.29	0.02	3.50
2.20	Button bits grinder	---	h	65.85	0.04	5.32	2.63	350.34
2.21	Breaker moil point resharpen	---	h	1.70	0.01	1.57	0.02	2.67
2.22	Steel structure for ventilation fan support	1	m.th	1.81			0.00	0.00
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	8.2	do	14.78			0.00	0.00
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	4.77	2.01	198.33	9.58	945.17
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	8.2	do	14.78	0.20	18.98	2.96	280.48
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	8.2	do	14.78	0.44	41.32	6.50	610.61
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.81	3.15	370.12	5.70	669.96
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	8.2	do	14.78	0.83	84.05	12.27	1,242.06
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	8.2	do	14.78	0.14	13.50	2.07	199.50
2.37	Control board, 10 KVA	1	do	1.81	0.24	27.23	0.43	49.29
2.38	Control board, 150 KVA	1	do	1.81	0.67	74.68	1.21	135.18
2.39	Control board, 300 KVA	1	do	1.81	0.95	105.80	1.72	191.51
2.40	Transformer cabin, 300 kVA	2	do	3.62	5.68	696.82	20.56	2,522.65
2.41	Transformer cabin, 450 kVA	1	do	1.81	7.43	911.23	13.45	1,649.43
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	916.74	2.31	0.00	2,117.68	0.00
3.02	Explosive, gramonite type	----	kg	8,250.70	2.06	0.00	16,996.45	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	8,533.15	0.00	1.98	0.00	16,895.64
3.06	Blasting connection wire	----	m	3,710.28	0.00	0.13	0.00	482.34
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	6.40	0.00	459.99	0.00	2,943.87
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	6.40	0.00	808.44	0.00	5,173.90
3.09	Jumbo drill shank adapter	----	ea.	10.24	0.00	302.37	0.00	3,096.20
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	32.00	0.00	164.35	0.00	5,259.09
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.93	0.00	586.85	0.00	544.34
3.12	Integral drill steel, 800 mm	----	ea.	0.41	0.00	132.65	0.00	54.05
3.13	Integral drill steel, 1600 mm	----	ea.	0.36	0.00	153.97	0.00	54.89
3.14	Integral drill steel, 2400 mm	----	ea.	0.25	0.00	174.35	0.00	44.40
3.15	Hand held breaker tool, moil point	----	ea.	0.00	0.00	32.37	0.00	0.00
3.16	Supports of pipelines including anchors	----	kg	1,282.34	1.38	3.22	1,769.64	4,129.15
3.17	Supports of power cables including anchors	----	m	512.94	0.35	0.83	181.58	423.69
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	512.94	0.79	7.11	405.22	3,646.99
Sub-total							78,499	338,678
Missing items and construction contingencies		%		2.00%			1,570	6,774
Total Direct Costs							80,069	345,452
Overheads, risks and profit		%		52.00%			22,127	199,144
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		16,977			6.02	32.08
AGGREGATE UNIT PRICE		m ³						38.10

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 005

UNDERGROUND EXCAV. - DIV. TUNNEL - FREEFLOW STRETCH - LEFT BANK - UPPER BENCH (ROCK CLASS IV) RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	68.97	0.00	47.25	0.00	3,258.80	
1.02	Gang foreman	1	h	689.69	6.60	0.00	4,551.97	0.00	
1.03	Tunnel specialist	1	h	689.69	3.69	0.00	2,544.97	0.00	
1.04	Tunneling jumbo operator	1	h	689.69	5.82	0.00	4,014.01	0.00	
1.05	Loader operator	---	h	90.32	5.82	0.00	525.67	0.00	
1.06	Operator of dumpers and other units	---	h	672.91	5.82	0.00	3,916.31	0.00	
1.07	Miner	4	h	2,758.77	2.99	0.00	8,248.73	0.00	
1.08	Explosive specialist	0.33	h	229.67	3.69	0.00	847.47	0.00	
1.09	Electrician	0.33	h	229.67	3.69	0.00	847.47	0.00	
1.10	Mechanic	0.33	h	229.67	3.69	0.00	847.47	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	46.78	3.69	0.00	172.62	0.00	
1.12	Pipe fitter	0.33	h	229.67	3.69	0.00	847.47	0.00	
1.13	Helper	5	h	3,448.46	2.38	0.00	8,207.35	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.20	0.00	19,475.66	0.00	23,319.83	
		---	h	161.07	3.17	94.80	510.59	15,269.24	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	5.99	0.00	187.16	0.00	1,120.51	
		---	h	7.53	0.07	1.53	0.53	11.52	
2.03	Hand-held rock drill, medium weigth type	4	m.th	4.79	0.00	130.63	0.00	625.66	
		---	h	11.30	0.04	2.03	0.45	22.94	
2.04	Hand-held breaker, medium weight type	5	m.th	5.99	0.00	46.95	0.00	281.09	
		---	h	200.87	0.03	0.91	6.03	182.79	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	689.69	0.25	57.86	172.42	39,905.63	
		s.b.	h	137.94	0.00	9.26	0.00	1,277.31	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00	
		s.b.	h	0.00	0.00	10.73	0.00	0.00	
2.07	Wheel loader, 375 kW (5.50 m3 heaped)	Op.	h	75.27	1.35	135.08	101.61	10,167.13	
		s.b.	h	15.05	0.00	44.63	0.00	671.84	
2.08	Mechanized pick scaler, 120 kW, 9.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b.	h	0.00	0.00	40.23	0.00	0.00	
2.09	Dump truck, 36.60 t pay load capacity	Op.	h	263.72	1.32	98.59	348.11	26,000.40	
		s.b.	h	52.74	0.00	33.74	0.00	1,779.60	
2.10	Sound-proof axial tunnel fan, 175 kW	1	m.th	1.20	0.00	1,027.61	0.00	1,230.44	
		---	h	689.69	0.64	51.43	441.40	35,470.91	
2.11	Halogen flood light, 1000 W	2	m.th	2.39	0.00	79.92	0.00	191.39	
		---	h	1,379.39	0.01	0.43	13.79	593.14	
2.12	Halogen flood light, 2000 W	2	m.th	2.39	0.00	92.77	0.00	222.16	
		---	h	1,379.39	0.01	0.48	13.79	662.11	
2.13	Ligthing line along tunnel, 100 m section	8.2	m.th	9.78	0.00	130.82	0.00	1,278.81	
		---	h	5,630.58	0.01	0.41	56.31	2,308.54	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	172.42	0.15	18.51	25.86	3,191.55	
		s.b.	h	34.48	0.00	7.46	0.00	257.26	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	126.63	0.32	29.23	40.52	3,701.51	
		s.b.	h	25.33	0.00	12.36	0.00	313.04	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	304.01	0.33	30.84	100.32	9,375.75	
		s.b.	h	60.80	0.00	19.27	0.00	1,171.66	
2.17	Bulldozer in disposal area, Kw 72 n. power	Op.	h	48.95	0.63	48.81	30.84	2,389.37	
		s.b.	h	9.79	0.00	20.84	0.00	204.03	
Total to carry forward ----->>								37,434	186,456

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 005

UNDERGROUND EXCAV. - DIV. TUNNEL - FREEFLOW STRETCH - LEFT BANK - UPPER BENCH (ROCK CLASS IV) RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						37,434	186,456
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.20	0.00	128.05	0.00	153.32
		---	h	5.99	0.03	8.70	0.18	52.09
2.19	Integral drill steel grinder	---	h	0.90	0.01	2.29	0.01	2.07
2.20	Button bits grinder	---	h	38.08	0.04	5.32	1.52	202.58
2.21	Breaker moil point resharpen	---	h	1.00	0.01	1.57	0.01	1.58
2.22	Steel structure for ventilation fan support	1	m.th	1.20			0.00	0.00
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	8.2	do	9.78			0.00	0.00
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	3.15	2.01	198.33	6.34	625.22
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	8.2	do	9.78	0.20	18.98	1.96	185.54
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	8.2	do	9.78	0.44	41.32	4.30	403.92
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.20	3.15	370.12	3.77	443.18
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	8.2	do	9.78	0.83	84.05	8.11	821.62
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	8.2	do	9.78	0.14	13.50	1.37	131.97
2.37	Control board, 10 KVA	1	do	1.20	0.24	27.23	0.29	32.60
2.38	Control board, 150 KVA	1	do	1.20	0.67	74.68	0.80	89.42
2.39	Control board, 300 KVA	1	do	1.20	0.95	105.80	1.14	126.68
2.40	Transformer cabin, 300 kVA	2	do	2.39	5.68	696.82	13.60	1,668.72
2.41	Transformer cabin, 450 kVA	1	do	1.20	7.43	911.23	8.90	1,091.09
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	512.21	2.31	0.00	1,183.21	0.00
3.02	Explosive, gramonite type	----	kg	4,609.92	2.06	0.00	9,496.43	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5,689.58	0.00	1.98	0.00	11,265.37
3.06	Blasting connection wire	----	m	2,532.68	0.00	0.13	0.00	329.25
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	3.70	0.00	459.99	0.00	1,701.15
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	3.70	0.00	808.44	0.00	2,989.79
3.09	Jumbo drill shank adapter	----	ea.	5.92	0.00	302.37	0.00	1,789.17
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	18.49	0.00	164.35	0.00	3,039.02
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.55	0.00	586.85	0.00	322.03
3.12	Integral drill steel, 800 mm	----	ea.	0.24	0.00	132.65	0.00	31.97
3.13	Integral drill steel, 1600 mm	----	ea.	0.21	0.00	153.97	0.00	32.47
3.14	Integral drill steel, 2400 mm	----	ea.	0.15	0.00	174.35	0.00	26.27
3.15	Hand held breaker tool, moil point	----	ea.	2.01	0.00	32.37	0.00	65.02
3.16	Supports of pipelines including anchors	----	kg	758.63	1.38	3.22	1,046.91	2,442.79
3.17	Supports of power cables including anchors	----	m	303.45	0.35	0.83	107.42	250.65
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	303.45	0.79	7.11	239.73	2,157.54
Sub-total							49,560	218,930
Missing items and construction contingencies		%		2.00%			991	4,379
Total Direct Costs							50,551	223,309
Overheads, risks and profit		%		52.00%			14,241	128,166
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		10,043			6.45	35.00
AGGREGATE UNIT PRICE		m ³						41.45

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 006

UNDERGROUND EXCAVATION - LEVEL 1 DIV. TUNNEL RIGTH BANK - UPPER BENCHING (ROCK CLASS IV)

RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	56.93	0.00	47.25	0.00	2,690.04	
1.02	Gang foreman	1	h	569.32	6.60	0.00	3,757.51	0.00	
1.03	Tunnel specialist	1	h	569.32	3.69	0.00	2,100.79	0.00	
1.04	Tunneling jumbo operator	1	h	569.32	5.82	0.00	3,313.44	0.00	
1.05	Loader operator	---	h	71.98	5.82	0.00	418.91	0.00	
1.06	Operator of dumpers and other units	---	h	638.80	5.82	0.00	3,717.80	0.00	
1.07	Miner	4	h	2,277.28	2.99	0.00	6,809.06	0.00	
1.08	Explosive specialist	0.33	h	189.58	3.69	0.00	699.56	0.00	
1.09	Electrician	0.33	h	189.58	3.69	0.00	699.56	0.00	
1.10	Mechanic	0.33	h	189.58	3.69	0.00	699.56	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	36.33	3.69	0.00	134.06	0.00	
1.12	Pipe fitter	0.33	h	189.58	3.69	0.00	699.56	0.00	
1.13	Helper	5	h	2,846.60	2.38	0.00	6,774.90	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.99	0.00	19,475.66	0.00	19,249.78	
		---	h	121.60	3.17	94.80	385.49	11,528.11	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	4.94	0.00	187.16	0.00	924.95	
		---	h	6.31	0.07	1.53	0.44	9.66	
2.03	Hand-held rock drill, medium weigth type	4	m.th	3.95	0.00	130.63	0.00	516.46	
		---	h	9.47	0.04	2.03	0.38	19.22	
2.04	Hand-held breaker, medium weight type	5	m.th	4.94	0.00	46.95	0.00	232.03	
		---	h	168.34	0.03	0.91	5.05	153.19	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	569.32	0.25	57.86	142.33	32,940.83	
		s.b.	h	113.86	0.00	9.26	0.00	1,054.38	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00	
		s.b.	h	0.00	0.00	10.73	0.00	0.00	
2.07	Wheel loader, 375 kW (5.50 m3 heaped)	Op.	h	59.98	1.35	135.08	80.97	8,102.29	
		s.b.	h	12.00	0.00	44.63	0.00	535.39	
2.08	Mechanized pick scaler, 120 kW, 9.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b.	h	0.00	0.00	40.23	0.00	0.00	
2.09	Dump truck, 36.60 t pay load capacity	Op.	h	307.18	1.32	98.59	405.48	30,285.11	
		s.b.	h	61.44	0.00	33.74	0.00	2,072.87	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.99	0.00	856.34	0.00	846.41	
		---	h	569.32	0.38	29.58	216.34	16,840.47	
2.11	Halogen flood light, 1000 W	2	m.th	1.98	0.00	79.92	0.00	157.99	
		---	h	1,138.64	0.01	0.43	11.39	489.61	
2.12	Halogen flood light, 2000 W	2	m.th	1.98	0.00	92.77	0.00	183.39	
		---	h	1,138.64	0.01	0.48	11.39	546.55	
2.13	Ligthing line along tunnel, 100 m section	5.5	m.th	5.46	0.00	130.82	0.00	714.32	
		---	h	3,145.15	0.01	0.41	31.45	1,289.51	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	142.33	0.15	18.51	21.35	2,634.53	
		s.b.	h	28.47	0.00	7.46	0.00	212.36	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	90.97	0.32	29.23	29.11	2,658.99	
		s.b.	h	18.19	0.00	12.36	0.00	224.87	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	238.85	0.33	30.84	78.82	7,366.11	
		s.b.	h	47.77	0.00	19.27	0.00	920.53	
2.17	Bulldozer in disposal area, Kw 72 n. power	Op.	h	40.25	0.63	48.81	25.35	1,964.37	
		s.b.	h	8.05	0.00	20.84	0.00	167.74	
Total to carry forward ----->>								31,270	147,532

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03

ANA 006

UNDERGROUND EXCAVATION - LEVEL 1 DIV. TUNNEL RIGTH BANK - UPPER BENCHING (ROCK CLASS IV)

RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						31,270	147,532
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.99	0.00	128.05	0.00	126.56
		---	h	4.94	0.03	8.70	0.15	43.00
2.19	Integral drill steel grinder	---	h	0.76	0.01	2.29	0.01	1.73
2.20	Button bits grinder	---	h	29.52	0.04	5.32	1.18	157.03
2.21	Breaker moil point resharpenner	---	h	0.84	0.01	1.57	0.01	1.32
2.22	Steel structure for ventilation fan support	1	m.th	0.99			0.00	0.00
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	5.5	do	5.46			0.00	0.00
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	2.08	2.01	198.33	4.18	412.62
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	5.5	do	5.46	0.20	18.98	1.09	103.64
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	5.5	do	5.46	0.44	41.32	2.40	225.62
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.99	3.15	370.12	3.11	365.83
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	5.5	do	5.46	0.83	84.05	4.53	458.94
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	5.5	do	5.46	0.14	13.50	0.76	73.71
2.37	Control board, 10 KVA	1	do	0.99	0.24	27.23	0.24	26.91
2.38	Control board, 150 KVA	1	do	0.99	0.67	74.68	0.66	73.81
2.39	Control board, 300 KVA	1	do	0.99	0.95	105.80	0.94	104.57
2.40	Transformer cabin, 300 kVA	2	do	1.98	5.68	696.82	11.23	1,377.48
2.41	Transformer cabin, 450 kVA	1	do	0.99	7.43	911.23	7.34	900.66
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	429.27	2.31	0.00	991.62	0.00
3.02	Explosive, gramonite type	----	kg	3,863.47	2.06	0.00	7,958.74	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	4,419.78	0.00	1.98	0.00	8,751.17
3.06	Blasting connection wire	----	m	1,819.35	0.00	0.13	0.00	236.52
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.87	0.00	459.99	0.00	1,321.49
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.87	0.00	808.44	0.00	2,322.53
3.09	Jumbo drill shank adapter	----	ea.	4.60	0.00	302.37	0.00	1,389.87
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	14.36	0.00	164.35	0.00	2,360.77
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.39	0.00	586.85	0.00	231.33
3.12	Integral drill steel, 800 mm	----	ea.	0.20	0.00	132.65	0.00	26.80
3.13	Integral drill steel, 1600 mm	----	ea.	0.18	0.00	153.97	0.00	27.22
3.14	Integral drill steel, 2400 mm	----	ea.	0.13	0.00	174.35	0.00	22.01
3.15	Hand held breaker tool, moil point	----	ea.	1.68	0.00	32.37	0.00	54.49
3.16	Supports of pipelines including anchors	----	kg	1,381.10	1.38	3.22	1,905.92	4,447.14
3.17	Supports of power cables including anchors	----	m	552.44	0.35	0.83	195.56	456.32
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	552.44	0.79	7.11	436.43	3,927.85
	Sub-total						42,796	177,561
	Missing items and construction contingencies	%		2.00%			856	3,551
	Total Direct Costs						43,652	181,112
	Overheads, risks and profit	%		52.00%			11,688	105,190
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		8,417			6.57	34.01
	AGGREGATE UNIT PRICE	m ³						40.59

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 007

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - PRESSURE STRETCH - LOWER BENCH (ROCK CLASS III)

RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	163.41	0.00	47.25	0.00	7,721.30
1.02	Gang foreman	1	h	1,634.14	6.60	0.00	10,785.31	0.00
1.03	Tunnel specialist	1	h	1,634.14	3.69	0.00	6,029.97	0.00
1.04	Crawler drill rig operator	----	h	675.07	5.82	0.00	3,928.91	0.00
1.05	Loader operator	----	h	315.12	5.82	0.00	1,833.98	0.00
1.06	Operator of dumpers and other units	----	h	1,803.36	5.82	0.00	10,495.55	0.00
1.07	Miner	3	h	4,902.41	2.99	0.00	14,658.21	0.00
1.08	Explosive specialist	1	h	1,634.14	3.69	0.00	6,029.97	0.00
1.09	Electrician	0.33	h	179.76	3.69	0.00	663.30	0.00
1.10	Mechanic	0.33	h	179.76	3.69	0.00	663.30	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	52.69	3.69	0.00	194.43	0.00
1.12	Pipe fitter	0.33	h	179.76	3.69	0.00	663.30	0.00
1.13	Helper	5	h	8,170.69	2.38	0.00	19,446.24	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	2.84	0.29	24.56	0.82	69.68
		---	h	613.70	0.00	16.40	0.00	10,064.69
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	11.35	0.00	187.16	0.00	2,123.92
		---	h	57.53	0.07	1.53	4.03	88.02
2.03	Hand-held rock drill, medium weight type	4	m.th	11.35	0.00	130.63	0.00	1,482.41
		---	h	86.29	0.04	2.03	3.45	175.17
2.04	Hand-held breaker, medium weight type	5	m.th	14.19	0.00	46.95	0.00	666.00
		---	h	204.54	0.03	0.91	6.14	186.13
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	1,634.14	0.15	24.64	245.12	40,265.15
		s.b.	h	326.83	0.00	5.46	0.00	1,784.48
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	613.70	0.33	99.41	202.52	61,007.98
		s.b.	h	122.74	0.00	11.98	0.00	1,470.43
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	286.47	1.35	135.08	386.74	38,696.43
		s.b.	h	57.29	0.00	44.63	0.00	2,557.04
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	572.68	1.32	98.59	755.93	56,460.05
		s.b.	h	114.54	0.00	33.74	0.00	3,864.41
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	2.84	0.00	856.34	0.00	2,429.47
		----	h	1,634.14	0.38	29.58	620.97	48,337.79
2.11	Halogen flood light, 1000 W	2	m.th	5.67	0.00	79.92	0.00	453.47
		----	h	3,268.28	0.01	0.43	32.68	1,405.36
2.12	Halogen flood light, 2000 W	2	m.th	5.67	0.00	92.77	0.00	526.39
		----	h	3,268.28	0.01	0.48	32.68	1,568.77
2.13	Ligthing line along tunnel, 100 m section	4.3	m.th	12.25	0.00	130.82	0.00	1,602.74
		----	h	7,056.86	0.01	0.41	70.57	2,893.31
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	306.40	0.15	18.51	45.96	5,671.48
		s.b.	h	61.28	0.00	7.46	0.00	457.15
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	64.81	0.32	29.23	20.74	1,894.42
		s.b.	h	12.96	0.00	12.36	0.00	160.21
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	594.99	0.33	30.84	196.35	18,349.58
		s.b.	h	119.00	0.00	19.27	0.00	2,293.10
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	100.54	0.63	48.81	63.34	4,907.28
		s.b.	h	20.11	0.00	20.84	0.00	419.04
Total to carry forward ----->>>							78,080	322,053

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 007
RC III - T. B

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - PRESSURE STRETCH - LOWER BENCH (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						78,080	322,053
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	2.84	0.00	82.94	0.00	235.30
		---	h	5.67	0.01	4.39	0.06	24.91
2.19	Integral drill steel grinder	1	h	3.60	0.01	2.29	0.04	8.23
2.20	Button bits grinder	1	h	40.31	0.04	5.32	1.61	214.47
2.21	Breaker tool resharpener	1	h	7.67	0.01	1.57	0.08	12.04
2.22	Steel structure for ventilation fan support	1	m.th	2.84	0.42	100.34	1.19	284.67
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	4	do	12.25	2.21	149.88	27.08	1,836.25
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	5.29	2.01	198.33	10.63	1,048.64
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4	do	12.25	0.20	18.98	2.45	232.53
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	4	do	12.25	1.40	139.97	17.15	1,714.84
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	2.84	3.15	370.12	8.94	1,050.05
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	12.25	0.38	38.10	4.66	466.78
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4	do	12.25	0.14	13.50	1.72	165.40
2.37	Control board, 10 KVA	2	do	5.67	0.24	27.23	1.36	154.51
2.38	Control board, 150 KVA	1	do	2.84	0.67	74.68	1.90	211.87
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 150 kVA	1	do	2.84	0.67	74.68	1.90	211.87
2.41	Transformer cabin, 450 kVA	1	do	2.84	7.43	911.23	21.08	2,585.20
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	10,464.78	2.31	0.00	24,173.63	0.00
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	1,620.27	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00
3.06	Blasting connection wire	----	m	2,873.28	0.00	0.13	0.00	373.53
3.07	Detonating fuse	----	ea.	24,601.19	0.00	0.82	0.00	20,172.97
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	10.37	0.00	483.24	0.00	5,011.40
3.09	Shank adapter for ditto	----	ea.	6.33	0.00	277.11	0.00	1,755.37
3.10	Coupling for ditto	----	ea.	12.37	0.00	54.15	0.00	670.02
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	20.16	0.00	291.98	0.00	5,885.31
3.12	Integral drill steel, 800 mm	----	ea.	1.34	0.00	132.65	0.00	178.06
3.13	Integral drill steel, 1600 mm	----	ea.	1.15	0.00	153.97	0.00	177.15
3.14	Integral drill steel, 2400 mm	----	ea.	0.38	0.00	174.35	0.00	66.87
3.15	Hand held breaker tool,moil point	----	ea.	2.56	0.00	32.37	0.00	82.76
3.16	Pipeline supports including anchors	----	kg	906.11	1.38	3.22	1,250.43	2,917.67
3.17	Cable tray including supports and anchors	----	m	362.44	0.35	0.83	128.30	299.38
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	362.44	0.79	7.11	286.33	2,576.97
Sub-total							104,021	372,678
Missing items and construction contingencies		%		2.00%			2,080	7,454
Total Direct Costs							106,101	380,131
Overheads, risks and profit		%		52.00%			25,284	227,557
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m ³	25,567.58		5.14	23.77
AGGREGATE UNIT PRICE				m ³				28.91

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - PRESSURE STRETCH - LOWER BENCH (ROCK CLASS IV)

SEC 2.03
 ANA 007
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	21.75	0.00	47.25	0.00	1,027.70
1.02	Gang foreman	1	h	217.50	6.60	0.00	1,435.52	0.00
1.03	Tunnel specialist	1	h	217.50	3.69	0.00	802.59	0.00
1.04	Crawler drill rig operator	----	h	133.49	5.82	0.00	776.94	0.00
1.05	Loader operator	----	h	317.31	5.82	0.00	1,846.72	0.00
1.06	Operator of dumpers and other units	----	h	231.87	5.82	0.00	1,754.32	0.00
1.07	Miner	3	h	652.51	2.99	0.00	2,536.30	0.00
1.08	Explosive specialist	1	h	217.50	3.69	0.00	1,043.36	0.00
1.09	Electrician	0.33	h	23.93	3.69	0.00	88.28	0.00
1.10	Mechanic	0.33	h	23.93	3.69	0.00	88.28	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	10.09	3.69	0.00	37.23	0.00
1.12	Pipe fitter	0.33	h	23.93	3.69	0.00	88.28	0.00
1.13	Helper	5	h	1,087.51	2.38	0.00	3,364.77	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.38	0.29	24.56	0.11	9.27
		---	h	121.36	0.00	16.40	0.00	1,990.28
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.51	0.00	187.16	0.00	282.69
		---	h	11.01	0.07	1.53	0.77	16.85
2.03	Hand-held rock drill, medium weight type	4	m.th	1.51	0.00	130.63	0.00	197.31
		---	h	16.52	0.04	2.03	0.66	33.54
2.04	Hand-held breaker, medium weight type	5	m.th	1.89	0.00	46.95	0.00	88.64
		---	h	39.16	0.03	0.91	1.17	35.64
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	217.50	0.15	24.64	32.63	5,359.27
		s.b.	h	43.50	0.00	5.46	0.00	237.51
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	121.36	0.33	99.41	40.05	12,064.23
		s.b.	h	24.27	0.00	11.98	0.00	290.77
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	288.46	1.35	135.08	389.42	38,965.08
		s.b.	h	57.69	0.00	44.63	0.00	2,574.79
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	110.45	1.32	98.59	145.79	10,889.26
		s.b.	h	22.09	0.00	33.74	0.00	745.32
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.38	0.00	856.34	0.00	323.36
		----	h	217.50	0.38	29.58	82.65	6,433.73
2.11	Halogen flood light, 1000 W	2	m.th	0.76	0.00	79.92	0.00	60.36
		----	h	435.01	0.01	0.43	4.35	187.05
2.12	Halogen flood light, 2000 W	2	m.th	0.76	0.00	92.77	0.00	70.06
		----	h	435.01	0.01	0.48	4.35	208.80
2.13	Ligthing line along tunnel, 100 m section	4.3	m.th	1.63	0.00	130.82	0.00	213.32
		----	h	939.26	0.01	0.41	9.39	385.10
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	40.78	0.15	18.51	6.12	754.87
		s.b.	h	8.16	0.00	7.46	0.00	60.85
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	12.41	0.32	29.23	3.97	362.72
		s.b.	h	2.48	0.00	12.36	0.00	30.68
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	27.76	0.33	30.84	9.16	856.07
		s.b.	h	5.55	0.00	19.27	0.00	106.98
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	19.39	0.63	48.81	12.22	946.45
		s.b.	h	3.88	0.00	20.84	0.00	80.82
Total to carry forward ----->>>							14,605	85,889

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03

ANA 007

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - PRESSURE STRETCH - LOWER BENCH (ROCK CLASS IV)

RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						14,605	85,889	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.38	0.00	82.94	0.00	31.32	
		---	h	0.76	0.01	4.39	0.01	3.32	
2.19	Integral drill steel grinder	1	h	0.69	0.01	2.29	0.01	1.58	
2.20	Button bits grinder	1	h	7.72	0.04	5.32	0.31	41.06	
2.21	Breaker tool resharpener	1	h	1.47	0.01	1.57	0.01	2.31	
2.22	Steel structure for ventilation fan support	1	m.th	0.38	0.42	100.34	0.16	37.89	
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	4	do	1.63	2.21	149.88	3.60	244.40	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	2	do	0.70	2.01	198.33	1.41	139.57	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4	do	1.63	0.20	18.98	0.33	30.95	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	4	do	1.63	1.40	139.97	2.28	228.24	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.38	3.15	370.12	1.19	139.76	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	1.63	0.38	38.10	0.62	62.13	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4	do	1.63	0.14	13.50	0.23	22.01	
2.37	Control board, 10 KVA	2	do	0.76	0.24	27.23	0.18	20.56	
2.38	Control board, 150 KVA	1	do	0.38	0.67	74.68	0.25	28.20	
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00	
2.40	Transformer cabin, 150 kVA	1	do	0.38	0.67	74.68	0.25	28.20	
2.41	Transformer cabin, 450 kVA	1	do	0.38	7.43	911.23	2.81	344.09	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	210.39	2.31	0.00	486.01	0.00	
3.02	Explosive, gramonite type	----	kg	1,893.53	2.06	0.00	3,900.68	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	310.23	0.00	1.98	0.00	614.26	
3.06	Blasting connection wire	----	m	550.14	0.00	0.13	0.00	71.52	
3.07	Detonating fuse	----	ea.	4,710.37	0.00	0.82	0.00	3,862.50	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	1.99	0.00	483.24	0.00	959.53	
3.09	Shank adapter for ditto	----	ea.	1.21	0.00	277.11	0.00	336.10	
3.10	Coupling for ditto	----	ea.	2.37	0.00	54.15	0.00	128.29	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	3.86	0.00	291.98	0.00	1,126.85	
3.12	Integral drill steel, 800 mm	----	ea.	0.26	0.00	132.65	0.00	34.09	
3.13	Integral drill steel, 1600 mm	----	ea.	0.22	0.00	153.97	0.00	33.92	
3.14	Integral drill steel, 2400 mm	----	ea.	0.07	0.00	174.35	0.00	12.80	
3.15	Hand held breaker tool,moil point	----	ea.	0.49	0.00	32.37	0.00	15.85	
3.16	Pipeline supports including anchors	----	kg	173.49	1.38	3.22	239.42	558.64	
3.17	Cable tray including supports and anchors	----	m	69.40	0.35	0.83	24.57	57.32	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	69.40	0.79	7.11	54.82	493.41	
Sub-total								19,325	95,600
Missing items and construction contingencies		%		2.0%			386	1,912	
Total Direct Costs								19,711	97,512
Overheads, risks and profit		%		52.00%			6,096	54,860	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		4,895.40			5.27	31.13	
AGGREGATE UNIT PRICE		m ³							36.40

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 008

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - FREEFLOW S. LEFT BANK - LOWER BENCH (ROCK CLASS III) RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	186.28	0.00	47.25	0.00	8,801.57
1.02	Gang foreman	1	h	1,862.77	6.60	0.00	12,294.26	0.00
1.03	Tunnel specialist	1	h	1,862.77	3.69	0.00	6,873.61	0.00
1.04	Crawler drill rig operator	----	h	1,027.67	5.82	0.00	5,981.02	0.00
1.05	Loader operator	----	h	415.83	5.82	0.00	2,420.12	0.00
1.06	Operator of dumpers and other units	----	h	2,156.20	5.82	0.00	12,549.06	0.00
1.07	Miner	3	h	5,588.30	2.99	0.00	16,709.02	0.00
1.08	Explosive specialist	1	h	1,862.77	3.69	0.00	6,873.61	0.00
1.09	Electrician	0.33	h	204.90	3.69	0.00	756.10	0.00
1.10	Mechanic	0.33	h	204.90	3.69	0.00	756.10	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	65.55	3.69	0.00	241.89	0.00
1.12	Pipe fitter	0.33	h	204.90	3.69	0.00	756.10	0.00
1.13	Helper	5	h	9,313.83	2.38	0.00	22,166.93	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	3.23	0.29	24.56	0.94	79.43
		---	h	934.24	0.00	16.40	0.00	15,321.58
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	12.94	0.00	187.16	0.00	2,421.08
		---	h	77.03	0.07	1.53	5.39	117.86
2.03	Hand-held rock drill, medium weight type	4	m.th	12.94	0.00	130.63	0.00	1,689.81
		---	h	115.55	0.04	2.03	4.62	234.56
2.04	Hand-held breaker, medium weight type	5	m.th	16.17	0.00	46.95	0.00	759.17
		---	h	273.89	0.03	0.91	8.22	249.24
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	1,862.77	0.15	24.64	279.42	45,898.58
		s.b.	h	372.55	0.00	5.46	0.00	2,034.14
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	934.24	0.33	99.41	308.30	92,873.07
		s.b.	h	186.85	0.00	11.98	0.00	2,238.45
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	378.03	1.35	135.08	510.33	51,063.67
		s.b.	h	75.61	0.00	44.63	0.00	3,374.25
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	882.52	1.32	98.59	1,164.93	87,007.91
		s.b.	h	176.50	0.00	33.74	0.00	5,955.26
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	3.23	0.00	978.67	0.00	3,164.99
		----	h	1,862.77	0.55	44.15	1,024.52	82,241.16
2.11	Halogen flood light, 1000 W	2	m.th	6.47	0.00	79.92	0.00	516.92
		----	h	3,725.53	0.01	0.43	37.26	1,601.98
2.12	Halogen flood light, 2000 W	2	m.th	6.47	0.00	92.77	0.00	600.03
		----	h	3,725.53	0.01	0.48	37.26	1,788.26
2.13	Ligthing line along tunnel, 100 m section	9.8	m.th	31.73	0.00	130.82	0.00	4,151.10
		----	h	18,277.28	0.01	0.41	182.77	7,493.69
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	349.27	0.15	18.51	52.39	6,464.97
		s.b.	h	69.85	0.00	7.46	0.00	521.11
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	64.70	0.32	29.23	20.70	1,891.12
		s.b.	h	12.94	0.00	12.36	0.00	159.93
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	529.60	0.33	30.84	174.77	16,332.90
		s.b.	h	105.92	0.00	19.27	0.00	2,041.08
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	134.09	0.63	48.81	84.48	6,544.81
		s.b.	h	26.82	0.00	20.84	0.00	558.88
Total to carry forward ----->>							92,274	456,193

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 008

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - FREEFLOW S. LEFT BANK - LOWER BENCH (ROCK CLASS III) RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						92,274	456,193	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.23	0.00	82.94	0.00	268.23	
		---	h	6.47	0.01	4.39	0.06	28.39	
2.19	Integral drill steel grinder	1	h	4.81	0.01	2.29	0.05	11.03	
2.20	Button bits grinder	1	h	49.81	0.04	5.32	1.99	265.01	
2.21	Breaker tool resharper	1	h	10.27	0.01	1.57	0.10	16.13	
2.22	Steel structure for ventilation fan support	1	m.th	3.23	0.57	133.79	1.84	432.67	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	10	do	31.73	2.35	159.52	74.57	5,061.79	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	3	do	9.58	2.01	198.33	19.26	1,900.05	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	10	do	31.73	0.20	18.98	6.35	602.26	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	10	do	31.73	1.40	139.97	44.42	4,441.44	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	3.23	3.15	370.12	10.19	1,196.96	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	10	do	31.73	0.38	38.10	12.06	1,208.97	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10	do	31.73	0.14	13.50	4.44	428.37	
2.37	Control board, 10 KVA	2	do	6.47	0.24	27.23	1.55	176.12	
2.38	Control board, 250 KVA	1	do	3.23	0.87	97.24	2.81	314.47	
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00	
2.40	Transformer cabin, 250 kVA	1	do	3.23	0.87	97.24	2.81	314.47	
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	13,955.54	2.31	0.00	32,237.29	0.00	
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	2,021.81	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00	
3.06	Blasting connection wire	----	m	3,191.77	0.00	0.13	0.00	414.93	
3.07	Detonating fuse	----	ea.	30,239.51	0.00	0.82	0.00	24,796.40	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	13.57	0.00	483.24	0.00	6,556.97	
3.09	Shank adapter for ditto	----	ea.	7.83	0.00	277.11	0.00	2,169.04	
3.10	Coupling for ditto	----	ea.	16.19	0.00	54.15	0.00	876.66	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	24.91	0.00	291.98	0.00	7,272.26	
3.12	Integral drill steel, 800 mm	----	ea.	1.80	0.00	132.65	0.00	238.43	
3.13	Integral drill steel, 1600 mm	----	ea.	1.54	0.00	153.97	0.00	237.21	
3.14	Integral drill steel, 2400 mm	----	ea.	0.51	0.00	174.35	0.00	89.54	
3.15	Hand held breaker tool,moil point	----	ea.	3.42	0.00	32.37	0.00	110.82	
3.16	Pipeline supports including anchors	----	kg	1,541.20	1.38	3.22	2,126.86	4,962.68	
3.17	Cable tray including supports and anchors	----	m	616.48	0.35	0.83	218.23	509.21	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	616.48	0.79	7.11	487.02	4,383.18	
Sub-total							127,526	525,476	
Missing items and construction contingencies		%		2.00%			2,551	10,510	
Total Direct Costs							130,077	535,986	
Overheads, risks and profit		%		52.00%			34,635	311,717	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	34,236			4.81	24.76
AGGREGATE UNIT PRICE				m³			29.57		

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 008

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - FREEFLOW S. LEFT BANK - LOWER BENCH (ROCK CLASS IV) RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	102.16	0.00	47.25	0.00	4,826.92
1.02	Gang foreman	1	h	1,021.57	6.60	0.00	6,742.36	0.00
1.03	Tunnel specialist	1	h	1,021.57	3.69	0.00	3,769.59	0.00
1.04	Crawler drill rig operator	----	h	630.45	5.82	0.00	3,669.24	0.00
1.05	Loader operator	----	h	418.23	5.82	0.00	2,434.07	0.00
1.06	Operator of dumpers and other units	----	h	1,168.01	5.82	0.00	8,837.18	0.00
1.07	Miner	3	h	3,064.71	2.99	0.00	11,912.53	0.00
1.08	Explosive specialist	1	h	1,021.57	3.69	0.00	4,900.47	0.00
1.09	Electrician	0.33	h	112.37	3.69	0.00	414.66	0.00
1.10	Mechanic	0.33	h	112.37	3.69	0.00	414.66	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	38.78	3.69	0.00	143.10	0.00
1.12	Pipe fitter	0.33	h	112.37	3.69	0.00	414.66	0.00
1.13	Helper	5	h	5,107.85	2.38	0.00	15,803.69	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	1.77	0.29	24.56	0.51	43.56
		---	h	573.14	0.00	16.40	0.00	9,399.48
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	7.09	0.00	187.16	0.00	1,327.76
		---	h	45.57	0.07	1.53	3.19	69.72
2.03	Hand-held rock drill, medium weight type	4	m.th	7.09	0.00	130.63	0.00	926.72
		---	h	68.36	0.04	2.03	2.73	138.77
2.04	Hand-held breaker, medium weight type	5	m.th	8.87	0.00	46.95	0.00	416.34
		---	h	162.03	0.03	0.91	4.86	147.45
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	1,021.57	0.15	24.64	153.24	25,171.49
		s.b.	h	204.31	0.00	5.46	0.00	1,115.55
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	573.14	0.33	99.41	189.14	56,975.75
		s.b.	h	114.63	0.00	11.98	0.00	1,373.24
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	380.21	1.35	135.08	513.28	51,358.11
		s.b.	h	76.04	0.00	44.63	0.00	3,393.71
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	525.22	1.32	98.59	693.30	51,781.79
		s.b.	h	105.04	0.00	33.74	0.00	3,544.21
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	1.77	0.00	978.67	0.00	1,735.73
		----	h	1,021.57	0.55	44.15	561.86	45,102.32
2.11	Halogen flood light, 1000 W	2	m.th	3.55	0.00	79.92	0.00	283.49
		----	h	2,043.14	0.01	0.43	20.43	878.55
2.12	Halogen flood light, 2000 W	2	m.th	3.55	0.00	92.77	0.00	329.07
		----	h	2,043.14	0.01	0.48	20.43	980.71
2.13	Ligthing line along tunnel, 100 m section	9.8	m.th	17.40	0.00	130.82	0.00	2,276.53
		----	h	10,023.54	0.01	0.41	100.24	4,109.65
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	191.54	0.15	18.51	28.73	3,545.49
		s.b.	h	38.31	0.00	7.46	0.00	285.78
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.28	0.32	29.23	12.25	1,118.78
		s.b.	h	7.66	0.00	12.36	0.00	94.62
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	226.99	0.33	30.84	74.91	7,000.24
		s.b.	h	45.40	0.00	19.27	0.00	874.80
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	79.80	0.63	48.81	50.27	3,895.07
		s.b.	h	15.96	0.00	20.84	0.00	332.61
Total to carry forward ----->>							61,886	284,854

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 008

UNDERGROUND EXCAVATION - L1 DIV. TUNNEL - FREEFLOW S. LEFT BANK - LOWER BENCH (ROCK CLASS IV) RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						61,886	284,854
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.77	0.00	82.94	0.00	147.10
		---	h	3.55	0.01	4.39	0.04	15.57
2.19	Integral drill steel grinder	1	h	2.85	0.01	2.29	0.03	6.52
2.20	Button bits grinder	1	h	29.47	0.04	5.32	1.18	156.78
2.21	Breaker tool resharper	1	h	6.08	0.01	1.57	0.06	9.54
2.22	Steel structure for ventilation fan support	1	m.th	1.77	0.57	133.79	1.01	237.28
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	10	do	17.40	2.35	159.52	40.89	2,775.96
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	5.25	2.01	198.33	10.56	1,042.02
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	10	do	17.40	0.20	18.98	3.48	330.29
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	10	do	17.40	1.40	139.97	24.36	2,435.76
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.77	3.15	370.12	5.59	656.43
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	10	do	17.40	0.38	38.10	6.61	663.02
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	10	do	17.40	0.14	13.50	2.44	234.93
2.37	Control board, 10 KVA	2	do	3.55	0.24	27.23	0.85	96.59
2.38	Control board, 250 KVA	1	do	1.77	0.87	97.24	1.54	172.46
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 250 kVA	1	do	1.77	0.87	97.24	1.54	172.46
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	866.70	2.31	0.00	2,002.08	0.00
3.02	Explosive, gramonite type	----	kg	7,800.33	2.06	0.00	16,068.67	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,196.10	0.00	1.98	0.00	2,368.27
3.06	Blasting connection wire	----	m	1,888.24	0.00	0.13	0.00	245.47
3.07	Detonating fuse	----	ea.	17,889.59	0.00	0.82	0.00	14,669.46
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	8.03	0.00	483.24	0.00	3,879.08
3.09	Shank adapter for ditto	----	ea.	4.63	0.00	277.11	0.00	1,283.20
3.10	Coupling for ditto	----	ea.	9.58	0.00	54.15	0.00	518.63
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	14.73	0.00	291.98	0.00	4,302.24
3.12	Integral drill steel, 800 mm	----	ea.	1.06	0.00	132.65	0.00	141.05
3.13	Integral drill steel, 1600 mm	----	ea.	0.91	0.00	153.97	0.00	140.33
3.14	Integral drill steel, 2400 mm	----	ea.	0.30	0.00	174.35	0.00	52.97
3.15	Hand held breaker tool,moil point	----	ea.	2.03	0.00	32.37	0.00	65.56
3.16	Pipeline supports including anchors	----	kg	911.77	1.38	3.22	1,258.24	2,935.90
3.17	Cable tray including supports and anchors	----	m	364.71	0.35	0.83	129.11	301.25
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	364.71	0.79	7.11	288.12	2,593.08
	Sub-total						81,732	327,503
	Missing items and construction contingencies	%		2.0%			1,635	6,550
	Total Direct Costs						83,367	334,053
	Overheads, risks and profit	%		52.00%			21,706	195,353
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	20,254			5.19	26.14
	AGGREGATE UNIT PRICE		m ³					31.33

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 009

UNDERGROUND EXCAVATION - L1 DIVERSION TUNNEL - RIGTH BANK - LOWER BENCH (ROCK CLASS IV)

RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	239.20	0.00	47.25	0.00	11,302.08
1.02	Gang foreman	1	h	2,391.98	6.60	0.00	15,787.04	0.00
1.03	Tunnel specialist	1	h	2,391.98	3.69	0.00	8,826.39	0.00
1.04	Crawler drill rig operator	----	h	922.13	5.82	0.00	5,366.77	0.00
1.05	Loader operator	----	h	521.43	5.82	0.00	3,034.72	0.00
1.06	Operator of dumpers and other units	----	h	3,252.68	5.82	0.00	24,609.78	0.00
1.07	Miner	3	h	7,175.93	2.99	0.00	27,892.82	0.00
1.08	Explosive specialist	1	h	2,391.98	3.69	0.00	11,474.31	0.00
1.09	Electrician	0.33	h	263.12	3.69	0.00	970.90	0.00
1.10	Mechanic	0.33	h	263.12	3.69	0.00	970.90	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	70.59	3.69	0.00	260.47	0.00
1.12	Pipe fitter	0.33	h	263.12	3.69	0.00	970.90	0.00
1.13	Helper	5	h	11,959.88	2.38	0.00	37,003.86	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	4.15	0.29	24.56	1.20	101.99
		---	h	838.30	0.00	16.40	0.00	13,748.05
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	16.61	0.00	187.16	0.00	3,108.90
		---	h	83.68	0.07	1.53	5.86	128.04
2.03	Hand-held rock drill, medium weight type	4	m.th	16.61	0.00	130.63	0.00	2,169.89
		---	h	125.52	0.04	2.03	5.02	254.82
2.04	Hand-held breaker, medium weight type	5	m.th	20.76	0.00	46.95	0.00	974.85
		---	h	297.54	0.03	0.91	8.93	270.76
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	2,391.98	0.15	24.64	358.80	58,938.27
		s.b.	h	478.40	0.00	5.46	0.00	2,612.04
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	838.30	0.33	99.41	276.64	83,334.96
		s.b.	h	167.66	0.00	11.98	0.00	2,008.56
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	474.03	1.35	135.08	639.94	64,031.47
		s.b.	h	94.81	0.00	44.63	0.00	4,231.16
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	1,318.40	1.32	98.59	1,740.28	129,980.64
		s.b.	h	263.68	0.00	33.74	0.00	8,896.53
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	4.15	0.00	747.05	0.00	3,102.30
		----	h	2,391.98	0.29	22.25	693.67	53,221.45
2.11	Halogen flood light, 1000 W	2	m.th	8.31	0.00	79.92	0.00	663.77
		----	h	4,783.95	0.01	0.43	47.84	2,057.10
2.12	Halogen flood light, 2000 W	2	m.th	8.31	0.00	92.77	0.00	770.50
		----	h	4,783.95	0.01	0.48	47.84	2,296.30
2.13	Ligthing line along tunnel, 100 m section	3.2	m.th	13.22	0.00	130.82	0.00	1,729.74
		----	h	7,616.05	0.01	0.41	76.16	3,122.58
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	448.50	0.15	18.51	67.27	8,301.65
		s.b.	h	89.70	0.00	7.46	0.00	669.16
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	55.95	0.32	29.23	17.90	1,635.42
		s.b.	h	11.19	0.00	12.36	0.00	138.31
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	987.60	0.33	30.84	325.91	30,457.70
		s.b.	h	197.52	0.00	19.27	0.00	3,806.22
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	146.54	0.63	48.81	92.32	7,152.49
		s.b.	h	29.31	0.00	20.84	0.00	610.77
Total to carry forward ----->>							141,574	505,828

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.03
ANA 009
RC IV - T. B

UNDERGROUND EXCAVATION - L1 DIVERSION TUNNEL - RIGTH BANK - LOWER BENCH (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						141,574	505,828
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	4.15	0.00	82.94	0.00	344.43
		---	h	8.31	0.01	4.39	0.08	36.46
2.19	Integral drill steel grinder	1	h	5.23	0.01	2.29	0.05	11.98
2.20	Button bits grinder	1	h	53.59	0.04	5.32	2.14	285.12
2.21	Breaker tool resharpeners	1	h	11.16	0.01	1.57	0.11	17.52
2.22	Steel structure for ventilation fan support	1	m.th	4.15	0.31	73.58	1.29	305.56
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	3	do	13.22	2.35	159.52	31.07	2,109.22
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	6.80	2.01	198.33	13.66	1,348.09
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3	do	13.22	0.14	13.13	1.85	173.61
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	3	do	13.22	0.74	69.67	9.78	921.20
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	0	do	0.00	1.40	139.97	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	4.15	2.37	278.28	9.84	1,155.62
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	3	do	13.22	0.38	38.10	5.02	503.77
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3	do	13.22	0.14	13.50	1.85	178.50
2.37	Control board, 10 KVA	2	do	8.31	0.24	27.23	1.99	226.16
2.38	Control board, 100 KVA	1	do	4.15	0.53	58.60	2.20	243.35
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 100 kVA	1	do	4.15	4.61	566.03	19.14	2,350.57
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1,600.43	2.31	0.00	3,697.00	0.00
3.02	Explosive, gramonite type	----	kg	14,403.91	2.06	0.00	29,672.06	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,748.44	0.00	1.98	0.00	3,461.91
3.06	Blasting connection wire	----	m	2,760.20	0.00	0.13	0.00	358.83
3.07	Detonating fuse	----	ea.	31,117.41	0.00	0.82	0.00	25,516.27
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	16.97	0.00	483.24	0.00	8,201.55
3.09	Shank adapter for ditto	----	ea.	8.42	0.00	277.11	0.00	2,333.62
3.10	Coupling for ditto	----	ea.	20.25	0.00	54.15	0.00	1,096.54
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	26.80	0.00	291.98	0.00	7,824.06
3.12	Integral drill steel, 800 mm	----	ea.	1.95	0.00	132.65	0.00	259.01
3.13	Integral drill steel, 1600 mm	----	ea.	1.67	0.00	153.97	0.00	257.69
3.14	Integral drill steel, 2400 mm	----	ea.	0.56	0.00	174.35	0.00	97.27
3.15	Hand held breaker tool,moil point	----	ea.	3.72	0.00	32.37	0.00	120.39
3.16	Pipeline supports including anchors	----	kg	796.00	1.38	3.22	1,098.48	2,563.12
3.17	Cable tray including supports and anchors	----	m	318.40	0.35	0.83	112.71	263.00
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	318.40	0.79	7.11	251.54	2,263.82
Sub-total							176,506	570,657
Missing items and construction contingencies		%		2.0%			3,530	11,413
Total Direct Costs							180,036	582,070
Overheads, risks and profit		%		52.00%			39,630	356,666
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m ³	37,193			5.91	25.24
AGGREGATE UNIT PRICE			m ³					31.15

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - AUXILIARY DIVERSION TUNNEL - (ROCK CLASS III)**

**SEC 2.03
ANA 010
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	153.48	0.00	47.25	0.00	7,252.06
1.02	Gang foreman	1	hr	1,534.83	6.60	0.00	10,129.86	0.00
1.03	Tunnel specialist	1	hr	940.32	0.00	45.38	0.00	42,671.74
1.04	Tunneling jumbo operator	1	hr	940.32	5.82	0.00	5,472.66	0.00
1.05	Loader operator	---	hr	255.08	5.82	0.00	1,484.57	0.00
1.06	Operator of dumpers and other units	---	h	922.58	5.82	0.00	5,369.44	0.00
1.07	Miner	5	hr	4,701.60	2.99	0.00	14,057.79	0.00
1.08	Explosive specialist	1	hr	940.32	3.69	0.00	3,469.78	0.00
1.09	Electrician	0.33	hr	313.13	3.69	0.00	1,155.44	0.00
1.10	Mechanic	0.33	hr	313.13	3.69	0.00	1,155.44	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	66.74	3.69	0.00	246.25	0.00
1.12	Pipe fitter	0.33	hr	313.13	3.69	0.00	1,155.44	0.00
1.13	Helper	6	hr	5,641.92	2.38	0.00	13,427.78	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.63	0.00	21,868.22	0.00	35,699.88
		---	h	117.42	3.71	122.14	435.62	14,341.34
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	8.16	0.00	187.16	0.00	1,527.69
		---	h	125.91	0.07	1.53	8.81	192.64
2.03	Hand-held rock drill, medium weight type	4	m.th	6.53	0.00	130.63	0.00	853.01
		---	h	188.86	0.04	2.03	7.55	383.39
2.04	Hand-held breaker, medium weight type	5	m.th	8.16	0.00	46.95	0.00	383.23
		---	h	402.90	0.03	0.91	12.09	366.64
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	940.32	0.29	77.99	272.69	73,335.59
		s.b	h	188.06	0.00	10.73	0.00	2,017.93
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	212.57	1.05	95.46	223.20	20,291.67
		---	h	42.51	0.00	36.59	0.00	1,555.57
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	37.20	0.70	64.44	26.04	2,397.20
		s.b	h	7.44	0.00	40.23	0.00	299.31
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	516.26	1.12	114.78	578.21	59,255.86
		s.b	h	103.25	0.00	50.07	0.00	5,169.79
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	1.63	0.00	978.67	0.00	1,597.68
		---	h	940.32	0.55	44.15	517.18	41,515.15
2.11	Halogen flood light, 1000 W	2	m.th	3.27	0.00	79.92	0.00	260.94
		---	h	1,880.64	0.01	0.43	18.81	808.68
2.12	Halogen flood light, 2000 W	2	m.th	3.27	0.00	92.77	0.00	302.89
		---	h	1,880.64	0.01	0.48	18.81	902.71
2.13	Ligthning line along tunnel, 100 m section	11.1	m.th	18.09	0.00	130.82	0.00	2,366.09
		---	h	10,417.90	0.01	0.41	104.18	4,271.34
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	176.31	0.15	18.51	26.45	3,263.50
		s.b	h	35.26	0.00	7.46	0.00	263.05
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	72.22	0.32	29.23	23.11	2,110.97
		s.b	h	14.44	0.00	12.36	0.00	178.53
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	356.26	0.33	30.84	117.57	10,987.02
		s.b	h	71.25	0.00	19.27	0.00	1,373.02
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	73.93	0.63	48.81	46.57	3,608.41
		s.b	h	14.79	0.00	20.84	0.00	308.13
Total to carry forward ----->>							59,561	342,113

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - AUXILIARY DIVERSION TUNNEL - (ROCK CLASS III)**

**SEC 2.03
ANA 010
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						59,561	342,113
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.63	0.00	128.05	0.00	209.04
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.63	0.57	133.79	0.93	218.41
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	11.1	do	18.09	2.21	149.88	39.97	2,710.83
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	5.25	2.01	198.33	10.55	1,041.20
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	11.1	do	18.09	0.20	18.98	3.62	343.28
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	11.1	do	18.09	0.37	34.41	6.69	622.36
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.63	3.15	370.12	5.14	604.22
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11.1	do	18.09	0.38	38.10	6.87	689.10
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	11.1	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	11.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1,616.65	2.31	0.00	3,734.46	0.00
3.02	Explosive, gramonite type	----	kg	14,549.85	2.06	0.00	29,972.69	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5,530.66	0.00	1.98	0.00	10,950.71
3.06	Blasting connection wire	----	m	1,805.48	0.00	0.13	0.00	234.71
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.08	0.00	459.99	0.00	1,417.86
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.08	0.00	808.44	0.00	2,491.92
3.09	Jumbo drill shank adapter	----	n.	5.33	0.00	302.37	0.00	1,611.98
3.10	Jumbo drill bit, 51 mm dia.	----	n.	16.95	0.00	164.35	0.00	2,786.24
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.36	0.00	586.85	0.00	211.91
3.12	Integral drill steel, 800 mm	----	n.	3.36	0.00	132.65	0.00	445.38
3.13	Integral drill steel, 1600 mm	----	n.	2.94	0.00	153.97	0.00	452.34
3.14	Integral drill steel, 2400 mm	----	n.	2.10	0.00	174.35	0.00	365.87
3.15	Breaker tool, moiil point	----	n.	8.39	0.00	32.37	0.00	271.71
3.16	Pipeline supports including anchors	----	kg	2,769.78	1.38	3.22	3,822.29	8,918.68
3.17	Cable tray including supports and anchors	----	m	1,107.91	0.35	0.83	392.20	915.13
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,107.91	0.79	7.11	875.25	7,877.24
	Sub-total						98,432	387,503
	Missing items and construction contingencies	%		2.00%			1,969	7,750
	Total Direct Costs						100,401	395,253
	Overheads, risks and profit	%		52.00%			25,774	231,966
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	16,788			7.52	37.36
	AGGREGATE UNIT PRICE		m³					44.88

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2.04
ANA 001

UNDERGROUND EXCAVATION - DIVERSION TUNNEL MAINTENANCE GATE CHAMBER - ARCH (ROCK CLASS III) RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	18.08	0.00	47.25	0.00	854.39
1.02	Gang foreman	1	h	180.82	6.60	0.00	1,193.43	0.00
1.03	Tunnel specialist	1	h	542.47	3.69	0.00	2,001.70	0.00
1.04	Tunneling jumbo operator	1	h	542.47	5.82	0.00	3,157.16	0.00
1.05	Loader operator	1	h	542.47	5.82	0.00	3,157.16	0.00
1.06	Operator of dumpers and other units	---	h	636.59	5.82	0.00	3,704.97	0.00
1.07	Miner	4	h	2,169.87	2.99	0.00	6,487.90	0.00
1.08	Explosive specialist	1	h	542.47	3.69	0.00	2,001.70	0.00
1.09	Electrician	0	h	60.21	3.69	0.00	222.19	0.00
1.10	Mechanic	0	h	60.21	3.69	0.00	222.19	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	28.70	3.69	0.00	105.91	0.00
1.12	Pipe fitter	0	h	60.21	3.69	0.00	222.19	0.00
1.13	Helper	5	h	2,712.33	2.38	0.00	6,455.36	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.94	0.00	15,947.19	0.00	15,018.79
		---	h	78.93	2.88	85.71	227.31	6,764.86
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.77	0.00	187.16	0.00	705.06
		---	h	6.13	0.07	1.53	0.43	9.38
2.03	Hand-held rock drill, medium weight type	3	m.th	2.83	0.00	130.63	0.00	369.08
		---	h	9.19	0.04	2.03	0.37	18.67
2.04	Hand-held breaker, medium weight type	4	m.th	3.77	0.00	46.95	0.00	176.87
		---	h	130.77	0.03	0.91	3.92	119.00
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.94	0.15	24.64	0.14	23.21
		---	h	542.47	0.00	5.46	0.00	2,961.87
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.94	0.20	40.08	0.19	37.75
		---	h	542.47	0.00	7.50	0.00	4,068.50
2.07	Weeel loader, 199 kW, 4.0 m3 heaped rock bucket	Op.	h	62.44	1.05	95.46	65.57	5,960.80
		s.b	h	12.49	0.00	36.59	0.00	456.96
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	364.26	0.73	75.31	265.91	27,432.10
		s.b	h	72.85	0.00	33.01	0.00	2,404.82
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.94	0.00	0.00	0.00	0.00
		---	h	542.47	0.38	29.58	206.14	16,046.17
2.11	Halogen flood light, 1000 W	2	m.th	1.88	0.00	79.92	0.00	150.53
		---	h	1,084.93	0.01	0.43	10.85	466.52
2.12	Halogen flood light, 2000 W	1	m.th	0.94	0.00	92.77	0.00	87.37
		---	h	542.47	0.01	0.48	5.42	260.38
2.13	Ligthing line along tunnel, 100 m section	4.3	m.th	4.08	0.00	130.82	0.00	534.39
		---	h	2450.93	0.01	0.41	24.51	1,004.88
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	135.62	0.15	18.51	20.34	2,510.27
		---	h	27.12	0.00	7.46	0.00	202.34
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	45.02	0.32	29.23	14.41	1,315.98
		s.b	h	9.00	0.00	12.36	0.00	111.29
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	492.98	0.26	24.87	128.17	12,260.30
		s.b	h	98.60	0.00	15.28	0.00	1,506.53
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	33.83	0.63	48.81	21.31	1,651.06
		s.b	h	6.77	0.00	20.84	0.00	140.99
Total to carry forward ----->>							29,926.84	105,631.09

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						29,926.84	105,631.09	
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.94	0.00	82.94	0.00	78.11	
		---	h	4.71	0.01	4.39	0.05	20.67	
2.19	Integral drill steel grinder	---	h	1.53	0.01	2.29	0.02	3.51	
2.20	Button bits grinder	---	h	22.39	0.04	5.32	0.90	119.09	
2.21	Breaker moil point resharpen	---	h	1.36	0.01	1.57	0.01	2.14	
2.22	Steel structure for ventilation fan support	1	m.th	0.94	0.42	100.34	0.40	94.50	
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	4.3	do	4.08	1.93	130.66	7.88	533.73	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	1.76	1.36	134.52	2.39	236.59	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4.3	do	4.08	0.14	13.13	0.57	53.63	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	4.3	do	4.08	0.37	34.41	1.51	140.56	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.94	2.37	278.28	2.23	262.08	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	4.08	0.38	38.10	1.55	155.63	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	4.3	do	4.08	0.55	55.77	2.25	227.81	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4.3	do	4.08	0.14	13.50	0.57	55.15	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	846	2.31	0.00	1,954.05	0.00	
3.02	Explosive, gramonite type	----	kg	7613	2.06	0.00	15,683.13	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	2865	0.00	1.98	0.00	5,672.18	
3.06	Blasting connection wire	----	m	900	0.00	0.13	0.00	117.06	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.19	0.00	459.99	0.00	1,009.02	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.19	0.00	808.44	0.00	1,773.37	
3.09	Jumbo drill shank adapter	----	ea.	3.51	0.00	302.37	0.00	1,061.23	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	10.97	0.00	164.35	0.00	1,802.57	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.23	0.00	586.85	0.00	132.10	
3.12	Integral drill steel, 800 mm	----	ea.	0.25	0.00	132.65	0.00	32.52	
3.13	Integral drill steel, 1600 mm	----	ea.	0.21	0.00	153.97	0.00	33.03	
3.14	Integral drill steel, 2400 mm	----	ea.	0.15	0.00	174.35	0.00	26.72	
3.15	Hand held breaker tool, moil point	----	ea.	2.72	0.00	32.37	0.00	88.19	
3.16	Pipeline supports including anchors	----	kg	1,084.35	1.38	3.22	1,496.40	3,491.61	
3.17	Cable tray including supports and anchors	----	m	433.74	0.35	0.83	153.54	358.27	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	433.74	0.79	7.11	342.65	3,083.89	
Sub-total								49,576.95	126,296.08
Missing items and construction contingencies		%		2.00%			991.54	2,525.92	
Total Direct Costs								50,568.49	128,822.00
Overheads, risks and profit		%		52.00%			9,328.31	83,954.75	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	8,173		7.33	26.03	
AGGREGATE UNIT PRICE				m³				33.36	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - MAINTENANCE GATE CHAMBER - BENCHING (ROCK CLASS III)

SEC 2-4
 ANA 002
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	54.06	0.00	47.25	0.00	2,554.14
1.02	Gang foreman	1	h	540.56	6.60	0.00	3,567.68	0.00
1.03	Tunnel specialist	1	h	540.56	3.69	0.00	1,994.66	0.00
1.04	Crawler drill rig operator	----	h	162.79	5.82	0.00	947.41	0.00
1.05	Loader operator	----	h	230.87	5.82	0.00	1,343.65	0.00
1.06	Operator of dumpers and other units	----	h	772.86	5.82	0.00	4,498.06	0.00
1.07	Miner	3	h	1,621.67	2.99	0.00	4,848.80	0.00
1.08	Explosive specialist	1	h	540.56	3.69	0.00	1,994.66	0.00
1.09	Electrician	0.33	h	59.46	3.69	0.00	219.41	0.00
1.10	Mechanic	0.33	h	59.46	3.69	0.00	219.41	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	13.83	3.69	0.00	51.02	0.00
1.12	Pipe fitter	0.33	h	59.46	3.69	0.00	219.41	0.00
1.13	Helper	5	h	2,702.79	2.38	0.00	6,432.64	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.94	0.29	24.56	0.27	23.05
		---	h	147.99	0.00	16.40	0.00	2,426.99
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.75	0.00	187.16	0.00	702.57
		---	h	13.85	0.07	1.53	0.97	21.19
2.03	Hand-held rock drill, medium weight type	4	m.th	3.75	0.00	130.63	0.00	490.37
		---	h	20.77	0.04	2.03	0.83	42.17
2.04	Hand-held breaker, medium weight type	5	m.th	4.69	0.00	46.95	0.00	220.31
		---	h	49.24	0.03	0.91	1.48	44.81
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	540.56	0.15	24.64	81.08	13,319.34
		s.b.	h	108.11	0.00	5.46	0.00	590.29
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	147.99	0.33	99.41	48.84	14,711.39
		s.b.	h	29.60	0.00	11.98	0.00	354.58
2.07	Wheel loader, 157 kW (3.10 m3 heaped)	Op.	h	77.52	0.75	70.52	58.14	5,466.49
	(loading of muck on dumper)	s.b.	h	15.50	0.00	26.87	0.00	416.58
2.08	Wheel loader, 157 kW (3.10 m3 heaped)	Op.	h	132.36	1.35	135.08	178.69	17,879.62
	(transfer of muck to the vertical shaft)	s.b.	h	26.47	0.00	44.63	0.00	1,181.47
2.09	Articulated tunnel dump truck, 25 t pay load	Op.	h	345.01	0.73	75.31	251.86	25,982.73
		s.b.	h	69.00	0.00	33.01	0.00	2,277.76
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.94	0.00	856.34	0.00	803.65
		----	h	540.56	0.38	29.58	205.41	15,989.70
2.11	Halogen flood light, 1000 W	2	m.th	1.88	0.00	79.92	0.00	150.00
		----	h	1,081.12	0.01	0.43	10.81	464.88
2.12	Halogen flood light, 2000 W	2	m.th	1.88	0.00	92.77	0.00	174.12
		----	h	1,081.12	0.01	0.48	10.81	518.94
2.13	Ligthing line along tunnel, 100 m section	3.8	m.th	3.60	0.00	130.82	0.00	471.12
		----	h	2,074.34	0.01	0.41	20.74	850.48
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	101.35	0.15	18.51	15.20	1,876.07
		s.b.	h	20.27	0.00	7.46	0.00	151.22
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	15.70	0.32	29.23	5.02	458.95
		s.b.	h	3.14	0.00	12.36	0.00	38.81
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	216.19	0.33	30.84	71.34	6,667.21
		s.b.	h	43.24	0.00	19.27	0.00	833.18
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	24.35	0.63	48.81	15.34	1,188.48
		s.b.	h	4.87	0.00	20.84	0.00	101.49
Total to carry forward ----->>>							27,314	119,444

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - MAINTENANCE GATE CHAMBER - BENCHING (ROCK CLASS III)

SEC 2-4
 ANA 002
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						27,314	119,444	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.94	0.00	82.94	0.00	77.84	
		---	h	1.88	0.01	4.39	0.02	8.24	
2.19	Integral drill steel grinder	1	h	0.87	0.01	2.29	0.01	1.98	
2.20	Button bits grinder	1	h	10.66	0.04	5.32	0.43	56.70	
2.21	Breaker tool resharper	1	h	1.85	0.01	1.57	0.02	2.90	
2.22	Steel structure for ventilation fan support	1	m.th	0.94	0.71	167.24	0.67	156.95	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	4	do	3.60	2.35	159.52	8.46	574.48	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	1.66	1.36	134.52	2.26	223.13	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4	do	3.60	0.14	13.13	0.50	47.28	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	4	do	3.60	1.40	139.97	5.04	504.07	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.94	3.15	370.12	2.96	347.35	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	3.60	0.38	38.10	1.37	137.21	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4	do	3.60	0.14	13.50	0.50	48.62	
2.37	Control board, 10 KVA	1	do	0.94	0.24	27.23	0.23	25.55	
2.38	Control board, 250 KVA	1	do	0.94	0.87	97.24	0.82	91.26	
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00	
2.40	Transformer cabin, 300 kVA	1	do	0.94	5.68	696.82	5.33	653.94	
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	3,155.53	2.31	0.00	7,289.27	0.00	
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	297.67	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00	
3.06	Blasting connection wire	----	m	620.20	0.00	0.13	0.00	80.63	
3.07	Detonating fuse	----	ea.	6,090.27	0.00	0.82	0.00	4,994.02	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	3.19	0.00	483.24	0.00	1,542.61	
3.09	Shank adapter for ditto	----	ea.	1.67	0.00	277.11	0.00	464.05	
3.10	Coupling for ditto	----	ea.	3.81	0.00	54.15	0.00	206.25	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	5.33	0.00	291.98	0.00	1,555.84	
3.12	Integral drill steel, 800 mm	----	ea.	0.32	0.00	132.65	0.00	42.86	
3.13	Integral drill steel, 1600 mm	----	ea.	0.28	0.00	153.97	0.00	42.65	
3.14	Integral drill steel, 2400 mm	----	ea.	0.09	0.00	174.35	0.00	16.10	
3.15	Hand held breaker tool,moil point	----	ea.	0.62	0.00	32.37	0.00	19.92	
3.16	Pipeline supports including anchors	----	kg	959.35	1.38	3.22	1,323.90	3,089.11	
3.17	Cable tray including supports and anchors	----	m	383.74	0.35	0.83	135.84	316.97	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	383.74	0.79	7.11	303.15	2,728.39	
Sub-total								36,394	137,501
Missing items and construction contingencies		%		2.00%			728	2,750	
Total Direct Costs								37,122	140,251
Overheads, risks and profit		%		52.00%			9,223	83,011	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		6,155			7.53	36.27	
AGGREGATE UNIT PRICE		m ³							43.80

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	12.95	0.00	47.25	0.00	612.05	
1.02	Gang foreman	1	h	129.53	6.60	0.00	854.92	0.00	
1.03	Tunnel specialist	1	h	388.60	3.69	0.00	1,433.93	0.00	
1.04	Tunneling jumbo operator	1	h	388.60	5.82	0.00	2,261.65	0.00	
1.05	Loader operator	1	h	388.60	5.82	0.00	2,261.65	0.00	
1.06	Operator of dumpers and other units	---	h	364.37	5.82	0.00	2,120.62	0.00	
1.07	Miner	4	h	1,554.40	2.99	0.00	4,647.66	0.00	
1.08	Explosive specialist	1	h	388.60	3.69	0.00	1,433.93	0.00	
1.09	Electrician	0	h	43.13	3.69	0.00	159.17	0.00	
1.10	Mechanic	0	h	43.13	3.69	0.00	159.17	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	19.42	3.69	0.00	71.65	0.00	
1.12	Pipe fitter	0	h	43.13	3.69	0.00	159.17	0.00	
1.13	Helper	5	h	1,943.00	2.38	0.00	4,624.34	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.67	0.00	15,947.19	0.00	10,758.82	
		---	h	61.01	2.88	85.71	175.71	5,229.18	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.70	0.00	187.16	0.00	505.07	
		---	h	2.90	0.07	1.53	0.20	4.44	
2.03	Hand-held rock drill, medium weight type	3	m.th	2.02	0.00	130.63	0.00	264.39	
		---	h	4.35	0.04	2.03	0.17	8.84	
2.04	Hand-held breaker, medium weight type	4	m.th	2.70	0.00	46.95	0.00	126.70	
		---	h	61.90	0.03	0.91	1.86	56.33	
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.67	0.15	24.64	0.10	16.62	
		---	h	388.60	0.00	5.46	0.00	2,121.76	
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.67	0.20	40.08	0.13	27.04	
		---	h	388.60	0.00	7.50	0.00	2,914.50	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.67	0.00	12,874.72	0.00	8,685.97	
		---	h	50.04	1.95	55.22	97.57	2,762.97	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	173.01	0.73	75.31	126.29	13,029.03	
		s.b	h	34.60	0.00	33.01	0.00	1,142.18	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.67	0.00	0.00	0.00	0.00	
		---	h	388.60	0.12	9.00	46.63	3,497.40	
2.11	Halogen flood light, 1000 W	2	m.th	1.35	0.00	79.92	0.00	107.84	
		---	h	777.20	0.01	0.43	7.77	334.20	
2.12	Halogen flood light, 2000 W	1	m.th	0.67	0.00	92.77	0.00	62.59	
		---	h	388.60	0.01	0.48	3.89	186.53	
2.13	Ligthing line along tunnel, 100 m section	3.8	m.th	2.59	0.00	130.82	0.00	338.68	
		---	h	1553.35	0.01	0.41	15.53	636.87	
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	97.15	0.15	18.51	14.57	1,798.25	
		---	h	19.43	0.00	7.46	0.00	144.95	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	45.02	0.32	29.23	14.41	1,315.98	
		s.b	h	9.00	0.00	12.36	0.00	111.29	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	437.59	0.26	24.87	113.77	10,882.89	
		s.b	h	87.52	0.00	15.28	0.00	1,337.28	
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	16.07	0.63	48.81	10.12	784.18	
		s.b	h	3.21	0.00	20.84	0.00	66.96	
Total to carry forward ----->>								20,817	69,872

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						20,816.60	69,871.76
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.67	0.00	82.94	0.00	55.96
		---	h	3.37	0.01	4.39	0.03	14.81
2.19	Integral drill steel grinder	---	h	0.73	0.01	2.29	0.01	1.66
2.20	Button bits grinder	---	h	15.46	0.04	5.32	0.62	82.23
2.21	Breaker moil point resharpen	---	h	0.64	0.01	1.57	0.01	1.01
2.22	Steel structure for ventilation fan support	1	m.th	0.67	0.14	33.45	0.09	22.57
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	3.8	do	2.59	1.51	102.31	3.91	264.87
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.19	1.36	134.52	1.62	160.41
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.8	do	2.59	0.14	13.13	0.36	33.99
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3.8	do	2.59	0.37	34.41	0.96	89.08
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.67	2.37	278.28	1.60	187.74
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	2.59	0.38	38.10	0.98	98.64
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	3.8	do	2.59	0.55	55.77	1.42	144.38
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.8	do	2.59	0.14	13.50	0.36	34.95
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	481	2.31	0.00	1,109.96	0.00
3.02	Explosive, gramonite type	----	kg	4325	2.06	0.00	8,908.53	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1941	0.00	1.98	0.00	3,842.64
3.06	Blasting connection wire	----	m	900	0.00	0.13	0.00	117.06
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	1.50	0.00	459.99	0.00	690.25
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	1.50	0.00	808.44	0.00	1,213.12
3.09	Jumbo drill shank adapter	----	ea.	2.40	0.00	302.37	0.00	725.96
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	7.50	0.00	164.35	0.00	1,233.09
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.23	0.00	586.85	0.00	132.10
3.12	Integral drill steel, 800 mm	----	ea.	0.12	0.00	132.65	0.00	15.40
3.13	Integral drill steel, 1600 mm	----	ea.	0.10	0.00	153.97	0.00	15.64
3.14	Integral drill steel, 2400 mm	----	ea.	0.07	0.00	174.35	0.00	12.65
3.15	Hand held breaker tool, moil point	----	ea.	1.29	0.00	32.37	0.00	41.74
3.16	Pipeline supports including anchors	----	kg	959.35	1.38	3.22	1,323.90	3,089.11
3.17	Cable tray including supports and anchors	----	m	383.74	0.35	0.83	135.84	316.97
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	383.74	0.79	7.11	303.15	2,728.39
	Sub-total						32,609.98	85,238.17
	Missing items and construction contingencies	%		2.00%			652.20	1,704.76
	Total Direct Costs						33,262.18	86,942.93
	Overheads, risks and profit	%		52.00%			6,250.67	56,255.99
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	3,869			10.21	37.01
	AGGREGATE UNIT PRICE		m³					47.23

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - DT EMERGENCY & SECTOR GATE CHAMBER - TOP H. REAMING (ROCK CLASS III)

SEC 2-4
 ANA 004
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	13.57	0.00	47.25	0.00	641.23	
1.02	Gang foreman	1	h	135.71	6.60	0.00	895.68	0.00	
1.03	Tunnel specialist	1	h	407.13	3.69	0.00	1,502.30	0.00	
1.04	Tunneling jumbo operator	1	h	407.13	5.82	0.00	2,369.48	0.00	
1.05	Loader operator	1	h	407.13	5.82	0.00	2,369.48	0.00	
1.06	Operator of dumpers and other units	---	h	388.86	5.82	0.00	2,263.16	0.00	
1.07	Miner	4	h	1,628.51	2.99	0.00	4,869.24	0.00	
1.08	Explosive specialist	1	h	407.13	3.69	0.00	1,502.30	0.00	
1.09	Electrician	0	h	45.19	3.69	0.00	166.76	0.00	
1.10	Mechanic	0	h	45.19	3.69	0.00	166.76	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	21.03	3.69	0.00	77.61	0.00	
1.12	Pipe fitter	0	h	45.19	3.69	0.00	166.76	0.00	
1.13	Helper	5	h	2,035.64	2.38	0.00	4,844.82	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.71	0.00	15,947.19	0.00	11,271.77	
		---	h	64.40	2.88	85.71	185.47	5,519.64	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.83	0.00	187.16	0.00	529.15	
		---	h	3.05	0.07	1.53	0.21	4.66	
2.03	Hand-held rock drill, medium weight type	3	m.th	2.12	0.00	130.63	0.00	277.00	
		---	h	4.57	0.04	2.03	0.18	9.28	
2.04	Hand-held breaker, medium weight type	4	m.th	2.83	0.00	46.95	0.00	132.74	
		---	h	64.98	0.03	0.91	1.95	59.13	
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.71	0.15	24.64	0.11	17.42	
		---	h	407.13	0.00	5.46	0.00	2,222.92	
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.71	0.20	40.08	0.14	28.33	
		---	h	407.13	0.00	7.50	0.00	3,053.46	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.71	0.00	12,874.72	0.00	9,100.09	
		---	h	53.82	1.95	55.22	104.94	2,971.72	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	189.14	0.73	75.31	138.07	14,244.22	
		s.b	h	37.83	0.00	33.01	0.00	1,248.71	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.71	0.00	0.00	0.00	0.00	
		---	h	407.13	0.12	9.00	48.86	3,664.15	
2.11	Halogen flood light, 1000 W	2	m.th	1.41	0.00	79.92	0.00	112.98	
		---	h	814.25	0.01	0.43	8.14	350.13	
2.12	Halogen flood light, 2000 W	1	m.th	0.71	0.00	92.77	0.00	65.57	
		---	h	407.13	0.01	0.48	4.07	195.42	
2.13	Ligthing line along tunnel, 100 m section	3.8	m.th	2.71	0.00	130.82	0.00	354.83	
		---	h	1627.41	0.01	0.41	16.27	667.24	
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	101.78	0.15	18.51	15.27	1,883.98	
		---	h	20.36	0.00	7.46	0.00	151.86	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	45.02	0.32	29.23	14.41	1,315.98	
		s.b	h	9.00	0.00	12.36	0.00	111.29	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	440.79	0.26	24.87	114.61	10,962.47	
		s.b	h	88.16	0.00	15.28	0.00	1,347.06	
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	17.56	0.63	48.81	11.07	857.32	
		s.b	h	3.51	0.00	20.84	0.00	73.21	
Total to carry forward ----->>>								21,858.12	73,444.94

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAV. - DT EMERGENCY & SECTOR GATE CHAMBER - TOP H. REAMING (ROCK CLASS III)**

**SEC 2-4
ANA 004
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						21,858.12	73,444.94	
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.71	0.00	82.94	0.00	58.62	
		---	h	3.53	0.01	4.39	0.04	15.51	
2.19	Integral drill steel grinder	---	h	0.76	0.01	2.29	0.01	1.74	
2.20	Button bits grinder	---	h	16.77	0.04	5.32	0.67	89.20	
2.21	Breaker moiil point resharpen	---	h	0.68	0.01	1.57	0.01	1.06	
2.22	Steel structure for ventilation fan support	1	m.th	0.71	0.14	33.45	0.10	23.64	
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	3.8	do	2.71	1.51	102.31	4.10	277.50	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	1.25	1.36	134.52	1.70	168.05	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.8	do	2.71	0.14	13.13	0.38	35.61	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3.8	do	2.71	0.37	34.41	1.00	93.33	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.71	2.37	278.28	1.68	196.69	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	2.71	0.38	38.10	1.03	103.34	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	3.8	do	2.71	0.55	55.77	1.49	151.27	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.8	do	2.71	0.14	13.50	0.38	36.62	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
							0.00	0.00	
3	Materials						0.00	0.00	
3.01	Explosive, amonite type	----	kg	493	2.31	0.00	1,139.89	0.00	
3.02	Explosive, gramonite type	----	kg	4441	2.06	0.00	9,148.73	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	2115	0.00	1.98	0.00	4,188.68	
3.06	Blasting connection wire	----	m	900	0.00	0.13	0.00	117.06	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	1.63	0.00	459.99	0.00	750.54	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	1.63	0.00	808.44	0.00	1,319.09	
3.09	Jumbo drill shank adapter	----	ea.	2.61	0.00	302.37	0.00	789.38	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	8.16	0.00	164.35	0.00	1,340.80	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.23	0.00	586.85	0.00	132.10	
3.12	Integral drill steel, 800 mm	----	ea.	0.12	0.00	132.65	0.00	16.16	
3.13	Integral drill steel, 1600 mm	----	ea.	0.11	0.00	153.97	0.00	16.41	
3.14	Integral drill steel, 2400 mm	----	ea.	0.08	0.00	174.35	0.00	13.28	
3.15	Hand held breaker tool, moiil point	----	ea.	1.35	0.00	32.37	0.00	43.82	
3.16	Pipeline supports including anchors	----	kg	959.35	1.38	3.22	1,323.90	3,089.11	
3.17	Cable tray including supports and anchors	----	m	383.74	0.35	0.83	135.84	316.97	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	383.74	0.79	7.11	303.15	2,728.39	
Sub-total								33,922.21	89,558.93
Missing items and construction contingencies			%	2.00%			678.44	1,791.18	
Total Direct Costs								34,600.65	91,350.11
Overheads, risks and profit			%	52.00%			6,549.44	58,944.96	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	4,061			10.13	37.01
AGGREGATE UNIT PRICE				m³				47.14	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - DT EMERGENCY & SECTOR GATE CHAMBER - BENCHING (ROCK CLASS III)

SEC 2-4
 ANA 005
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	25.35	0.00	47.25	0.00	1,197.69
1.02	Gang foreman	1	h	253.48	6.60	0.00	1,672.96	0.00
1.03	Tunnel specialist	1	h	253.48	3.69	0.00	935.34	0.00
1.04	Crawler drill rig operator	----	h	153.44	5.82	0.00	893.01	0.00
1.05	Loader operator	----	h	234.20	5.82	0.00	1,363.05	0.00
1.06	Operator of dumpers and other units	----	h	389.12	5.82	0.00	2,264.67	0.00
1.07	Miner	3	h	760.44	2.99	0.00	2,273.70	0.00
1.08	Explosive specialist	1	h	253.48	3.69	0.00	935.34	0.00
1.09	Electrician	0.33	h	27.88	3.69	0.00	102.89	0.00
1.10	Mechanic	0.33	h	27.88	3.69	0.00	102.89	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	12.41	3.69	0.00	45.78	0.00
1.12	Pipe fitter	0.33	h	27.88	3.69	0.00	102.89	0.00
1.13	Helper	5	h	1,267.39	2.38	0.00	3,016.40	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.44	0.29	24.56	0.13	10.81
		---	h	139.49	0.00	16.40	0.00	2,287.62
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.76	0.00	187.16	0.00	329.45
		---	h	12.90	0.07	1.53	0.90	19.73
2.03	Hand-held rock drill, medium weight type	4	m.th	1.76	0.00	130.63	0.00	229.94
		---	h	19.34	0.04	2.03	0.77	39.27
2.04	Hand-held breaker, medium weight type	5	m.th	2.20	0.00	46.95	0.00	103.31
		---	h	45.85	0.03	0.91	1.38	41.73
2.05	Diesel powered compressor, 20. m3/min.	Op.	h	253.48	0.25	57.86	63.37	14,666.28
		s.b.	h	50.70	0.00	9.26	0.00	469.44
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	334.77	0.33	99.41	110.48	33,279.91
		s.b.	h	66.95	0.00	11.98	0.00	802.12
2.07	Wheel loader, 157 kW (3.10 m3 heaped)	Op.	h	72.04	0.75	70.52	54.03	5,080.42
	(loading of muck on dumper)	s.b.	h	14.41	0.00	26.87	0.00	387.16
2.08	Wheel loader, 157 kW (3.10 m3 heaped)	Op.	h	140.87	0.75	70.52	105.65	9,934.04
	(transfer of muck to the vertical shaft)	s.b.	h	28.17	0.00	26.87	0.00	757.03
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	252.42	0.73	75.31	184.27	19,009.76
		s.b.	h	50.48	0.00	33.01	0.00	1,666.48
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.44	0.00	856.34	0.00	376.85
		----	h	253.48	0.38	29.58	96.32	7,497.90
2.11	Halogen flood light, 1000 W	2	m.th	0.88	0.00	79.92	0.00	70.34
		----	h	506.96	0.01	0.43	5.07	217.99
2.12	Halogen flood light, 2000 W	2	m.th	0.88	0.00	92.77	0.00	81.65
		----	h	506.96	0.01	0.48	5.07	243.34
2.13	Ligthning line along tunnel, 100 m section	4.0	m.th	1.78	0.00	130.82	0.00	232.43
		----	h	1,023.39	0.01	0.41	10.23	419.59
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	47.53	0.15	18.51	7.13	879.73
		s.b.	h	9.51	0.00	7.46	0.00	70.91
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	15.70	0.32	29.23	5.02	458.95
		s.b.	h	3.14	0.00	12.36	0.00	38.81
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	15.49	0.33	30.84	5.11	477.56
		s.b.	h	3.10	0.00	19.27	0.00	59.68
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	22.61	0.63	48.81	14.24	1,103.58
		s.b.	h	4.52	0.00	20.84	0.00	94.24
Total to carry forward ----->>>							14,378	102,636

PROJECT:
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAV. - DT EMERGENCY & SECTOR GATE CHAMBER - BENCHING (ROCK CLASS III)

SEC 2-4
ANA 005
RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						14,378	102,636
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.44	0.00	82.94	0.00	36.50
		---	h	0.88	0.01	4.39	0.01	3.86
2.19	Integral drill steel grinder	1	h	0.81	0.01	2.29	0.01	1.85
2.20	Button bits grinder	1	h	9.53	0.04	5.32	0.38	50.72
2.21	Breaker tool resharpeners	1	h	1.72	0.01	1.57	0.02	2.70
2.22	Steel structure for ventilation fan support	1	m.th	0.44	0.71	167.24	0.31	73.60
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	4	do	1.78	2.35	159.52	4.18	283.42
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.80	1.36	134.52	1.08	107.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4	do	1.78	0.14	13.13	0.25	23.33
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	4	do	1.78	0.74	69.67	1.31	123.78
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	0	do	0.00	1.40	139.97	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.44	3.15	370.12	1.39	162.88
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4	do	1.78	0.38	38.10	0.68	67.69
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4	do	1.78	0.14	13.50	0.25	23.99
2.37	Control board, 10 KVA	2	do	0.88	0.24	27.23	0.21	23.97
2.38	Control board, 250 KVA	1	do	0.44	0.87	97.24	0.38	42.79
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	1	do	0.44	5.68	696.82	2.50	306.65
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3,388.18	2.31	0.00	7,826.70	0.00
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	336.92	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00
3.06	Blasting connection wire	----	m	651.60	0.00	0.13	0.00	84.71
3.07	Detonating fuse	----	ea.	5,687.15	0.00	0.82	0.00	4,663.46
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	2.54	0.00	483.24	0.00	1,228.58
3.09	Shank adapter for ditto	----	ea.	1.50	0.00	277.11	0.00	415.12
3.10	Coupling for ditto	----	ea.	3.03	0.00	54.15	0.00	164.26
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	4.77	0.00	291.98	0.00	1,391.80
3.12	Integral drill steel, 800 mm	----	ea.	0.30	0.00	132.65	0.00	39.92
3.13	Integral drill steel, 1600 mm	----	ea.	0.26	0.00	153.97	0.00	39.71
3.14	Integral drill steel, 2400 mm	----	ea.	0.09	0.00	174.35	0.00	14.99
3.15	Hand held breaker tool, moil point	----	ea.	0.57	0.00	32.37	0.00	18.55
3.16	Pipeline supports including anchors	----	kg	1,009.35	1.38	3.22	1,392.90	3,250.11
3.17	Cable tray including supports and anchors	----	m	403.74	0.35	0.83	142.92	333.49
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	403.74	0.79	7.11	318.95	2,870.59
Sub-total							24,073	118,486
Missing items and construction contingencies		%		2.00%			481	2,370
Total Direct Costs							24,554	120,855
Overheads, risks and profit		%		52.00%			7,561	68,052
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		5,732			5.60	32.96
AGGREGATE UNIT PRICE		m ³						38.56

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING PILOT TUNNEL (ROCK CLASS III)**

**SEC 2-05
ANA 001
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	22.35	0.00	47.25	0.00	1,055.99	
1.02	Gang foreman	1	h	223.49	6.60	0.00	1,475.03	0.00	
1.03	Tunnel specialist	1	h	670.47	3.69	0.00	2,474.02	0.00	
1.04	Tunneling jumbo operator	1	h	670.47	5.82	0.00	3,902.12	0.00	
1.05	Loader operator	1	h	670.47	5.82	0.00	3,902.12	0.00	
1.06	Operator of dumpers and other units	---	h	752.83	5.82	0.00	4,381.48	0.00	
1.07	Miner	4	h	2,681.87	2.99	0.00	8,018.79	0.00	
1.08	Explosive specialist	1	h	670.47	3.69	0.00	2,474.02	0.00	
1.09	Electrician	0	h	74.42	3.69	0.00	274.62	0.00	
1.10	Mechanic	0	h	74.42	3.69	0.00	274.62	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	38.07	3.69	0.00	140.47	0.00	
1.12	Pipe fitter	0	h	74.42	3.69	0.00	274.62	0.00	
1.13	Helper	5	h	3,352.34	2.38	0.00	7,978.56	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.16	0.00	15,947.19	0.00	18,562.62	
		---	h	116.51	2.88	85.71	335.55	9,986.18	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	4.66	0.00	187.16	0.00	871.42	
		---	h	5.88	0.07	1.53	0.41	9.00	
2.03	Hand-held rock drill, medium weight type	3	m.th	3.49	0.00	130.63	0.00	456.16	
		---	h	8.83	0.04	2.03	0.35	17.92	
2.04	Hand-held breaker, medium weight type	4	m.th	4.66	0.00	46.95	0.00	218.60	
		---	h	125.53	0.03	0.91	3.77	114.23	
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	1.16	0.15	24.64	0.17	28.68	
		---	h	670.47	0.00	5.46	0.00	3,660.75	
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	1.16	0.20	40.08	0.23	46.65	
		---	h	670.47	0.00	7.50	0.00	5,028.50	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	1.16	0.00	12,874.72	0.00	14,986.24	
		---	h	99.69	1.95	55.22	194.40	5,504.99	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	402.21	0.73	75.31	293.61	30,290.38	
		s.b	h	80.44	0.00	33.01	0.00	2,655.39	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	1.16	0.00	0.00	0.00	0.00	
		---	h	670.47	0.38	29.58	254.78	19,832.42	
2.11	Halogen flood light, 1000 W	2	m.th	2.33	0.00	79.92	0.00	186.05	
		---	h	1,340.93	0.01	0.43	13.41	576.60	
2.12	Halogen flood light, 2000 W	1	m.th	1.16	0.00	92.77	0.00	107.98	
		---	h	670.47	0.01	0.48	6.70	321.82	
2.13	Ligthing line along tunnel, 100 m section	7.5	m.th	8.71	0.00	130.82	0.00	1,139.78	
		---	h	5227.55	0.01	0.41	52.28	2,143.29	
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	167.62	0.15	18.51	25.14	3,102.59	
		---	h	33.52	0.00	7.46	0.00	250.08	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	81.90	0.32	29.23	26.21	2,394.05	
		s.b	h	16.38	0.00	12.36	0.00	202.47	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	796.96	0.26	24.87	207.21	19,820.32	
		s.b	h	159.39	0.00	15.28	0.00	2,435.50	
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	32.66	0.63	48.81	20.58	1,594.27	
		s.b	h	6.53	0.00	20.84	0.00	136.14	
Total to carry forward ----->>>								37,005.27	147,737.07

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-5
ANA 001
RC III - T. B

UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING PILOT TUNNEL (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						37,005.27	147,737.07
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	1.16	0.00	82.94	0.00	96.54
		---	h	5.82	0.01	4.39	0.06	25.55
2.19	Integral drill steel grinder	---	h	1.47	0.01	2.29	0.01	3.37
2.20	Button bits grinder	---	h	30.25	0.04	5.32	1.21	160.95
2.21	Breaker moiil point resharpen	---	h	1.31	0.01	1.57	0.01	2.05
2.22	Steel structure for ventilation fan support	1	m.th	1.16	0.02	0.02	0.02	0.02
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	7.5	do	8.71	0.02	0.02	0.17	0.17
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	2.91	1.36	134.52	3.95	390.99
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.5	do	8.71	0.14	13.13	1.22	114.40
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	7.5	do	8.71	0.37	34.41	3.22	299.80
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.16	2.37	278.28	2.76	323.92
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7	do	8.71	0.38	38.10	3.31	331.95
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.5	do	8.71	0.55	55.77	4.79	485.90
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.5	do	8.71	0.14	13.50	1.22	117.62
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
							0.00	0.00
3	Materials						0.00	0.00
3.01	Explosive, amonite type	----	kg	932	2.31	0.00	2,153.04	0.00
3.02	Explosive, gramonite type	----	kg	8388	2.06	0.00	17,280.25	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3815	0.00	1.98	0.00	7,554.31
3.06	Blasting connection wire	----	m	1638	0.00	0.13	0.00	212.95
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.94	0.00	459.99	0.00	1,353.93
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.94	0.00	808.44	0.00	2,379.55
3.09	Jumbo drill shank adapter	----	ea.	4.71	0.00	302.37	0.00	1,423.99
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	14.72	0.00	164.35	0.00	2,418.73
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.41	0.00	586.85	0.00	240.33
3.12	Integral drill steel, 800 mm	----	ea.	0.24	0.00	132.65	0.00	31.22
3.13	Integral drill steel, 1600 mm	----	ea.	0.21	0.00	153.97	0.00	31.71
3.14	Integral drill steel, 2400 mm	----	ea.	0.15	0.00	174.35	0.00	25.65
3.15	Hand held breaker tool, moiil point	----	ea.	2.62	0.00	32.37	0.00	84.65
3.16	Pipeline supports including anchors	----	kg	1,247.56	1.38	3.22	1,721.64	4,017.15
3.17	Cable tray including supports and anchors	----	m	499.02	0.35	0.83	176.65	412.19
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	499.02	0.79	7.11	394.23	3,548.07
	Sub-total						58,753.05	173,824.73
	Missing items and construction contingencies	%		2.00%			1,175.06	3,476.49
	Total Direct Costs						59,928.11	177,301.22
	Overheads, risks and profit	%		52.00%			12,335.93	111,023.33
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	7,846			9.21	36.75
	AGGREGATE UNIT PRICE		m³					45.96

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING PILOT TUNNEL (ROCK CLASS IV)

SEC 2-05
 ANA 001
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	12.25	0.00	47.25	0.00	578.81
1.02	Gang foreman	1	h	122.50	6.60	0.00	808.49	0.00
1.03	Tunnel specialist	1	h	367.50	3.69	0.00	1,356.06	0.00
1.04	Tunneling jumbo operator	1	h	367.50	5.82	0.00	2,138.83	0.00
1.05	Loader operator	1	h	367.50	5.82	0.00	2,138.83	0.00
1.06	Operator of dumpers and other units	---	h	344.53	5.82	0.00	2,005.14	0.00
1.07	Miner	4	h	1,469.99	2.99	0.00	4,395.27	0.00
1.08	Explosive specialist	1	h	367.50	3.69	0.00	1,356.06	0.00
1.09	Electrician	0.33	h	40.79	3.69	0.00	150.52	0.00
1.10	Mechanic	0.33	h	40.79	3.69	0.00	150.52	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	18.56	3.69	0.00	68.49	0.00
1.12	Pipe fitter	0.33	h	40.79	3.69	0.00	150.52	0.00
1.13	Helper	5	h	1,837.49	2.38	0.00	4,373.22	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.64	0.00	15,947.19	0.00	10,174.56
		---	h	59.88	2.88	85.71	172.45	5,132.30
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.55	0.00	187.16	0.00	477.64
		---	h	2.94	0.07	1.53	0.21	4.50
2.03	Hand-held rock drill, medium weight type	3	m.th	1.91	0.00	130.63	0.00	250.03
		---	h	4.41	0.04	2.03	0.18	8.96
2.04	Hand-held breaker, medium weight type	4	m.th	2.55	0.00	46.95	0.00	119.82
		---	h	62.76	0.03	0.91	1.88	57.11
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.64	0.15	24.64	0.10	15.72
		---	h	367.50	0.00	5.46	0.00	2,006.54
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.64	0.20	40.08	0.13	25.57
		---	h	367.50	0.00	7.50	0.00	2,756.23
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.64	0.00	12,874.72	0.00	8,214.28
		---	h	51.42	1.95	55.22	100.26	2,839.24
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	202.29	0.73	75.31	147.67	15,234.25
		s.b	h	40.46	0.00	33.01	0.00	1,335.50
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.64	0.00	856.34	0.00	546.36
		---	h	367.50	0.38	29.58	139.65	10,870.57
2.11	Halogen flood light, 1000 W	2	m.th	1.28	0.00	79.92	0.00	101.98
		---	h	734.99	0.01	0.43	7.35	316.05
2.12	Halogen flood light, 2000 W	1	m.th	0.64	0.00	92.77	0.00	59.19
		---	h	367.50	0.01	0.48	3.67	176.40
2.13	Ligthing line along tunnel, 100 m section	7.5	m.th	4.78	0.00	130.82	0.00	624.74
		---	h	2,750.72	0.01	0.41	27.51	1,127.79
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	47.25	0.15	18.51	7.09	874.51
		---	h	9.45	0.00	7.46	0.00	70.49
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	47.25	0.32	29.23	15.12	1,380.97
		s.b	h	9.45	0.00	12.36	0.00	116.79
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	463.10	0.26	24.87	120.41	11,517.26
		s.b	h	92.62	0.00	15.28	0.00	1,415.23
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	16.43	0.63	48.81	10.35	801.82
		s.b	h	3.29	0.00	20.84	0.00	68.47
Total to carry forward ----->>							19,845.99	79,299.68

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 001
RC IV - T. B

UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING PILOT TUNNEL (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						19,845.99	79,299.68	
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.64	0.00	82.94	0.00	52.92	
		---	h	3.19	0.01	4.39	0.03	14.00	
2.19	Integral drill steel grinder	---	h	0.74	0.01	2.29	0.01	1.68	
2.20	Button bits grinder	---	h	14.73	0.04	5.32	0.59	78.37	
2.21	Breaker moiil point resharpenner	---	h	0.65	0.01	1.57	0.01	1.03	
2.22	Steel structure for ventilation fan support	1	m.th	0.64	0.02	0.02	0.01	0.01	
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	7.5	do	4.78	0.02	0.02	0.10	0.10	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	1.59	1.36	134.52	2.17	214.31	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	7.5	do	4.78	0.14	13.13	0.67	62.70	
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	7.5	do	4.78	0.37	34.41	1.77	164.33	
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.64	2.37	278.28	1.51	177.55	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7	do	4.78	0.38	38.10	1.81	181.95	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.5	do	4.78	0.55	55.77	2.63	266.33	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.5	do	4.78	0.14	13.50	0.67	64.47	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
							0.00	0.00	
3	Materials						0.00	0.00	
3.01	Explosive, amonite type	----	kg	440.07	2.31	0.00	1,016.56	0.00	
3.02	Explosive, gramonite type	----	kg	3,960.63	2.06	0.00	8,158.89	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	2,140.34	0.00	1.98	0.00	4,237.87	
3.06	Blasting connection wire	----	m	944.90	0.00	0.13	0.00	122.84	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	1.43	0.00	459.99	0.00	658.78	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	1.43	0.00	808.44	0.00	1,157.82	
3.09	Jumbo drill shank adapter	----	ea.	2.29	0.00	302.37	0.00	692.87	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	7.16	0.00	164.35	0.00	1,176.88	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.20	0.00	586.85	0.00	120.14	
3.12	Integral drill steel, 800 mm	----	ea.	0.12	0.00	132.65	0.00	15.61	
3.13	Integral drill steel, 1600 mm	----	ea.	0.10	0.00	153.97	0.00	15.85	
3.14	Integral drill steel, 2400 mm	----	ea.	0.07	0.00	174.35	0.00	12.82	
3.15	Hand held breaker tool, moiil point	----	ea.	1.31	0.00	32.37	0.00	42.32	
3.16	Pipeline supports including anchors	----	kg	623.69	1.38	3.22	860.69	2,008.27	
3.17	Cable tray including supports and anchors	----	m	249.48	0.35	0.83	88.31	206.07	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	249.48	0.79	7.11	197.09	1,773.77	
Sub-total								30,179.50	92,821.34
Missing items and construction contingencies		%		2.00%			603.59	1,856.43	
Total Direct Costs								30,783.09	94,677.76
Overheads, risks and profit		%		52.00%			6,523.96	58,715.68	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	3,922		9.51	39.11	
AGGREGATE UNIT PRICE				m³				48.62	

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING REAMING (ROCK CLASS III)**

**SEC 2-05
ANA 002
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	25.34	0.00	47.25	0.00	1,197.13
1.02	Gang foreman	1	h	253.36	6.60	0.00	1,672.18	0.00
1.03	Tunnel specialist	1	h	760.08	3.69	0.00	2,804.70	0.00
1.04	Tunneling jumbo operator	1	h	760.08	5.82	0.00	4,423.68	0.00
1.05	Loader operator	1	h	760.08	5.82	0.00	4,423.68	0.00
1.06	Operator of dumpers and other units	---	h	836.39	5.82	0.00	4,867.79	0.00
1.07	Miner	4	h	3,040.33	2.99	0.00	9,090.58	0.00
1.08	Explosive specialist	1	h	760.08	3.69	0.00	2,804.70	0.00
1.09	Electrician	0	h	84.37	3.69	0.00	311.32	0.00
1.10	Mechanic	0	h	84.37	3.69	0.00	311.32	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	42.36	3.69	0.00	156.30	0.00
1.12	Pipe fitter	0	h	84.37	3.69	0.00	311.32	0.00
1.13	Helper	5	h	3,800.41	2.38	0.00	9,044.98	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.32	0.00	15,947.19	0.00	21,043.71
		---	h	125.42	2.88	85.71	361.21	10,749.76
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	5.28	0.00	187.16	0.00	987.90
		---	h	6.40	0.07	1.53	0.45	9.79
2.03	Hand-held rock drill, medium weight type	3	m.th	3.96	0.00	130.63	0.00	517.13
		---	h	9.60	0.04	2.03	0.38	19.48
2.04	Hand-held breaker, medium weight type	4	m.th	5.28	0.00	46.95	0.00	247.82
		---	h	136.50	0.03	0.91	4.09	124.21
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	1.32	0.15	24.64	0.20	32.51
		---	h	760.08	0.00	5.46	0.00	4,150.05
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	1.32	0.20	40.08	0.26	52.89
		---	h	760.08	0.00	7.50	0.00	5,700.62
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	1.32	0.00	12,874.72	0.00	16,989.32
		---	h	109.84	1.95	55.22	214.19	6,065.38
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	451.74	0.73	75.31	329.77	34,020.87
		s.b	h	90.35	0.00	33.01	0.00	2,982.42
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	1.32	0.00	0.00	0.00	0.00
		---	h	760.08	0.38	29.58	288.83	22,483.23
2.11	Halogen flood light, 1000 W	2	m.th	2.64	0.00	79.92	0.00	210.92
		---	h	1,520.16	0.01	0.43	15.20	653.67
2.12	Halogen flood light, 2000 W	1	m.th	1.32	0.00	92.77	0.00	122.42
		---	h	760.08	0.01	0.48	7.60	364.84
2.13	Ligthing line along tunnel, 100 m section	7.5	m.th	9.88	0.00	130.82	0.00	1,292.12
		---	h	5926.27	0.01	0.41	59.26	2,429.77
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	190.02	0.15	18.51	28.50	3,517.28
		---	h	38.00	0.00	7.46	0.00	283.51
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	81.90	0.32	29.23	26.21	2,394.05
		s.b	h	16.38	0.00	12.36	0.00	202.47
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	823.90	0.26	24.87	214.21	20,490.34
		s.b	h	164.78	0.00	15.28	0.00	2,517.83
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	36.69	0.63	48.81	23.11	1,790.62
		s.b	h	7.34	0.00	20.84	0.00	152.90
Total to carry forward ----->>							41,796.06	163,796.96

ROGUN HYDROELECTRIC POWER PLANT

SEC 2-05

CIVIL WORKS COST ESTIMATE - PHASE I

ANA 002

UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING REAMING (ROCK CLASS III)

RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						41,796.06	163,796.96
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	1.32	0.00	82.94	0.00	109.45
		---	h	6.60	0.01	4.39	0.07	28.96
2.19	Integral drill steel grinder	---	h	1.60	0.01	2.29	0.02	3.66
2.20	Button bits grinder	---	h	33.70	0.04	5.32	1.35	179.28
2.21	Breaker moil point resharpen	---	h	1.42	0.01	1.57	0.01	2.23
2.22	Steel structure for ventilation fan support	1	m.th	1.32	0.42	100.34	0.55	132.41
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	7.5	do	9.88	1.51	102.31	14.91	1,010.53
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	3.30	1.36	134.52	4.48	443.24
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.5	do	9.88	0.14	13.13	1.38	129.69
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	7.5	do	9.88	0.37	34.41	3.65	339.87
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.32	2.37	278.28	3.13	367.21
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7	do	9.88	0.38	38.10	3.75	376.32
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.5	do	9.88	0.55	55.77	5.43	550.85
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.5	do	9.88	0.14	13.50	1.38	133.34
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	998	2.31	0.00	2,305.70	0.00
3.02	Explosive, gramonite type	----	kg	8983	2.06	0.00	18,505.48	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	4275	0.00	1.98	0.00	8,464.01
3.06	Blasting connection wire	----	m	1638	0.00	0.13	0.00	212.95
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	3.29	0.00	459.99	0.00	1,512.43
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	3.29	0.00	808.44	0.00	2,658.12
3.09	Jumbo drill shank adapter	----	ea.	5.26	0.00	302.37	0.00	1,590.69
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	16.44	0.00	164.35	0.00	2,701.89
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.41	0.00	586.85	0.00	240.33
3.12	Integral drill steel, 800 mm	----	ea.	0.26	0.00	132.65	0.00	33.95
3.13	Integral drill steel, 1600 mm	----	ea.	0.22	0.00	153.97	0.00	34.48
3.14	Integral drill steel, 2400 mm	----	ea.	0.16	0.00	174.35	0.00	27.89
3.15	Hand held breaker tool, moil point	----	ea.	2.84	0.00	32.37	0.00	92.05
3.16	Pipeline supports including anchors	----	kg	1,247.56	1.38	3.22	1,721.64	4,017.15
3.17	Cable tray including supports and anchors	----	m	499.02	0.35	0.83	176.65	412.19
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	499.02	0.79	7.11	394.23	3,548.07
	Sub-total						64,939.88	193,150.20
	Missing items and construction contingencies	%		2.00%			1,298.80	3,863.00
	Total Direct Costs						66,238.68	197,013.20
	Overheads, risks and profit	%		52.00%			13,689.10	123,201.88
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	8,531			9.37	37.54
	AGGREGATE UNIT PRICE		m³					46.90

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING REAMING (ROCK CLASS IV)

SEC 2-05
 ANA 002
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	13.69	0.00	47.25	0.00	646.86
1.02	Gang foreman	1	h	136.90	6.60	0.00	903.55	0.00
1.03	Tunnel specialist	1	h	410.70	3.69	0.00	1,515.50	0.00
1.04	Tunneling jumbo operator	1	h	410.70	5.82	0.00	2,390.30	0.00
1.05	Loader operator	1	h	410.70	5.82	0.00	2,390.30	0.00
1.06	Operator of dumpers and other units	---	h	375.42	5.82	0.00	2,184.94	0.00
1.07	Miner	4	h	1,642.82	2.99	0.00	4,912.03	0.00
1.08	Explosive specialist	1	h	410.70	3.69	0.00	1,515.50	0.00
1.09	Electrician	0.33	h	45.59	3.69	0.00	168.22	0.00
1.10	Mechanic	0.33	h	45.59	3.69	0.00	168.22	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	20.67	3.69	0.00	76.26	0.00
1.12	Pipe fitter	0.33	h	45.59	3.69	0.00	168.22	0.00
1.13	Helper	5	h	2,053.52	2.38	0.00	4,887.38	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.71	0.00	15,947.19	0.00	11,370.80
		---	h	64.50	2.88	85.71	185.75	5,528.05
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.85	0.00	187.16	0.00	533.80
		---	h	3.20	0.07	1.53	0.22	4.89
2.03	Hand-held rock drill, medium weight type	3	m.th	2.14	0.00	130.63	0.00	279.43
		---	h	4.80	0.04	2.03	0.19	9.74
2.04	Hand-held breaker, medium weight type	4	m.th	2.85	0.00	46.95	0.00	133.91
		---	h	68.24	0.03	0.91	2.05	62.10
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.71	0.15	24.64	0.11	17.57
		---	h	410.70	0.00	5.46	0.00	2,242.45
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.71	0.20	40.08	0.14	28.58
		---	h	410.70	0.00	7.50	0.00	3,080.28
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.71	0.00	12,874.72	0.00	9,180.04
		---	h	56.74	1.95	55.22	110.64	3,133.11
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	228.26	0.73	75.31	166.63	17,190.55
		s.b	h	45.65	0.00	33.01	0.00	1,507.00
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.71	0.00	856.34	0.00	610.59
		---	h	410.70	0.38	29.58	156.07	12,148.64
2.11	Halogen flood light, 1000 W	2	m.th	1.43	0.00	79.92	0.00	113.97
		---	h	821.41	0.01	0.43	8.21	353.21
2.12	Halogen flood light, 2000 W	1	m.th	0.71	0.00	92.77	0.00	66.15
		---	h	410.70	0.01	0.48	4.11	197.14
2.13	Ligthing line along tunnel, 100 m section	7.5	m.th	5.34	0.00	130.82	0.00	698.19
		---	h	3,074.12	0.01	0.41	30.74	1,260.39
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	47.25	0.15	18.51	7.09	874.51
		---	h	9.45	0.00	7.46	0.00	70.49
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	47.25	0.32	29.23	15.12	1,380.97
		s.b	h	9.45	0.00	12.36	0.00	116.79
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	474.61	0.26	24.87	123.40	11,803.45
		s.b	h	94.92	0.00	15.28	0.00	1,450.40
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	18.54	0.63	48.81	11.68	904.79
		s.b	h	3.71	0.00	20.84	0.00	77.26
Total to carry forward ----->>							22,102.58	87,076.10

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - POWERHOUSE - TOP HEADING REAMING (ROCK CLASS IV)

SEC 2-05
 ANA 002
 RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						22,102.58	87,076.10
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.71	0.00	82.94	0.00	59.14
		---	h	3.57	0.01	4.39	0.04	15.65
2.19	Integral drill steel grinder	---	h	0.80	0.01	2.29	0.01	1.83
2.20	Button bits grinder	---	h	16.42	0.04	5.32	0.66	87.37
2.21	Breaker moiil point resharpen	---	h	0.71	0.01	1.57	0.01	1.12
2.22	Steel structure for ventilation fan support	1	m.th	0.71	0.42	100.34	0.30	71.55
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	7.5	do	5.34	1.51	102.31	8.06	546.03
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.78	1.36	134.52	2.42	239.50
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.5	do	5.34	0.14	13.13	0.75	70.08
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	7.5	do	5.34	0.37	34.41	1.97	183.65
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.71	2.37	278.28	1.69	198.42
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7	do	5.34	0.38	38.10	2.03	203.34
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	7.5	do	5.34	0.55	55.77	2.94	297.65
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.5	do	5.34	0.14	13.50	0.75	72.05
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	471.27	2.31	0.00	1,088.64	0.00
3.02	Explosive, gramonite type	----	kg	4,241.45	2.06	0.00	8,737.39	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2,400.63	0.00	1.98	0.00	4,753.26
3.06	Blasting connection wire	----	m	944.90	0.00	0.13	0.00	122.84
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	1.60	0.00	459.99	0.00	736.61
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	1.60	0.00	808.44	0.00	1,294.60
3.09	Jumbo drill shank adapter	----	ea.	2.56	0.00	302.37	0.00	774.72
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	8.01	0.00	164.35	0.00	1,315.92
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.20	0.00	586.85	0.00	120.14
3.12	Integral drill steel, 800 mm	----	ea.	0.13	0.00	132.65	0.00	16.97
3.13	Integral drill steel, 1600 mm	----	ea.	0.11	0.00	153.97	0.00	17.24
3.14	Integral drill steel, 2400 mm	----	ea.	0.08	0.00	174.35	0.00	13.94
3.15	Hand held breaker tool, moiil point	----	ea.	1.42	0.00	32.37	0.00	46.02
3.16	Pipeline supports including anchors	----	kg	623.69	1.38	3.22	860.69	2,008.27
3.17	Cable tray including supports and anchors	----	m	249.48	0.35	0.83	88.31	206.07
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	249.48	0.79	7.11	197.09	1,773.77
	Sub-total						33,096.30	102,323.83
	Missing items and construction contingencies	%		2.00%			661.93	2,046.48
	Total Direct Costs						33,758.23	104,370.31
	Overheads, risks and profit	%		52.00%			7,182.68	64,644.15
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	4,265			9.60	39.63
	AGGREGATE UNIT PRICE		m³					49.23

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - POWERHOUSE - FIRST HORIZONTAL SIDE BENCHING (ROCK CLASS III)**

**SEC 2-05
ANA 003
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	14.89	0.00	47.25	0.00	703.67
1.02	Gang foreman	1	h	148.93	6.60	0.00	982.91	0.00
1.03	Tunnel specialist	1	h	446.78	3.69	0.00	1,648.60	0.00
1.04	Tunneling jumbo operator	1	h	446.78	5.82	0.00	2,600.24	0.00
1.05	Loader operator	1	h	446.78	5.82	0.00	2,600.24	0.00
1.06	Operator of dumpers and other units	---	h	641.82	5.82	0.00	3,735.38	0.00
1.07	Miner	4	h	1,787.10	2.99	0.00	5,343.44	0.00
1.08	Explosive specialist	1	h	446.78	3.69	0.00	1,648.60	0.00
1.09	Electrician	0	h	49.59	3.69	0.00	183.00	0.00
1.10	Mechanic	0	h	49.59	3.69	0.00	183.00	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	31.20	3.69	0.00	115.11	0.00
1.12	Pipe fitter	0	h	49.59	3.69	0.00	183.00	0.00
1.13	Helper	5	h	2,233.88	2.38	0.00	5,316.64	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.78	0.00	15,947.19	0.00	12,369.49
		---	h	102.63	2.88	85.71	295.56	8,796.09
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.10	0.00	187.16	0.00	580.68
		---	h	4.46	0.07	1.53	0.31	6.82
2.03	Hand-held rock drill, medium weight type	3	m.th	2.33	0.00	130.63	0.00	303.97
		---	h	6.68	0.04	2.03	0.27	13.57
2.04	Hand-held breaker, medium weight type	4	m.th	3.10	0.00	46.95	0.00	145.67
		---	h	95.06	0.03	0.91	2.85	86.51
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.78	0.15	24.64	0.12	19.11
		---	h	446.78	0.00	5.46	0.00	2,439.40
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.78	0.20	40.08	0.16	31.09
		---	h	446.78	0.00	7.50	0.00	3,350.82
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.78	0.00	12,874.72	0.00	9,986.32
		---	h	77.25	1.95	55.22	150.63	4,265.48
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	366.11	0.73	75.31	267.26	27,571.55
		s.b	h	73.22	0.00	33.01	0.00	2,417.04
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.78	0.00	0.00	0.00	0.00
		---	h	446.78	0.46	36.86	205.52	16,468.17
2.11	Halogen flood light, 1000 W	2	m.th	1.55	0.00	79.92	0.00	123.98
		---	h	893.55	0.01	0.43	8.94	384.23
2.12	Halogen flood light, 2000 W	1	m.th	0.78	0.00	92.77	0.00	71.96
		---	h	446.78	0.01	0.48	4.47	214.45
2.13	Ligthning line along tunnel, 100 m section	11.8	m.th	9.14	0.00	130.82	0.00	1,195.83
		---	h	5484.64	0.01	0.41	54.85	2,248.70
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	111.69	0.15	18.51	16.75	2,067.46
		---	h	22.34	0.00	7.46	0.00	166.65
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	81.90	0.32	29.23	26.21	2,394.05
		s.b	h	16.38	0.00	12.36	0.00	202.47
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	667.33	0.26	24.87	173.51	16,596.61
		s.b	h	133.47	0.00	15.28	0.00	2,039.37
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	23.77	0.63	48.81	14.97	1,159.98
		s.b	h	4.75	0.00	20.84	0.00	99.05
Total to carry forward ----->>							25,762.51	118,520.24

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - POWERHOUSE - FIRST HORIZONTAL SIDE BENCHING (ROCK CLASS III)**

**SEC 2-05
ANA 003
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						25,762.51	118,520.24
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.78	0.00	82.94	0.00	64.33
		---	h	3.88	0.01	4.39	0.04	17.03
2.19	Integral drill steel grinder	---	h	1.11	0.01	2.29	0.01	2.55
2.20	Button bits grinder	---	h	24.88	0.04	5.32	1.00	132.37
2.21	Breaker moiil point resharpen	---	h	0.99	0.01	1.57	0.01	1.55
2.22	Steel structure for ventilation fan support	1	m.th	0.78	0.57	133.79	0.44	103.77
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	11.8	do	9.14	1.51	102.31	13.80	935.22
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	2.60	1.36	134.52	3.54	350.27
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	11.8	do	9.14	0.14	13.13	1.28	120.02
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	11.8	do	9.14	0.37	34.41	3.38	314.54
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.78	2.37	278.28	1.84	215.85
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12	do	9.14	0.38	38.10	3.47	348.27
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11.8	do	9.14	0.55	55.77	5.03	509.80
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11.8	do	9.14	0.14	13.50	1.28	123.40
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
							0.00	0.00
3	Materials						0.00	0.00
3.01	Explosive, amonite type	----	kg	658	2.31	0.00	1,519.29	0.00
3.02	Explosive, gramonite type	----	kg	5919	2.06	0.00	12,193.79	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3099	0.00	1.98	0.00	6,136.49
3.06	Blasting connection wire	----	m	1638	0.00	0.13	0.00	212.95
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.41	0.00	459.99	0.00	1,106.89
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.41	0.00	808.44	0.00	1,945.37
3.09	Jumbo drill shank adapter	----	ea.	3.85	0.00	302.37	0.00	1,164.16
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	12.03	0.00	164.35	0.00	1,977.40
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.41	0.00	586.85	0.00	240.33
3.12	Integral drill steel, 800 mm	----	ea.	0.18	0.00	132.65	0.00	23.64
3.13	Integral drill steel, 1600 mm	----	ea.	0.16	0.00	153.97	0.00	24.01
3.14	Integral drill steel, 2400 mm	----	ea.	0.11	0.00	174.35	0.00	19.42
3.15	Hand held breaker tool, moiil point	----	ea.	1.98	0.00	32.37	0.00	64.11
3.16	Pipeline supports including anchors	----	kg	1,964.26	1.38	3.22	2,710.69	6,324.93
3.17	Cable tray including supports and anchors	----	m	785.71	0.35	0.83	278.14	648.99
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	785.71	0.79	7.11	620.71	5,586.37
	Sub-total						43,120.24	147,234.32
	Missing items and construction contingencies	%		2.00%			862.40	2,944.69
	Total Direct Costs						43,982.64	150,179.01
	Overheads, risks and profit	%		52.00%			10,096.41	90,867.65
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	5,941			9.10	40.57
	AGGREGATE UNIT PRICE		m³					49.67

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - POWERHOUSE - FIRST HORIZONTAL SIDE BENCHING (ROCK CLASS IV)

SEC 2-05
 ANA 003
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	8.03	0.00	47.25	0.00	379.19
1.02	Gang foreman	1	h	80.25	6.60	0.00	529.66	0.00
1.03	Tunnel specialist	1	h	240.76	3.69	0.00	888.39	0.00
1.04	Tunneling jumbo operator	1	h	240.76	5.82	0.00	1,401.20	0.00
1.05	Loader operator	1	h	240.76	5.82	0.00	1,401.20	0.00
1.06	Operator of dumpers and other units	---	h	318.34	5.82	0.00	1,852.72	0.00
1.07	Miner	4	h	963.02	2.99	0.00	2,879.44	0.00
1.08	Explosive specialist	1	h	240.76	3.69	0.00	888.39	0.00
1.09	Electrician	0.33	h	26.72	3.69	0.00	98.61	0.00
1.10	Mechanic	0.33	h	26.72	3.69	0.00	98.61	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	15.20	3.69	0.00	56.08	0.00
1.12	Pipe fitter	0.33	h	26.72	3.69	0.00	98.61	0.00
1.13	Helper	5	h	1,203.78	2.38	0.00	2,864.99	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.42	0.00	15,947.19	0.00	6,665.58
		---	h	52.72	2.88	85.71	151.83	4,518.66
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.67	0.00	187.16	0.00	312.92
		---	h	2.23	0.07	1.53	0.16	3.41
2.03	Hand-held rock drill, medium weight type	3	m.th	1.25	0.00	130.63	0.00	163.80
		---	h	3.34	0.04	2.03	0.13	6.78
2.04	Hand-held breaker, medium weight type	4	m.th	1.67	0.00	46.95	0.00	78.50
		---	h	47.52	0.03	0.91	1.43	43.25
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.42	0.15	24.64	0.06	10.30
		---	h	240.76	0.00	5.46	0.00	1,314.53
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.42	0.20	40.08	0.08	16.75
		---	h	240.76	0.00	7.50	0.00	1,805.67
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.42	0.00	12,874.72	0.00	5,381.36
		---	h	39.95	1.95	55.22	77.90	2,205.86
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 25 t pay l.	Op.	h	183.03	0.73	75.31	133.61	13,783.71
		s.b	h	36.61	0.00	33.01	0.00	1,208.34
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.42	0.00	918.32	0.00	383.84
		---	h	240.76	0.46	36.86	110.75	8,874.26
2.11	Halogen flood light, 1000 W	2	m.th	0.84	0.00	79.92	0.00	66.81
		---	h	481.51	0.01	0.43	4.82	207.05
2.12	Halogen flood light, 2000 W	1	m.th	0.42	0.00	92.77	0.00	38.78
		---	h	240.76	0.01	0.48	2.41	115.56
2.13	Ligthing line along tunnel, 100 m section	11.8	m.th	4.93	0.00	130.82	0.00	644.40
		---	h	2,837.31	0.01	0.41	28.37	1,163.30
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	47.25	0.15	18.51	7.09	874.51
		---	h	9.45	0.00	7.46	0.00	70.49
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	47.25	0.32	29.23	15.12	1,380.97
		s.b	h	9.45	0.00	12.36	0.00	116.79
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	385.13	0.26	24.87	100.13	9,578.20
		s.b	h	77.03	0.00	15.28	0.00	1,176.96
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	11.88	0.63	48.81	7.48	579.90
		s.b	h	2.38	0.00	20.84	0.00	49.52
Total to carry forward ----->>							13,699.27	63,219.92

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						13,699.27	63,219.92	
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.42	0.00	82.94	0.00	34.67	
		---	h	2.09	0.01	4.39	0.02	9.17	
2.19	Integral drill steel grinder	---	h	0.56	0.01	2.29	0.01	1.28	
2.20	Button bits grinder	---	h	12.11	0.04	5.32	0.48	64.41	
2.21	Breaker moiil point resharpen	---	h	0.50	0.01	1.57	0.00	0.78	
2.22	Steel structure for ventilation fan support	1	m.th	0.42	0.57	133.79	0.24	55.92	
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	11.8	do	4.93	1.51	102.31	7.44	503.97	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	3	do	1.40	1.36	134.52	1.91	188.75	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	11.8	do	4.93	0.14	13.13	0.69	64.68	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	11.8	do	4.93	0.37	34.41	1.82	169.50	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.42	2.37	278.28	0.99	116.32	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12	do	4.93	0.38	38.10	1.87	187.68	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11.8	do	4.93	0.55	55.77	2.71	274.72	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11.8	do	4.93	0.14	13.50	0.69	66.50	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
							0.00	0.00	
3	Materials						0.00	0.00	
3.01	Explosive, amonite type	----	kg	310.53	2.31	0.00	717.34	0.00	
3.02	Explosive, gramonite type	----	kg	2,794.81	2.06	0.00	5,757.31	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	1,736.73	0.00	1.98	0.00	3,438.72	
3.06	Blasting connection wire	----	m	944.90	0.00	0.13	0.00	122.84	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	1.17	0.00	459.99	0.00	538.11	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	1.17	0.00	808.44	0.00	945.73	
3.09	Jumbo drill shank adapter	----	ea.	1.87	0.00	302.37	0.00	565.95	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	5.85	0.00	164.35	0.00	961.30	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.20	0.00	586.85	0.00	120.14	
3.12	Integral drill steel, 800 mm	----	ea.	0.09	0.00	132.65	0.00	11.82	
3.13	Integral drill steel, 1600 mm	----	ea.	0.08	0.00	153.97	0.00	12.00	
3.14	Integral drill steel, 2400 mm	----	ea.	0.06	0.00	174.35	0.00	9.71	
3.15	Hand held breaker tool, moiil point	----	ea.	0.99	0.00	32.37	0.00	32.05	
3.16	Pipeline supports including anchors	----	kg	981.99	1.38	3.22	1,355.14	3,161.99	
3.17	Cable tray including supports and anchors	----	m	392.79	0.35	0.83	139.05	324.45	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	392.79	0.79	7.11	310.31	2,792.77	
Sub-total							21,997.29	77,995.82	
Missing items and construction contingencies		%	2.00%	----->>			439.95	1,559.92	
Total Direct Costs							22,437.23	79,555.74	
Overheads, risks and profit		%	52.00%	----->>			5,303.63	47,732.71	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	2,970	----->>		9.34	42.86
AGGREGATE UNIT PRICE				m³	----->>			52.19	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - POWERHOUSE, FIRST VERTICAL BENCHING (ROCK CLASS III)

SEC 2-05
 ANA 004
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	41.80	0.00	47.25	0.00	1,975.27
1.02	Gang foreman	1	h	418.05	6.60	0.00	2,759.11	0.00
1.03	Tunnel specialist	1	h	418.05	3.69	0.00	1,542.59	0.00
1.04	Crawler drill rig operator	----	h	228.16	5.82	0.00	1,327.92	0.00
1.05	Loader operator	----	h	140.07	5.82	0.00	815.21	0.00
1.06	Operator of dumpers and other units	----	h	1,078.61	5.82	0.00	6,277.53	0.00
1.07	Miner	3	h	1,254.14	2.99	0.00	3,749.88	0.00
1.08	Explosive specialist	1	h	418.05	3.69	0.00	1,542.59	0.00
1.09	Electrician	0.33	h	45.99	3.69	0.00	169.69	0.00
1.10	Mechanic	0.33	h	45.99	3.69	0.00	169.69	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	27.18	3.69	0.00	100.29	0.00
1.12	Pipe fitter	0.33	h	45.99	3.69	0.00	169.69	0.00
1.13	Helper	5	h	2,090.24	2.38	0.00	4,974.76	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.73	0.29	24.56	0.21	17.83
		---	h	207.42	0.00	16.40	0.00	3,401.73
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.90	0.00	187.16	0.00	543.35
		---	h	28.47	0.07	1.53	1.99	43.56
2.03	Hand-held rock drill, medium weight type	4	m.th	2.90	0.00	130.63	0.00	379.23
		---	h	42.71	0.04	2.03	1.71	86.70
2.04	Hand-held breaker, medium weight type	5	m.th	3.63	0.00	46.95	0.00	170.38
		---	h	101.24	0.03	0.91	3.04	92.13
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	418.05	0.15	24.64	62.71	10,300.68
		s.b.	h	83.61	0.00	5.46	0.00	456.51
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	207.42	0.33	99.41	68.45	20,619.87
		s.b.	h	41.48	0.00	11.98	0.00	496.98
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	127.34	1.05	95.46	133.70	12,155.55
		s.b.	h	25.47	0.00	36.59	0.00	931.85
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	799.80	0.73	75.31	583.86	60,233.24
		s.b.	h	159.96	0.00	33.01	0.00	5,280.31
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	0.73	0.00	878.67	0.00	637.72
		----	h	418.05	0.55	44.15	229.93	18,456.78
2.11	Halogen flood light, 1000 W	2	m.th	1.45	0.00	79.92	0.00	116.01
		----	h	836.09	0.01	0.43	8.36	359.52
2.12	Halogen flood light, 2000 W	2	m.th	1.45	0.00	92.77	0.00	134.66
		----	h	836.09	0.01	0.48	8.36	401.33
2.13	Ligthing line along tunnel, 100 m section	11.8	m.th	8.55	0.00	130.82	0.00	1,118.94
		----	h	4,926.69	0.01	0.41	49.27	2,019.94
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	78.38	0.15	18.51	11.76	1,450.88
		s.b.	h	15.68	0.00	7.46	0.00	116.95
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	28.56	0.32	29.23	9.14	834.92
		s.b.	h	5.71	0.00	12.36	0.00	70.61
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	23.88	0.33	30.84	7.88	736.61
		s.b.	h	4.78	0.00	19.27	0.00	92.05
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	49.92	0.63	48.81	31.45	2,436.64
		s.b.	h	9.98	0.00	20.84	0.00	208.07
Total to carry forward ----->>>							24,811	146,377

PROJECT:
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - POWERHOUSE, FIRST VERTICAL BENCHING (ROCK CLASS III)

SEC 2-05
ANA 004
RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						24,811	146,377	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.73	0.00	82.94	0.00	60.20	
		---	h	1.45	0.01	4.39	0.01	6.37	
2.19	Integral drill steel grinder	1	h	1.78	0.01	2.29	0.02	4.08	
2.20	Button bits grinder	1	h	20.87	0.04	5.32	0.83	111.02	
2.21	Breaker tool resharper	1	h	3.80	0.01	1.57	0.04	5.96	
2.22	Steel structure for ventilation fan support	1	m.th	0.73	0.57	133.79	0.41	97.10	
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	12	do	8.55	2.21	149.88	18.90	1,281.96	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	3	do	2.44	1.36	134.52	3.31	327.75	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12	do	8.55	0.14	13.13	1.20	112.30	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	12	do	8.55	0.74	69.67	6.33	595.91	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	0	do	0.00	1.40	139.97	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.73	3.15	370.12	2.29	268.62	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12	do	8.55	0.38	38.10	3.25	325.88	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12	do	8.55	0.14	13.50	1.20	115.47	
2.37	Control board, 10 KVA	2	do	1.45	0.24	27.23	0.35	39.53	
2.38	Control board, 150 KVA	1	do	0.73	0.67	74.68	0.49	54.20	
2.39	Control board, 300 KVA	1	do	0.73	0.95	105.80	0.69	76.79	
2.40	Transformer cabin, 300 kVA	2	do	1.45	5.68	696.82	8.24	1,011.47	
2.41	Transformer cabin, 450 kVA	1	do	0.73	7.43	911.23	5.39	661.35	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	6,261.32	2.31	0.00	14,463.64	0.00	
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	612.93	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00	
3.06	Blasting connection wire	----	m	1,185.40	0.00	0.13	0.00	154.10	
3.07	Detonating fuse	----	ea.	11,988.94	0.00	0.82	0.00	9,830.93	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	6.31	0.00	483.24	0.00	3,049.53	
3.09	Shank adapter for ditto	----	ea.	3.28	0.00	277.11	0.00	908.69	
3.10	Coupling for ditto	----	ea.	7.53	0.00	54.15	0.00	407.72	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	10.43	0.00	291.98	0.00	3,046.62	
3.12	Integral drill steel, 800 mm	----	ea.	0.66	0.00	132.65	0.00	88.13	
3.13	Integral drill steel, 1600 mm	----	ea.	0.57	0.00	153.97	0.00	87.68	
3.14	Integral drill steel, 2400 mm	----	ea.	0.19	0.00	174.35	0.00	33.10	
3.15	Hand held breaker tool,moil point	----	ea.	1.27	0.00	32.37	0.00	40.96	
3.16	Pipeline supports including anchors	----	kg	1,964.26	1.38	3.22	2,710.69	6,324.93	
3.17	Cable tray including supports and anchors	----	m	785.71	0.35	0.83	278.14	648.99	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	785.71	0.79	7.11	620.71	5,586.37	
Sub-total								42,937	181,741
Missing items and construction contingencies		%		2.00%			859	3,635	
Total Direct Costs								43,796	185,375
Overheads, risks and profit		%		52.00%			11,917	107,252	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		12,655			4.40	23.12	
AGGREGATE UNIT PRICE		m ³					27.53		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - POWERHOUSE, FIRST VERTICAL BENCHING (ROCK CLASS IV)

SEC 2-05
 ANA 004
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	20.76	0.00	47.25	0.00	980.76
1.02	Gang foreman	1	h	207.57	6.60	0.00	1,369.95	0.00
1.03	Tunnel specialist	1	h	207.57	3.69	0.00	765.93	0.00
1.04	Crawler drill rig operator	----	h	117.95	5.82	0.00	686.46	0.00
1.05	Loader operator	----	h	70.58	5.82	0.00	410.79	0.00
1.06	Operator of dumpers and other units	----	h	538.30	5.82	0.00	4,072.81	0.00
1.07	Miner	3	h	622.70	2.99	0.00	2,420.45	0.00
1.08	Explosive specialist	1	h	207.57	3.69	0.00	995.70	0.00
1.09	Electrician	0.33	h	22.83	3.69	0.00	84.25	0.00
1.10	Mechanic	0.33	h	22.83	3.69	0.00	84.25	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	13.59	3.69	0.00	50.14	0.00
1.12	Pipe fitter	0.33	h	22.83	3.69	0.00	84.25	0.00
1.13	Helper	5	h	1,037.84	2.38	0.00	3,211.08	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.36	0.29	24.56	0.10	8.85
		---	h	107.23	0.00	16.40	0.00	1,758.50
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.44	0.00	187.16	0.00	269.78
		---	h	14.23	0.07	1.53	1.00	21.78
2.03	Hand-held rock drill, medium weight type	4	m.th	1.44	0.00	130.63	0.00	188.30
		---	h	21.35	0.04	2.03	0.85	43.34
2.04	Hand-held breaker, medium weight type	5	m.th	1.80	0.00	46.95	0.00	84.59
		---	h	50.61	0.03	0.91	1.52	46.06
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	207.57	0.15	24.64	31.14	5,114.48
		s.b.	h	41.51	0.00	5.46	0.00	226.66
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	107.23	0.33	99.41	35.38	10,659.30
		s.b.	h	21.45	0.00	11.98	0.00	256.91
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	64.17	1.05	95.46	67.37	6,125.30
		s.b.	h	12.83	0.00	36.59	0.00	469.57
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	403.17	0.73	75.31	294.32	30,363.04
		s.b.	h	80.63	0.00	33.01	0.00	2,661.76
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	0.36	0.00	878.67	0.00	316.64
		----	h	207.57	0.55	44.15	114.16	9,164.13
2.11	Halogen flood light, 1000 W	2	m.th	0.72	0.00	79.92	0.00	57.60
		----	h	415.14	0.01	0.43	4.15	178.51
2.12	Halogen flood light, 2000 W	2	m.th	0.72	0.00	92.77	0.00	66.86
		----	h	415.14	0.01	0.48	4.15	199.27
2.13	Ligthning line along tunnel, 100 m section	11.8	m.th	4.25	0.00	130.82	0.00	555.57
		----	h	2,446.19	0.01	0.41	24.46	1,002.94
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	38.92	0.15	18.51	5.84	720.39
		s.b.	h	7.78	0.00	7.46	0.00	58.07
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.28	0.32	29.23	4.57	417.40
		s.b.	h	2.86	0.00	12.36	0.00	35.30
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	7.83	0.33	30.84	2.58	241.48
		s.b.	h	1.57	0.00	19.27	0.00	30.18
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	25.16	0.63	48.81	15.85	1,228.29
		s.b.	h	5.03	0.00	20.84	0.00	104.89
Total to carry forward ----->>							14,844	73,656

PROJECT:
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - POWERHOUSE, FIRST VERTICAL BENCHING (ROCK CLASS IV)

SEC 2-05
ANA 004
RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						14,844	73,656	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.36	0.00	82.94	0.00	29.89	
		---	h	0.72	0.01	4.39	0.01	3.16	
2.19	Integral drill steel grinder	1	h	0.89	0.01	2.29	0.01	2.04	
2.20	Button bits grinder	1	h	10.43	0.04	5.32	0.42	55.50	
2.21	Breaker tool resharper	1	h	1.90	0.01	1.57	0.02	2.98	
2.22	Steel structure for ventilation fan support	1	m.th	0.36	0.57	133.79	0.21	48.21	
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	12	do	4.25	2.21	149.88	9.39	636.52	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	3	do	1.21	1.36	134.52	1.65	162.73	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12	do	4.25	0.14	13.13	0.59	55.76	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	12	do	4.25	0.74	69.67	3.14	295.88	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	0	do	0.00	1.40	139.97	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.36	3.15	370.12	1.14	133.38	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12	do	4.25	0.38	38.10	1.61	161.81	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12	do	4.25	0.14	13.50	0.59	57.33	
2.37	Control board, 10 KVA	2	do	0.72	0.24	27.23	0.17	19.63	
2.38	Control board, 150 KVA	1	do	0.36	0.67	74.68	0.24	26.91	
2.39	Control board, 300 KVA	1	do	0.36	0.95	105.80	0.34	38.13	
2.40	Transformer cabin, 300 kVA	2	do	0.72	5.68	696.82	4.09	502.21	
2.41	Transformer cabin, 450 kVA	1	do	0.36	7.43	911.23	2.68	328.37	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	328.82	2.31	0.00	759.57	0.00	
3.02	Explosive, gramonite type	----	kg	2,959.37	2.06	0.00	6,096.31	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	306.42	0.00	1.98	0.00	606.71	
3.06	Blasting connection wire	----	m	592.61	0.00	0.13	0.00	77.04	
3.07	Detonating fuse	----	ea.	5,993.57	0.00	0.82	0.00	4,914.73	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	3.15	0.00	483.24	0.00	1,524.54	
3.09	Shank adapter for ditto	----	ea.	1.64	0.00	277.11	0.00	454.28	
3.10	Coupling for ditto	----	ea.	3.76	0.00	54.15	0.00	203.83	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	5.22	0.00	291.98	0.00	1,523.08	
3.12	Integral drill steel, 800 mm	----	ea.	0.33	0.00	132.65	0.00	44.06	
3.13	Integral drill steel, 1600 mm	----	ea.	0.28	0.00	153.97	0.00	43.83	
3.14	Integral drill steel, 2400 mm	----	ea.	0.09	0.00	174.35	0.00	16.55	
3.15	Hand held breaker tool,moil point	----	ea.	0.63	0.00	32.37	0.00	20.48	
3.16	Pipeline supports including anchors	----	kg	981.99	1.38	3.22	1,355.14	3,161.99	
3.17	Cable tray including supports and anchors	----	m	392.79	0.35	0.83	139.05	324.45	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	392.79	0.79	7.11	310.31	2,792.77	
Sub-total								23,530	91,925
Missing items and construction contingencies		%		2.0%			471	1,839	
Total Direct Costs								24,001	93,764
Overheads, risks and profit		%		52.00%			6,124	55,114	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		6,327			4.76	23.53	
AGGREGATE UNIT PRICE		m ³							28.29

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 005

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 986.00 TO 974.60 (ROCK CLASS III) RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	53.25	0.00	47.25	0.00	2,516.06
1.02	Gang foreman	1	h	532.50	6.60	0.00	3,514.50	0.00
1.03	Tunnel specialist	1	h	532.50	3.69	0.00	1,964.93	0.00
1.04	Crawler drill rig operator	----	h	423.99	5.82	0.00	2,467.63	0.00
1.05	Loader operator	----	h	186.25	5.82	0.00	1,083.97	0.00
1.06	Operator of dumpers and other units	----	h	1,363.72	5.82	0.00	7,936.83	0.00
1.07	Miner	3	h	1,597.50	2.99	0.00	4,776.53	0.00
1.08	Explosive specialist	1	h	532.50	3.69	0.00	1,964.93	0.00
1.09	Electrician	0.33	h	58.58	3.69	0.00	216.14	0.00
1.10	Mechanic	0.33	h	58.58	3.69	0.00	216.14	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	31.19	3.69	0.00	115.08	0.00
1.12	Pipe fitter	0.33	h	58.58	3.69	0.00	216.14	0.00
1.13	Helper	5	h	2,662.50	2.38	0.00	6,336.75	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.92	0.29	24.56	0.27	22.71
		---	h	385.45	0.00	16.40	0.00	6,321.33
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.70	0.00	187.16	0.00	692.10
		---	h	38.68	0.07	1.53	2.71	59.19
2.03	Hand-held rock drill, medium weight type	4	m.th	3.70	0.00	130.63	0.00	483.06
		---	h	58.03	0.04	2.03	2.32	117.79
2.04	Hand-held breaker, medium weight type	5	m.th	4.62	0.00	46.95	0.00	217.02
		---	h	137.55	0.03	0.91	4.13	125.17
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	532.50	0.15	24.64	79.88	13,120.80
		s.b.	h	106.50	0.00	5.46	0.00	581.49
2.06	Diesel powered compressor, 25.0 m3/min.	Op.	h	770.89	0.29	77.99	223.56	60,121.97
		s.b.	h	154.18	0.00	10.73	0.00	1,654.34
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	169.32	1.05	95.46	177.78	16,163.02
		s.b.	h	33.86	0.00	36.59	0.00	1,239.06
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	1023.90	0.73	75.31	747.45	77,110.21
		s.b.	h	204.78	0.00	33.01	0.00	6,759.81
2.10	Sound-proof axial tunnel fan, 200 kW	1	m.th	0.92	0.00	1,060.23	0.00	980.16
		----	h	532.50	0.55	58.70	292.88	31,257.76
2.11	Halogen flood light, 1000 W	2	m.th	1.85	0.00	79.92	0.00	147.77
		----	h	1,065.00	0.01	0.43	10.65	457.95
2.12	Halogen flood light, 2000 W	2	m.th	1.85	0.00	92.77	0.00	171.53
		----	h	1,065.00	0.01	0.48	10.65	511.20
2.13	Ligthing line along tunnel, 100 m section	11.7	m.th	10.80	0.00	130.82	0.00	1,413.19
		----	h	6,222.26	0.01	0.41	62.22	2,551.13
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	99.84	0.15	18.51	14.98	1,848.11
		s.b.	h	19.97	0.00	7.46	0.00	148.97
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	28.56	0.32	29.23	9.14	834.92
		s.b.	h	5.71	0.00	12.36	0.00	70.61
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	20.30	0.33	30.84	6.70	626.10
		s.b.	h	4.06	0.00	19.27	0.00	78.24
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	67.13	0.63	48.81	42.29	3,276.60
		s.b.	h	13.43	0.00	20.84	0.00	279.80
Total to carry forward ----->>>							32,497.17	231,959.17

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 005

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 986.00 TO 974.60 (ROCK CLASS III) RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						32,497.17	231,959.17
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.92	0.00	82.94	0.00	76.68
		---	h	1.85	0.01	4.39	0.02	8.12
2.19	Integral drill steel grinder	1	h	2.42	0.01	2.29	0.02	5.54
2.20	Button bits grinder	1	h	23.57	0.04	5.32	0.94	125.41
2.21	Breaker tool resharpener	1	h	5.16	0.01	1.57	0.05	8.10
2.22	Steel structure for ventilation fan support	1	m.th	0.92	0.71	167.24	0.66	154.61
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	12	do	10.80	2.35	159.52	25.39	1,723.22
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	3.08	1.36	134.52	4.20	414.99
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12	do	10.80	0.14	13.13	1.51	141.84
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	12	do	10.80	1.40	139.97	15.12	1,512.03
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.92	3.15	370.12	2.91	342.17
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12	do	10.80	0.38	38.10	4.10	411.58
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12	do	10.80	0.14	13.50	1.51	145.83
2.37	Control board, 10 KVA	2	do	1.85	0.24	27.23	0.44	50.35
2.38	Control board, 250 KVA	1	do	0.92	0.87	97.24	0.80	89.90
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	1	do	0.92	5.68	696.82	5.25	644.20
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	8,445.90	2.31	0.00	19,510.03	0.00
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	1,094.95	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00
3.06	Blasting connection wire	----	m	1,571.02	0.00	0.13	0.00	204.23
3.07	Detonating fuse	----	ea.	14,679.95	0.00	0.82	0.00	12,037.56
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	6.19	0.00	483.24	0.00	2,988.92
3.09	Shank adapter for ditto	----	ea.	3.70	0.00	277.11	0.00	1,026.42
3.10	Coupling for ditto	----	ea.	7.38	0.00	54.15	0.00	399.62
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	11.79	0.00	291.98	0.00	3,441.33
3.12	Integral drill steel, 800 mm	----	ea.	0.90	0.00	132.65	0.00	119.74
3.13	Integral drill steel, 1600 mm	----	ea.	0.77	0.00	153.97	0.00	119.13
3.14	Integral drill steel, 2400 mm	----	ea.	0.26	0.00	174.35	0.00	44.96
3.15	Hand held breaker tool,moil point	----	ea.	1.72	0.00	32.37	0.00	55.65
3.16	Pipeline supports including anchors	----	kg	1,947.60	1.38	3.22	2,687.68	6,271.26
3.17	Cable tray including supports and anchors	----	m	779.04	0.35	0.83	275.78	643.49
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	779.04	0.79	7.11	615.44	5,538.97
Sub-total							55,649.04	270,705.00
Missing items and construction contingencies		%		2.00%			1,112.98	5,414.10
Total Direct Costs							56,762.02	276,119.10
Overheads, risks and profit		%		52.00%			17,309.82	155,788.37
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m ³	17,193			4.31	25.12
AGGREGATE UNIT PRICE			m ³					29.43

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 005

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 986.00 TO 974.60 (ROCK CLASS IV) RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	26.59	0.00	47.25	0.00	1,256.52
1.02	Gang foreman	1	h	265.93	6.60	0.00	1,755.14	0.00
1.03	Tunnel specialist	1	h	265.93	3.69	0.00	981.29	0.00
1.04	Crawler drill rig operator	----	h	218.95	5.82	0.00	1,274.28	0.00
1.05	Loader operator	----	h	93.56	5.82	0.00	544.51	0.00
1.06	Operator of dumpers and other units	----	h	681.05	5.82	0.00	5,152.85	0.00
1.07	Miner	3	h	797.79	2.99	0.00	3,101.02	0.00
1.08	Explosive specialist	1	h	265.93	3.69	0.00	1,275.67	0.00
1.09	Electrician	0.33	h	29.25	3.69	0.00	107.94	0.00
1.10	Mechanic	0.33	h	29.25	3.69	0.00	107.94	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	15.59	3.69	0.00	57.53	0.00
1.12	Pipe fitter	0.33	h	29.25	3.69	0.00	107.94	0.00
1.13	Helper	5	h	1,329.66	2.38	0.00	4,113.95	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.46	0.29	24.56	0.13	11.34
		---	h	199.04	0.00	16.40	0.00	3,264.33
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.85	0.00	187.16	0.00	345.64
		---	h	19.34	0.07	1.53	1.35	29.59
2.03	Hand-held rock drill, medium weight type	4	m.th	1.85	0.00	130.63	0.00	241.24
		---	h	29.01	0.04	2.03	1.16	58.89
2.04	Hand-held breaker, medium weight type	5	m.th	2.31	0.00	46.95	0.00	108.38
		---	h	68.76	0.03	0.91	2.06	62.57
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	265.93	0.15	24.64	39.89	6,552.54
		s.b.	h	53.19	0.00	5.46	0.00	290.40
2.06	Diesel powered compressor, 25.0 m3/min.	Op.	h	398.09	0.29	77.99	115.45	31,046.96
		s.b.	h	79.62	0.00	10.73	0.00	854.30
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	85.05	1.05	95.46	89.31	8,119.18
		s.b.	h	17.01	0.00	36.59	0.00	622.42
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	514.42	0.73	75.31	375.53	38,741.11
		s.b.	h	102.88	0.00	33.01	0.00	3,396.21
2.10	Sound-proof axial tunnel fan, 200 kW	1	m.th	0.46	0.00	1,060.23	0.00	489.49
		----	h	265.93	0.55	58.70	146.26	15,610.15
2.11	Halogen flood light, 1000 W	2	m.th	0.92	0.00	79.92	0.00	73.80
		----	h	531.86	0.01	0.43	5.32	228.70
2.12	Halogen flood light, 2000 W	2	m.th	0.92	0.00	92.77	0.00	85.66
		----	h	531.86	0.01	0.48	5.32	255.29
2.13	Ligthning line along tunnel, 100 m section	11.7	m.th	5.39	0.00	130.82	0.00	705.75
		----	h	3,107.40	0.01	0.41	31.07	1,274.04
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	49.86	0.15	18.51	7.48	922.95
		s.b.	h	9.97	0.00	7.46	0.00	74.39
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.28	0.32	29.23	4.57	417.40
		s.b.	h	2.86	0.00	12.36	0.00	35.30
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	6.85	0.33	30.84	2.26	211.23
		s.b.	h	1.37	0.00	19.27	0.00	26.40
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	33.73	0.63	48.81	21.25	1,646.20
		s.b.	h	6.75	0.00	20.84	0.00	140.57
Total to carry forward ----->>							19,428.49	117,198.95

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 005

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 986.00 TO 974.60 (ROCK CLASS IV) RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						19,428.49	117,198.95	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.46	0.00	82.94	0.00	38.29	
		---	h	0.92	0.01	4.39	0.01	4.05	
2.19	Integral drill steel grinder	1	h	1.21	0.01	2.29	0.01	2.77	
2.20	Button bits grinder	1	h	11.78	0.04	5.32	0.47	62.69	
2.21	Breaker tool resharper	1	h	2.58	0.01	1.57	0.03	4.05	
2.22	Steel structure for ventilation fan support	1	m.th	0.46	0.71	167.24	0.33	77.21	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	12	do	5.39	2.35	159.52	12.68	860.58	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	3	do	1.54	1.36	134.52	2.10	207.25	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12	do	5.39	0.14	13.13	0.76	70.83	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	12	do	5.39	1.40	139.97	7.55	755.11	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.46	3.15	370.12	1.45	170.88	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12	do	5.39	0.38	38.10	2.05	205.54	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12	do	5.39	0.14	13.50	0.76	72.83	
2.37	Control board, 10 KVA	2	do	0.92	0.24	27.23	0.22	25.14	
2.38	Control board, 250 KVA	1	do	0.46	0.87	97.24	0.40	44.89	
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00	
2.40	Transformer cabin, 300 kVA	1	do	0.46	5.68	696.82	2.62	321.71	
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	443.36	2.31	0.00	1,024.16	0.00	
3.02	Explosive, gramonite type	----	kg	3,990.24	2.06	0.00	8,219.90	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	547.39	0.00	1.98	0.00	1,083.84	
3.06	Blasting connection wire	----	m	785.39	0.00	0.13	0.00	102.10	
3.07	Detonating fuse	----	ea.	7,338.88	0.00	0.82	0.00	6,017.88	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	3.09	0.00	483.24	0.00	1,494.24	
3.09	Shank adapter for ditto	----	ea.	1.85	0.00	277.11	0.00	513.13	
3.10	Coupling for ditto	----	ea.	3.69	0.00	54.15	0.00	199.78	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	5.89	0.00	291.98	0.00	1,720.41	
3.12	Integral drill steel, 800 mm	----	ea.	0.45	0.00	132.65	0.00	59.86	
3.13	Integral drill steel, 1600 mm	----	ea.	0.39	0.00	153.97	0.00	59.55	
3.14	Integral drill steel, 2400 mm	----	ea.	0.13	0.00	174.35	0.00	22.48	
3.15	Hand held breaker tool,moil point	----	ea.	0.86	0.00	32.37	0.00	27.82	
3.16	Pipeline supports including anchors	----	kg	973.65	1.38	3.22	1,343.64	3,135.16	
3.17	Cable tray including supports and anchors	----	m	389.46	0.35	0.83	137.87	321.69	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	389.46	0.79	7.11	307.67	2,769.07	
Sub-total								30,493.17	137,649.80
Missing items and construction contingencies		%		2.0%			609.86	2,753.00	
Total Direct Costs								31,103.04	140,402.80
Overheads, risks and profit		%		52.00%			8,918.30	80,264.73	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	8,595		4.66	25.67	
AGGREGATE UNIT PRICE				m³				30.33	

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 006

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 974.60 TO 962.20 (ROCK CLASS III) RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	46.12	0.00	47.25	0.00	2,179.38
1.02	Gang foreman	1	h	461.25	6.60	0.00	3,044.22	0.00
1.03	Tunnel specialist	1	h	461.25	3.69	0.00	1,702.00	0.00
1.04	Crawler drill rig operator	----	h	447.02	5.82	0.00	2,601.65	0.00
1.05	Loader operator	----	h	191.68	5.82	0.00	1,115.61	0.00
1.06	Operator of dumpers and other units	----	h	934.63	5.82	0.00	5,439.54	0.00
1.07	Miner	3	h	1,383.74	2.99	0.00	4,137.37	0.00
1.08	Explosive specialist	1	h	461.25	3.69	0.00	1,702.00	0.00
1.09	Electrician	0.33	h	50.74	3.69	0.00	187.22	0.00
1.10	Mechanic	0.33	h	50.74	3.69	0.00	187.22	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	32.88	3.69	0.00	121.34	0.00
1.12	Pipe fitter	0.33	h	50.74	3.69	0.00	187.22	0.00
1.13	Helper	5	h	2,306.23	2.38	0.00	5,488.82	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.80	0.29	24.56	0.23	19.67
		---	h	406.38	0.00	16.40	0.00	6,664.65
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.20	0.00	187.16	0.00	599.49
		---	h	42.02	0.07	1.53	2.94	64.29
2.03	Hand-held rock drill, medium weight type	4	m.th	3.20	0.00	130.63	0.00	418.42
		---	h	63.03	0.04	2.03	2.52	127.95
2.04	Hand-held breaker, medium weight type	5	m.th	4.00	0.00	46.95	0.00	187.98
		---	h	149.40	0.03	0.91	4.48	135.96
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	867.63	0.15	24.64	130.14	21,378.32
		s.b.	h	173.53	0.00	5.46	0.00	947.45
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	812.76	0.33	99.41	268.21	80,796.66
		s.b.	h	162.55	0.00	11.98	0.00	1,947.38
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	32.51	1.05	95.46	34.14	3,103.45
		s.b.	h	6.50	0.00	36.59	0.00	237.91
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	141.75	1.35	135.08	191.36	19,147.40
		s.b.	h	28.35	0.00	44.63	0.00	1,265.25
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	644.88	1.32	98.59	851.24	63,578.62
		s.b.	h	128.98	0.00	33.74	0.00	4,351.64
2.10	Sound-proof axial tunnel fan, 250 kW	1	m.th	0.80	0.00	1,141.79	0.00	914.32
		----	h	461.25	0.90	73.25	415.12	33,786.23
2.11	Halogen flood light, 1000 W	2	m.th	1.60	0.00	79.92	0.00	128.00
		----	h	922.49	0.01	0.43	9.22	396.67
2.12	Halogen flood light, 2000 W	2	m.th	1.60	0.00	92.77	0.00	148.58
		----	h	922.49	0.01	0.48	9.22	442.80
2.13	Ligthing line along tunnel, 100 m section	11.1	m.th	8.87	0.00	130.82	0.00	1,159.92
		----	h	5,107.14	0.01	0.41	51.07	2,093.93
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	86.48	0.15	18.51	12.97	1,600.81
		s.b.	h	17.30	0.00	7.46	0.00	129.03
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	25.91	0.32	29.23	8.29	757.28
		s.b.	h	5.18	0.00	12.36	0.00	64.04
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	19.57	0.33	30.84	6.46	603.67
		s.b.	h	3.91	0.00	19.27	0.00	75.44
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	72.82	0.63	48.81	45.88	3,554.22
		s.b.	h	14.56	0.00	20.84	0.00	303.50
Total to carry forward ----->>>							27,957.70	253,310.30

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 006

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 974.60 TO 962.20 (ROCK CLASS III) RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						27,957.70	253,310.30	
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.80	0.00	128.05	0.00	102.54	
		---	h	1.60	0.03	8.70	0.05	13.93	
2.19	Integral drill steel grinder	1	h	2.63	0.01	2.29	0.03	6.01	
2.20	Button bits grinder	1	h	24.78	0.04	5.32	0.99	131.81	
2.21	Breaker tool resharper	1	h	5.60	0.01	1.57	0.06	8.80	
2.22	Steel structure for ventilation fan support	1	m.th	0.80	0.71	167.24	0.57	133.92	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	11	do	8.87	2.35	159.52	20.84	1,414.39	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	3	do	2.57	2.01	198.33	5.17	510.52	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	11	do	8.87	0.20	18.98	1.77	168.29	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	11	do	8.87	1.40	139.97	12.41	1,241.05	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.80	3.15	370.12	2.52	296.38	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11	do	8.87	0.38	38.10	3.37	337.82	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11	do	8.87	0.55	55.77	4.88	494.49	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11	do	8.87	0.14	13.50	1.24	119.70	
2.37	Control board, 10 KVA	2	do	1.60	0.24	27.23	0.38	43.61	
2.38	Control board, 150 KVA	0	do	0.00	0.67	74.68	0.00	0.00	
2.39	Control board, 350 KVA	1	do	0.80	1.02	113.45	0.82	90.85	
2.40	Transformer cabin, 350 kVA	1	do	0.80	5.68	696.82	4.55	557.99	
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	9,173.82	2.31	0.00	21,191.52	0.00	
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	1,101.07	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00	
3.06	Blasting connection wire	----	m	1,511.27	0.00	0.13	0.00	196.47	
3.07	Detonating fuse	----	ea.	15,238.93	0.00	0.82	0.00	12,495.92	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	6.85	0.00	483.24	0.00	3,312.56	
3.09	Shank adapter for ditto	----	ea.	3.89	0.00	277.11	0.00	1,078.82	
3.10	Coupling for ditto	----	ea.	8.18	0.00	54.15	0.00	442.89	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	12.39	0.00	291.98	0.00	3,617.01	
3.12	Integral drill steel, 800 mm	----	ea.	0.98	0.00	132.65	0.00	130.06	
3.13	Integral drill steel, 1600 mm	----	ea.	0.84	0.00	153.97	0.00	129.40	
3.14	Integral drill steel, 2400 mm	----	ea.	0.28	0.00	174.35	0.00	48.84	
3.15	Hand held breaker tool,moil point	----	ea.	1.87	0.00	32.37	0.00	60.45	
3.16	Pipeline supports including anchors	----	kg	1,845.51	1.38	3.22	2,546.80	5,942.54	
3.17	Cable tray including supports and anchors	----	m	738.20	0.35	0.83	261.32	609.76	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	738.20	0.79	7.11	583.18	5,248.63	
Sub-total							52,600.17	292,295.73	
Missing items and construction contingencies		%		2.00%			1,052.00	5,845.91	
Total Direct Costs							53,652.18	298,141.64	
Overheads, risks and profit		%		52.00%			18,293.28	164,639.51	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	18,676			3.85	24.78
AGGREGATE UNIT PRICE				m³			28.63		

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 006

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 974.60 TO 962.20 (ROCK CLASS IV) RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	22.97	0.00	47.25	0.00	1,085.39
1.02	Gang foreman	1	h	229.71	6.60	0.00	1,516.10	0.00
1.03	Tunnel specialist	1	h	229.71	3.69	0.00	847.64	0.00
1.04	Crawler drill rig operator	----	h	230.94	5.82	0.00	1,344.07	0.00
1.05	Loader operator	----	h	78.29	5.82	0.00	455.64	0.00
1.06	Operator of dumpers and other units	----	h	465.27	5.82	0.00	3,520.22	0.00
1.07	Miner	3	h	689.14	2.99	0.00	2,678.68	0.00
1.08	Explosive specialist	1	h	229.71	3.69	0.00	1,101.93	0.00
1.09	Electrician	0.33	h	25.27	3.69	0.00	93.24	0.00
1.10	Mechanic	0.33	h	25.27	3.69	0.00	93.24	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	16.44	3.69	0.00	60.66	0.00
1.12	Pipe fitter	0.33	h	25.27	3.69	0.00	93.24	0.00
1.13	Helper	5	h	1,148.56	2.38	0.00	3,553.65	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.40	0.29	24.56	0.12	9.79
		---	h	209.95	0.00	16.40	0.00	3,443.11
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.60	0.00	187.16	0.00	298.56
		---	h	21.01	0.07	1.53	1.47	32.14
2.03	Hand-held rock drill, medium weight type	4	m.th	1.60	0.00	130.63	0.00	208.38
		---	h	31.51	0.04	2.03	1.26	63.97
2.04	Hand-held breaker, medium weight type	5	m.th	1.99	0.00	46.95	0.00	93.62
		---	h	74.69	0.03	0.91	2.24	67.97
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	439.66	0.15	24.64	65.95	10,833.17
		s.b.	h	87.93	0.00	5.46	0.00	480.11
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	419.89	0.33	99.41	138.56	41,741.38
		s.b.	h	83.98	0.00	11.98	0.00	1,006.06
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	71.17	1.35	135.08	96.08	9,613.82
		s.b.	h	14.23	0.00	44.63	0.00	635.27
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	323.85	1.32	98.59	427.48	31,928.36
		s.b.	h	64.77	0.00	33.74	0.00	2,185.34
2.10	Sound-proof axial tunnel fan, 250 kW	1	m.th	0.40	0.00	1,141.79	0.00	455.35
		----	h	229.71	0.90	73.25	206.74	16,826.44
2.11	Halogen flood light, 1000 W	2	m.th	0.80	0.00	79.92	0.00	63.75
		----	h	459.42	0.01	0.43	4.59	197.55
2.12	Halogen flood light, 2000 W	2	m.th	0.80	0.00	92.77	0.00	73.99
		----	h	459.42	0.01	0.48	4.59	220.52
2.13	Ligthing line along tunnel, 100 m section	11.1	m.th	4.42	0.00	130.82	0.00	577.67
		----	h	2,543.49	0.01	0.41	25.43	1,042.83
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	43.07	0.15	18.51	6.46	797.25
		s.b.	h	8.61	0.00	7.46	0.00	64.26
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	12.95	0.32	29.23	4.14	378.58
		s.b.	h	2.59	0.00	12.36	0.00	32.02
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	6.53	0.33	30.84	2.15	201.39
		s.b.	h	1.31	0.00	19.27	0.00	25.17
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	36.57	0.63	48.81	23.04	1,784.88
		s.b.	h	7.31	0.00	20.84	0.00	152.42
Total to carry forward ----->>							16,368.63	126,620.52

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 006

UNDERGROUND EXCAVATION - POWERHOUSE, VERTICAL BENCH FROM EL. 974.60 TO 962.20 (ROCK CLASS IV) RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						16,368.63	126,620.52	
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.40	0.00	128.05	0.00	51.07	
		---	h	0.80	0.03	8.70	0.02	6.94	
2.19	Integral drill steel grinder	1	h	1.31	0.01	2.29	0.01	3.01	
2.20	Button bits grinder	1	h	12.39	0.04	5.32	0.50	65.89	
2.21	Breaker tool resharpeners	1	h	2.80	0.01	1.57	0.03	4.40	
2.22	Steel structure for ventilation fan support	1	m.th	0.40	0.71	167.24	0.28	66.70	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	11	do	4.42	2.35	159.52	10.38	704.41	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	3	do	1.28	2.01	198.33	2.58	254.25	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	11	do	4.42	0.20	18.98	0.88	83.81	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	11	do	4.42	1.40	139.97	6.18	618.08	
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00	
2.32	Steel water tank, 100 m3 capacity	1	do	0.40	3.15	370.12	1.26	147.61	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11	do	4.42	0.38	38.10	1.68	168.24	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11	do	4.42	0.55	55.77	2.43	246.27	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11	do	4.42	0.14	13.50	0.62	59.61	
2.37	Control board, 10 KVA	2	do	0.80	0.24	27.23	0.19	21.72	
2.38	Control board, 150 KVA	0	do	0.00	0.67	74.68	0.00	0.00	
2.39	Control board, 350 KVA	1	do	0.40	1.02	113.45	0.41	45.24	
2.40	Transformer cabin, 350 kVA	1	do	0.40	5.68	696.82	2.27	277.90	
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	481.57	2.31	0.00	1,112.43	0.00	
3.02	Explosive, gramonite type	----	kg	4,334.14	2.06	0.00	8,928.33	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	550.45	0.00	1.98	0.00	1,089.90	
3.06	Blasting connection wire	----	m	755.52	0.00	0.13	0.00	98.22	
3.07	Detonating fuse	----	ea.	7,618.32	0.00	0.82	0.00	6,247.02	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	3.43	0.00	483.24	0.00	1,656.03	
3.09	Shank adapter for ditto	----	ea.	1.95	0.00	277.11	0.00	539.33	
3.10	Coupling for ditto	----	ea.	4.09	0.00	54.15	0.00	221.41	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	6.19	0.00	291.98	0.00	1,808.23	
3.12	Integral drill steel, 800 mm	----	ea.	0.49	0.00	132.65	0.00	65.02	
3.13	Integral drill steel, 1600 mm	----	ea.	0.42	0.00	153.97	0.00	64.69	
3.14	Integral drill steel, 2400 mm	----	ea.	0.14	0.00	174.35	0.00	24.42	
3.15	Hand held breaker tool, moil point	----	ea.	0.93	0.00	32.37	0.00	30.22	
3.16	Pipeline supports including anchors	----	kg	922.62	1.38	3.22	1,273.21	2,970.82	
3.17	Cable tray including supports and anchors	----	m	369.05	0.35	0.83	130.64	304.83	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	369.05	0.79	7.11	291.55	2,623.92	
Sub-total								28,134.49	147,189.71
Missing items and construction contingencies		%		2.0%			562.69	2,943.79	
Total Direct Costs								28,697.18	150,133.50
Overheads, risks and profit		%		52.00%			9,299.20	83,692.76	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	9,336		4.07	25.04	
AGGREGATE UNIT PRICE				m³				29.11	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - COLLECTOR OF DRAFT TUBES 1-2-3 - ARCH (ROCK CLASS III)

SEC 2-05
 ANA 007
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	132.47	0.00	47.25	0.00	6,259.33
1.02	Gang foreman	1	hr	1,324.73	6.60	0.00	8,743.20	0.00
1.03	Tunnel specialist	1	hr	818.16	0.00	45.38	0.00	37,128.10
1.04	Tunneling jumbo operator	1	hr	818.16	5.82	0.00	4,761.69	0.00
1.05	Loader operator	---	hr	206.82	5.82	0.00	1,203.67	0.00
1.06	Operator of dumpers and other units	---	h	713.51	5.82	0.00	4,152.60	0.00
1.07	Miner	5	hr	4,090.80	2.99	0.00	12,231.49	0.00
1.08	Explosive specialist	1	hr	818.16	3.69	0.00	3,019.01	0.00
1.09	Electrician	0.33	hr	272.45	3.69	0.00	1,005.33	0.00
1.10	Mechanic	0.33	hr	272.45	3.69	0.00	1,005.33	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	55.36	3.69	0.00	204.28	0.00
1.12	Pipe fitter	0.33	hr	272.45	3.69	0.00	1,005.33	0.00
1.13	Helper	6	hr	4,908.96	2.38	0.00	11,683.33	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	1.42	0.00	21,868.22	0.00	31,061.99
		---	h	100.88	3.71	122.14	374.25	12,321.01
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	7.10	0.00	187.16	0.00	1,329.23
		---	h	99.78	0.07	1.53	6.98	152.67
2.03	Hand-held rock drill, medium weight type	4	m.th	5.68	0.00	130.63	0.00	742.20
		---	h	149.68	0.04	2.03	5.99	303.84
2.04	Hand-held breaker, medium weight type	5	m.th	7.10	0.00	46.95	0.00	333.44
		---	h	319.31	0.03	0.91	9.58	290.57
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	818.16	0.25	57.86	204.54	47,338.74
		s.b	h	163.63	0.00	9.26	0.00	1,515.23
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	172.35	1.05	95.46	180.96	16,452.24
		---	h	34.47	0.00	36.59	0.00	1,261.24
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	29.48	0.70	64.44	20.63	1,899.52
		s.b	h	5.90	0.00	40.23	0.00	237.17
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	372.55	1.12	114.78	417.26	42,761.75
		s.b	h	74.51	0.00	50.07	0.00	3,730.76
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	1.42	0.00	856.34	0.00	1,216.36
		---	h	818.16	0.38	29.58	310.90	24,201.18
2.11	Halogen flood light, 1000 W	2	m.th	2.84	0.00	79.92	0.00	227.04
		---	h	1,636.32	0.01	0.43	16.36	703.62
2.12	Halogen flood light, 2000 W	2	m.th	2.84	0.00	92.77	0.00	263.54
		---	h	1,636.32	0.01	0.48	16.36	785.43
2.13	Ligthing line along tunnel, 100 m section	8.1	m.th	11.50	0.00	130.82	0.00	1,504.46
		---	h	6,624.15	0.01	0.41	66.24	2,715.90
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	153.41	0.15	18.51	23.01	2,839.53
		s.b	h	30.68	0.00	7.46	0.00	228.88
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	63.07	0.32	29.23	20.18	1,843.56
		s.b	h	12.61	0.00	12.36	0.00	155.91
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	320.17	0.33	30.84	105.66	9,874.00
		s.b	h	64.03	0.00	19.27	0.00	1,233.93
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	59.61	0.63	48.81	37.56	2,909.62
		s.b	h	11.92	0.00	20.84	0.00	248.46
Total to carry forward ----->>							50,831.74	256,070.46

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - COLLECTOR OF DRAFT TUBES 1-2-3 - ARCH (ROCK CLASS III)**

**SEC 2-05
ANA 007
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						50,831.74	256,070.46
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	1.42	0.00	128.05	0.00	181.88
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.42	0.42	100.34	0.60	142.52
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	8.1	do	11.50	2.21	149.88	25.42	1,723.66
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	3	do	3.72	2.01	198.33	7.48	737.88
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	8.1	do	11.50	0.20	18.98	2.30	218.27
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	8	do	11.50	0.37	34.41	4.26	395.72
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.42	3.15	370.12	4.47	525.72
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	8.1	do	11.50	0.38	38.10	4.37	438.16
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	8.1	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	8.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	6.80	883.80	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1,437.16	2.31	0.00	3,319.85	0.00
3.02	Explosive, gramonite type	----	kg	12,934.46	2.06	0.00	26,644.99	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	4,706.07	0.00	1.98	0.00	9,318.02
3.06	Blasting connection wire	----	m	1,576.77	0.00	0.13	0.00	204.98
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.62	0.00	459.99	0.00	1,207.37
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.62	0.00	808.44	0.00	2,121.98
3.09	Jumbo drill shank adapter	----	n.	4.54	0.00	302.37	0.00	1,372.67
3.10	Jumbo drill bit, 51 mm dia.	----	n.	14.44	0.00	164.35	0.00	2,372.60
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.32	0.00	586.85	0.00	185.10
3.12	Integral drill steel, 800 mm	----	n.	2.66	0.00	132.65	0.00	352.97
3.13	Integral drill steel, 1600 mm	----	n.	2.33	0.00	153.97	0.00	358.49
3.14	Integral drill steel, 2400 mm	----	n.	1.66	0.00	174.35	0.00	289.96
3.15	Breaker tool, moiil point	----	n.	6.65	0.00	32.37	0.00	215.33
3.16	Pipeline supports including anchors	----	kg	2,024.10	1.38	3.22	2,793.26	6,517.60
3.17	Cable tray including supports and anchors	----	m	809.64	0.35	0.83	286.61	668.76
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	809.64	0.79	7.11	639.62	5,756.54
	Sub-total						84,564.95	291,376.68
	Missing items and construction contingencies	%		2.00%			1,691.30	5,827.53
	Total Direct Costs						86,256.25	297,204.21
	Overheads, risks and profit	%		52.00%			19,939.94	179,459.50
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	13,305			7.98	35.83
	AGGREGATE UNIT PRICE		m³					43.81

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-05
ANA 008
RC III - T. A

UNDERGROUND EXCAVATION - COLLECTOR OF DRAFT TUBES 1-2-3 - UPPER BENCHING (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	49.72	0.00	47.25	0.00	2,349.19	
1.02	Gang foreman	1	h	497.18	6.60	0.00	3,281.41	0.00	
1.03	Tunnel specialist	1	h	497.18	3.69	0.00	1,834.61	0.00	
1.04	Tunneling jumbo operator	1	h	497.18	5.82	0.00	2,893.61	0.00	
1.05	Loader operator	---	h	64.20	5.82	0.00	373.66	0.00	
1.06	Operator of dumpers and other units	---	h	494.79	5.82	0.00	2,879.67	0.00	
1.07	Miner	4	h	1,988.73	2.99	0.00	5,946.31	0.00	
1.08	Explosive specialist	0.33	h	165.56	3.69	0.00	610.92	0.00	
1.09	Electrician	0.33	h	165.56	3.69	0.00	610.92	0.00	
1.10	Mechanic	0.33	h	165.56	3.69	0.00	610.92	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	34.37	3.69	0.00	126.83	0.00	
1.12	Pipe fitter	0.33	h	165.56	3.69	0.00	610.92	0.00	
1.13	Helper	5	h	2,485.92	2.38	0.00	5,916.48	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.86	0.00	19,475.66	0.00	16,810.72	
		---	h	108.51	3.17	94.80	343.98	10,286.90	
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	4.32	0.00	187.16	0.00	807.75	
		---	h	5.85	0.07	1.53	0.41	8.95	
2.03	Hand-held rock drill, medium weighth type	4	m.th	3.45	0.00	130.63	0.00	451.02	
		---	h	8.78	0.04	2.03	0.35	17.82	
2.04	Hand-held breaker, medium weight type	5	m.th	4.32	0.00	46.95	0.00	202.63	
		---	h	156.02	0.03	0.91	4.68	141.98	
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	497.18	0.25	57.86	124.30	28,767.03	
		s.b.	h	99.44	0.00	9.26	0.00	920.78	
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	0.00	0.29	77.99	0.00	0.00	
		s.b.	h	0.00	0.00	10.73	0.00	0.00	
2.07	Wheel loader, 375 kW (5.50 m3 heaped)	Op.	h	53.50	1.35	135.08	72.23	7,227.05	
		s.b.	h	10.70	0.00	44.63	0.00	477.56	
2.08	Mechanized pick scaler, 120 kW, 9.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b.	h	0.00	0.00	40.23	0.00	0.00	
2.09	Dump truck, 36.60 t pay load capacity	Op.	h	210.49	1.32	98.59	277.85	20,752.26	
		s.b.	h	42.10	0.00	33.74	0.00	1,420.39	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.86	0.00	856.34	0.00	739.16	
		---	h	497.18	0.38	28.58	188.93	14,209.50	
2.11	Halogen flood light, 1000 W	2	m.th	1.73	0.00	79.92	0.00	137.97	
		---	h	994.37	0.01	0.43	9.94	427.58	
2.12	Halogen flood light, 2000 W	2	m.th	1.73	0.00	92.77	0.00	160.15	
		---	h	994.37	0.01	0.48	9.94	477.30	
2.13	Ligthing line along tunnel, 100 m section	5.5	m.th	4.77	0.00	130.82	0.00	623.81	
		---	h	2,746.64	0.01	0.41	27.47	1,126.12	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	124.30	0.15	18.51	18.64	2,300.72	
		s.b.	h	24.86	0.00	7.46	0.00	185.45	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	78.84	0.32	29.23	25.23	2,304.46	
		s.b.	h	15.77	0.00	12.36	0.00	194.89	
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	201.59	0.33	30.84	66.52	6,217.02	
		s.b.	h	40.32	0.00	19.27	0.00	776.93	
2.17	Bulldozer in disposal area, Kw 72 n. power	Op.	h	36.18	0.63	48.81	22.80	1,766.12	
		s.b.	h	7.24	0.00	20.84	0.00	150.81	
Total to carry forward ----->>>								26,889.55	122,440.01

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - COLLECTOR OF DRAFT TUBES 1-2-3 - UPPER BENCHING (ROCK CLASS III)**

**SEC 2-05
ANA 008
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						26,889.55	122,440.01
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.86	0.00	128.05	0.00	110.53
		---	h	4.32	0.03	8.70	0.13	37.55
2.19	Integral drill steel grinder	---	h	0.70	0.01	2.29	0.01	1.61
2.20	Button bits grinder	---	h	27.94	0.04	5.32	1.12	148.65
2.21	Breaker moil point resharpen	---	h	0.78	0.01	1.57	0.01	1.22
2.22	Steel structure for ventilation fan support	1	m.th	0.86			0.00	0.00
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	5.5	do	4.77			0.00	0.00
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	1.82	2.01	198.33	3.65	360.34
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	5.5	do	4.77	0.20	18.98	0.95	90.51
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	5.5	do	4.77	0.44	41.32	2.10	197.03
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.86	3.15	370.12	2.72	319.47
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	5.5	do	4.77	0.83	84.05	3.96	400.79
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	5.5	do	4.77	0.14	13.50	0.67	64.37
2.37	Control board, 10 KVA	1	do	0.86	0.24	27.23	0.21	23.50
2.38	Control board, 150 KVA	1	do	0.86	0.67	74.68	0.58	64.46
2.39	Control board, 300 KVA	1	do	0.86	0.95	105.80	0.82	91.32
2.40	Transformer cabin, 300 kVA	2	do	1.73	5.68	696.82	9.81	1,202.94
2.41	Transformer cabin, 450 kVA	1	do	0.86	7.43	911.23	6.41	786.54
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	421.27	2.31	0.00	973.13	0.00
3.02	Explosive, gramonite type	----	kg	3,791.41	2.06	0.00	7,810.30	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3,620.36	0.00	1.98	0.00	7,168.32
3.06	Blasting connection wire	----	m	1,576.77	0.00	0.13	0.00	204.98
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.72	0.00	459.99	0.00	1,249.00
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.72	0.00	808.44	0.00	2,195.14
3.09	Jumbo drill shank adapter	----	ea.	4.34	0.00	302.37	0.00	1,313.63
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	13.58	0.00	164.35	0.00	2,231.28
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.39	0.00	586.85	0.00	231.33
3.12	Integral drill steel, 800 mm	----	ea.	0.19	0.00	132.65	0.00	24.84
3.13	Integral drill steel, 1600 mm	----	ea.	0.16	0.00	153.97	0.00	25.22
3.14	Integral drill steel, 2400 mm	----	ea.	0.12	0.00	174.35	0.00	20.40
3.15	Hand held breaker tool, moil point	----	ea.	0.00	0.00	32.37	0.00	0.00
3.16	Supports of pipelines including anchors	----	kg	1,381.10	1.38	3.22	1,905.92	4,447.14
3.17	Supports of power cables including anchors	----	m	552.44	0.35	0.83	195.56	456.32
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	552.44	0.79	7.11	436.43	3,927.85
Sub-total							38,244.02	149,836.29
Missing items and construction contingencies		%		2.00%			764.88	2,996.73
Total Direct Costs							39,008.90	152,833.01
Overheads, risks and profit		%		52.00%			9,975.78	89,782.02
UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³		7,801			6.28	31.10
AGGREGATE UNIT PRICE		m ³						37.38

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - COLLECTOR OF DRAFT TUBES 1-2-3 - LOWER BENCHING (ROCK CLASS III)

SEC 2-05
 ANA 009
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	100.44	0.00	47.25	0.00	4,746.03
1.02	Gang foreman	1	h	1,004.45	6.60	0.00	6,629.37	0.00
1.03	Tunnel specialist	1	h	1,004.45	3.69	0.00	3,706.42	0.00
1.04	Crawler drill rig operator	----	h	388.61	5.82	0.00	2,261.68	0.00
1.05	Loader operator	----	h	451.56	5.82	0.00	2,628.06	0.00
1.06	Operator of dumpers and other units	----	h	1,185.59	5.82	0.00	6,900.13	0.00
1.07	Miner	3	h	3,013.35	2.99	0.00	9,009.92	0.00
1.08	Explosive specialist	1	h	1,004.45	3.69	0.00	3,706.42	0.00
1.09	Electrician	0.33	h	110.49	3.69	0.00	407.71	0.00
1.10	Mechanic	0.33	h	110.49	3.69	0.00	407.71	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	30.87	3.69	0.00	113.91	0.00
1.12	Pipe fitter	0.33	h	110.49	3.69	0.00	407.71	0.00
1.13	Helper	5	h	5,022.25	2.38	0.00	11,952.95	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	1.74	0.29	24.56	0.51	42.83
		---	h	353.28	0.00	16.40	0.00	5,793.76
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	6.98	0.00	187.16	0.00	1,305.51
		---	h	35.61	0.07	1.53	2.49	54.48
2.03	Hand-held rock drill, medium weight type	4	m.th	6.98	0.00	130.63	0.00	911.19
		---	h	53.41	0.04	2.03	2.14	108.42
2.04	Hand-held breaker, medium weight type	5	m.th	8.72	0.00	46.95	0.00	409.37
		---	h	126.60	0.03	0.91	3.80	115.21
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	401.78	0.15	24.64	60.27	9,899.86
		s.b.	h	0.00	0.00	5.46	0.00	0.00
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	353.28	0.33	99.41	116.58	35,119.35
		s.b.	h	70.66	0.00	11.98	0.00	846.45
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	0.00	1.05	95.46	0.00	0.00
		s.b.	h	0.00	0.00	36.59	0.00	0.00
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	410.51	1.35	135.08	554.18	55,451.16
		s.b.	h	82.10	0.00	44.63	0.00	3,664.18
2.09	Off-highway dump truck, 36.6 t pay load	Op.	h	416.01	1.32	98.59	549.13	41,014.38
		s.b.	h	83.20	0.00	33.74	0.00	2,807.23
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	1.74	0.00	978.67	0.00	1,706.64
		----	h	1,004.45	0.55	44.15	552.45	44,346.46
2.11	Halogen flood light, 1000 W	2	m.th	3.49	0.00	79.92	0.00	278.73
		----	h	2,008.90	0.01	0.43	20.09	863.83
2.12	Halogen flood light, 2000 W	2	m.th	3.49	0.00	92.77	0.00	323.55
		----	h	2,008.90	0.01	0.48	20.09	964.27
2.13	Ligthing line along tunnel, 100 m section	8.1	m.th	14.12	0.00	130.82	0.00	1,847.02
		----	h	8,132.43	0.01	0.41	81.32	3,334.30
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	188.33	0.15	18.51	28.25	3,486.07
		s.b.	h	37.67	0.00	7.46	0.00	280.99
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	27.50	0.32	29.23	8.80	803.68
		s.b.	h	5.50	0.00	12.36	0.00	67.97
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	383.90	0.33	30.84	126.69	11,839.54
		s.b.	h	76.78	0.00	19.27	0.00	1,479.56
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	62.07	0.63	48.81	39.10	3,029.55
		s.b.	h	12.41	0.00	20.84	0.00	258.70
Total to carry forward ----->>>							50,297.87	237,200.26

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - COLLECTOR OF DRAFT TUBES 1-2-3 - LOWER BENCHING (ROCK CLASS III)**

**SEC 2-05
ANA 009
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						50,297.87	237,200.26	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.74	0.00	82.94	0.00	144.63	
		---	h	3.49	0.01	4.39	0.03	15.31	
2.19	Integral drill steel grinder	1	h	2.23	0.01	2.29	0.02	5.10	
2.20	Button bits grinder	1	h	23.50	0.04	5.32	0.94	125.02	
2.21	Breaker tool resharper	1	h	4.75	0.01	1.57	0.05	7.45	
2.22	Steel structure for ventilation fan support	1	m.th	1.74	0.57	133.79	0.99	233.31	
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	8	do	14.12	2.35	159.52	33.18	2,252.23	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	3	do	4.57	2.01	198.33	9.18	905.89	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	8	do	14.12	0.14	13.13	1.98	185.38	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	8	do	14.12	0.74	69.67	10.45	983.66	
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	0	do	0.00	1.40	139.97	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	1.74	2.37	278.28	4.13	485.27	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	8	do	14.12	0.38	38.10	5.37	537.93	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	8	do	14.12	0.14	13.50	1.98	190.60	
2.37	Control board, 10 KVA	2	do	3.49	0.24	27.23	0.84	94.97	
2.38	Control board, 200 KVA	1	do	1.74	0.79	88.17	1.38	153.75	
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00	
2.40	Transformer cabin, 200 kVA	1	do	1.74	4.98	611.06	8.68	1,065.59	
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	6,575.78	2.31	0.00	15,190.06	0.00	
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	790.48	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00	
3.06	Blasting connection wire	----	m	1,301.43	0.00	0.13	0.00	169.19	
3.07	Detonating fuse	----	ea.	13,747.61	0.00	0.82	0.00	11,273.04	
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	7.11	0.00	483.24	0.00	3,434.04	
3.09	Shank adapter for ditto	----	ea.	3.69	0.00	277.11	0.00	1,023.27	
3.10	Coupling for ditto	----	ea.	8.48	0.00	54.15	0.00	459.13	
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	11.75	0.00	291.98	0.00	3,430.76	
3.12	Integral drill steel, 800 mm	----	ea.	0.83	0.00	132.65	0.00	110.21	
3.13	Integral drill steel, 1600 mm	----	ea.	0.71	0.00	153.97	0.00	109.65	
3.14	Integral drill steel, 2400 mm	----	ea.	0.24	0.00	174.35	0.00	41.39	
3.15	Hand held breaker tool,moil point	----	ea.	1.58	0.00	32.37	0.00	51.23	
3.16	Pipeline supports including anchors	----	kg	2,024.10	1.38	3.22	2,793.26	6,517.60	
3.17	Cable tray including supports and anchors	----	m	809.64	0.35	0.83	286.61	668.76	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	809.64	0.79	7.11	639.62	5,756.54	
Sub-total								69,286.61	277,631.16
Missing items and construction contingencies		%		2.00%			1,385.73	5,552.62	
Total Direct Costs								70,672.35	283,183.78
Overheads, risks and profit		%		52.00%			18,400.52	165,604.67	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	15,825		5.63	28.36	
AGGREGATE UNIT PRICE				m³				33.99	

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 001

UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - TOP HEADING PILOT TUNNEL (ROCK CLASS III)

RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	30.02	0.00	47.25	0.00	1,418.65
1.02	Gang foreman	1	h	300.24	6.60	0.00	1,981.61	0.00
1.03	Tunnel specialist	1	h	900.73	3.69	0.00	3,323.70	0.00
1.04	Tunneling jumbo operator	1	h	900.73	5.82	0.00	5,242.25	0.00
1.05	Loader operator	1	h	900.73	5.82	0.00	5,242.25	0.00
1.06	Operator of dumpers and other units	---	h	848.01	5.82	0.00	4,935.44	0.00
1.07	Miner	4	h	3,602.92	2.99	0.00	10,772.74	0.00
1.08	Explosive specialist	1	h	900.73	3.69	0.00	3,323.70	0.00
1.09	Electrician	0	h	99.98	3.69	0.00	368.93	0.00
1.10	Mechanic	0	h	99.98	3.69	0.00	368.93	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	39.70	3.69	0.00	146.49	0.00
1.12	Pipe fitter	0	h	99.98	3.69	0.00	368.93	0.00
1.13	Helper	5	h	4,503.66	2.38	0.00	10,718.70	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.56	0.00	12,651.92	0.00	19,784.68
		---	h	209.52	1.95	50.77	408.56	10,637.11
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	6.26	0.00	187.16	0.00	1,170.70
		---	h	4.78	0.07	1.53	0.33	7.31
2.03	Hand-held rock drill, medium weight type	3	m.th	4.69	0.00	130.63	0.00	612.83
		---	h	7.16	0.04	2.03	0.29	14.54
2.04	Hand-held breaker, medium weight type	4	m.th	6.26	0.00	46.95	0.00	293.68
		---	h	101.88	0.03	0.91	3.06	92.71
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	1.56	0.15	24.64	0.23	38.53
		---	h	900.73	0.00	5.46	0.00	4,917.99
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	1.56	0.20	40.08	0.31	62.68
		---	h	900.73	0.00	7.50	0.00	6,755.48
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.56	0.00	8,943.66	0.00	13,985.82
		---	h	131.45	1.30	33.65	170.88	4,423.24
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	411.47	0.63	62.22	259.23	25,601.96
		s.b	h	82.29	0.00	28.86	0.00	2,375.03
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	1.56	0.00	0.00	0.00	0.00
		---	h	900.73	0.20	14.93	180.15	13,447.91
2.11	Halogen flood light, 1000 W	2	m.th	3.13	0.00	79.92	0.00	249.95
		---	h	1,801.46	0.01	0.43	18.01	774.63
2.12	Halogen flood light, 2000 W	1	m.th	1.56	0.00	92.77	0.00	145.07
		---	h	900.73	0.01	0.48	9.01	432.35
2.13	Ligthing line along tunnel, 100 m section	6.4	m.th	10.00	0.00	130.82	0.00	1,308.44
		---	h	6001.12	0.01	0.41	60.01	2,460.46
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	225.18	0.15	18.51	33.78	4,168.13
		---	h	45.04	0.00	7.46	0.00	335.97
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	107.31	0.32	29.23	34.34	3,136.72
		s.b	h	21.46	0.00	12.36	0.00	265.27
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	993.27	0.26	24.87	258.25	24,702.51
		s.b	h	198.65	0.00	15.28	0.00	3,035.42
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	26.95	0.63	48.81	16.98	1,315.57
		s.b	h	5.39	0.00	20.84	0.00	112.34
Total to carry forward ----->>							48,247.10	148,083.69

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 001
RC III - T. B

UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - TOP HEADING PILOT TUNNEL (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						48,247.10	148,083.69
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	1.56	0.00	82.94	0.00	129.70
		---	h	7.82	0.01	4.39	0.08	34.32
2.19	Integral drill steel grinder	---	h	1.19	0.01	2.29	0.01	2.73
2.20	Button bits grinder	---	h	31.89	0.04	5.32	1.28	169.65
2.21	Breaker moil point resharpen	---	h	1.06	0.01	1.57	0.01	1.67
2.22	Steel structure for ventilation fan support	1	m.th	1.56	0.14	33.45	0.22	52.31
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.4	do	10.00	1.31	89.04	13.10	890.57
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	3.56	1.36	134.52	4.85	479.45
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.4	do	10.00	0.14	13.13	1.40	131.32
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.4	do	10.00	0.37	34.41	3.70	344.16
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.56	2.37	278.28	3.71	435.17
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	6	do	10.00	0.38	38.10	3.80	381.07
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.4	do	10.00	0.55	55.77	5.50	557.80
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.4	do	10.00	0.14	13.50	1.40	135.03
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	0	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
							0.00	0.00
3	Materials						0.00	0.00
3.01	Explosive, amonite type	----	kg	917	2.31	0.00	2,118.00	0.00
3.02	Explosive, gramonite type	----	kg	8252	2.06	0.00	16,999.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3966	0.00	1.98	0.00	7,851.95
3.06	Blasting connection wire	----	m	2146	0.00	0.13	0.00	279.01
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	3.08	0.00	459.99	0.00	1,417.48
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	3.08	0.00	808.44	0.00	2,491.24
3.09	Jumbo drill shank adapter	----	ea.	4.93	0.00	302.37	0.00	1,490.82
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	15.41	0.00	164.35	0.00	2,532.25
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.54	0.00	586.85	0.00	314.88
3.12	Integral drill steel, 800 mm	----	ea.	0.19	0.00	132.65	0.00	25.34
3.13	Integral drill steel, 1600 mm	----	ea.	0.17	0.00	153.97	0.00	25.73
3.14	Integral drill steel, 2400 mm	----	ea.	0.12	0.00	174.35	0.00	20.81
3.15	Hand held breaker tool, moil point	----	ea.	2.12	0.00	32.37	0.00	68.70
3.16	Pipeline supports including anchors	----	kg	1,599.00	1.38	3.22	2,206.62	5,148.78
3.17	Cable tray including supports and anchors	----	m	639.60	0.35	0.83	226.42	528.31
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	639.60	0.79	7.11	505.28	4,547.56
	Sub-total						70,341.48	178,571.51
	Missing items and construction contingencies	%		2.00%			1,406.83	3,571.43
	Total Direct Costs						71,748.30	182,142.94
	Overheads, risks and profit	%		52.00%			13,202.34	118,821.10
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	6,367			13.34	47.27
	AGGREGATE UNIT PRICE		m³					60.61

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - TOP HEADING REAMING (ROCK CLASS III)

SEC 2-06
 ANA 002
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	34.14	0.00	47.25	0.00	1,613.10
1.02	Gang foreman	1	h	341.40	6.60	0.00	2,253.22	0.00
1.03	Tunnel specialist	1	h	1,024.19	3.69	0.00	3,779.27	0.00
1.04	Tunneling jumbo operator	1	h	1,024.19	5.82	0.00	5,960.79	0.00
1.05	Loader operator	1	h	1,024.19	5.82	0.00	5,960.79	0.00
1.06	Operator of dumpers and other units	---	h	925.60	5.82	0.00	5,387.00	0.00
1.07	Miner	4	h	4,096.77	2.99	0.00	12,249.33	0.00
1.08	Explosive specialist	1	h	1,024.19	3.69	0.00	3,779.27	0.00
1.09	Electrician	0	h	113.69	3.69	0.00	419.50	0.00
1.10	Mechanic	0	h	113.69	3.69	0.00	419.50	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	42.57	3.69	0.00	157.07	0.00
1.12	Pipe fitter	0	h	113.69	3.69	0.00	419.50	0.00
1.13	Helper	5	h	5,120.96	2.38	0.00	12,187.88	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.78	0.00	12,651.92	0.00	22,496.51
		---	h	221.55	1.95	50.77	432.02	11,248.04
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	7.11	0.00	187.16	0.00	1,331.16
		---	h	5.03	0.07	1.53	0.35	7.70
2.03	Hand-held rock drill, medium weight type	3	m.th	5.33	0.00	130.63	0.00	696.82
		---	h	7.54	0.04	2.03	0.30	15.32
2.04	Hand-held breaker, medium weight type	4	m.th	7.11	0.00	46.95	0.00	333.93
		---	h	107.30	0.03	0.91	3.22	97.65
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	1.78	0.15	24.64	0.27	43.81
		---	h	1,024.19	0.00	5.46	0.00	5,592.09
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	1.78	0.20	40.08	0.36	71.27
		---	h	1,024.19	0.00	7.50	0.00	7,681.44
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.78	0.00	8,943.66	0.00	15,902.81
		---	h	141.29	1.30	33.65	183.68	4,754.49
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	448.71	0.63	62.22	282.68	27,918.45
		s.b	h	89.74	0.00	28.86	0.00	2,589.93
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	1.78	0.00	0.00	0.00	0.00
		---	h	1,024.19	0.20	14.93	204.84	15,291.18
2.11	Halogen flood light, 1000 W	2	m.th	3.56	0.00	79.92	0.00	284.21
		---	h	2,048.38	0.01	0.43	20.48	880.80
2.12	Halogen flood light, 2000 W	1	m.th	1.78	0.00	92.77	0.00	164.96
		---	h	1,024.19	0.01	0.48	10.24	491.61
2.13	Ligthing line along tunnel, 100 m section	6.4	m.th	11.37	0.00	130.82	0.00	1,487.79
		---	h	6823.68	0.01	0.41	68.24	2,797.71
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	256.05	0.15	18.51	38.41	4,739.45
		---	h	51.21	0.00	7.46	0.00	382.02
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	107.31	0.32	29.23	34.34	3,136.72
		s.b	h	21.46	0.00	12.36	0.00	265.27
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	1052.33	0.26	24.87	273.61	26,171.43
		s.b	h	210.47	0.00	15.28	0.00	3,215.92
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	29.39	0.63	48.81	18.52	1,434.60
		s.b	h	5.88	0.00	20.84	0.00	122.50
Total to carry forward ----->>							54,544.68	163,260.67

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 002
RC III - T. B

UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - TOP HEADING REAMING (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						54,544.68	163,260.67	
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	1.78	0.00	82.94	0.00	147.48	
		---	h	8.89	0.01	4.39	0.09	39.03	
2.19	Integral drill steel grinder	---	h	1.26	0.01	2.29	0.01	2.88	
2.20	Button bits grinder	---	h	34.22	0.04	5.32	1.37	182.03	
2.21	Breaker moiil point resharpen	---	h	1.12	0.01	1.57	0.01	1.75	
2.22	Steel structure for ventilation fan support	1	m.th	1.78	0.14	33.45	0.25	59.48	
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.4	do	11.37	1.31	89.04	14.90	1,012.63	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	4.05	1.36	134.52	5.51	545.16	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.4	do	11.37	0.14	13.13	1.59	149.32	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.4	do	11.37	0.37	34.41	4.21	391.34	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	1.78	2.37	278.28	4.21	494.81	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	6	do	11.37	0.38	38.10	4.32	433.30	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.4	do	11.37	0.55	55.77	6.26	634.26	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.4	do	11.37	0.14	13.50	1.59	153.53	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	0	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
							0.00	0.00	
3	Materials						0.00	0.00	
3.01	Explosive, amonite type	----	kg	936	2.31	0.00	2,161.16	0.00	
3.02	Explosive, gramonite type	----	kg	8420	2.06	0.00	17,345.38	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	4276	0.00	1.98	0.00	8,466.31	
3.06	Blasting connection wire	----	m	2146	0.00	0.13	0.00	279.01	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	3.31	0.00	459.99	0.00	1,524.52	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	3.31	0.00	808.44	0.00	2,679.37	
3.09	Jumbo drill shank adapter	----	ea.	5.30	0.00	302.37	0.00	1,603.41	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	16.57	0.00	164.35	0.00	2,723.48	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.54	0.00	586.85	0.00	314.88	
3.12	Integral drill steel, 800 mm	----	ea.	0.20	0.00	132.65	0.00	26.69	
3.13	Integral drill steel, 1600 mm	----	ea.	0.18	0.00	153.97	0.00	27.11	
3.14	Integral drill steel, 2400 mm	----	ea.	0.13	0.00	174.35	0.00	21.92	
3.15	Hand held breaker tool, moiil point	----	ea.	2.24	0.00	32.37	0.00	72.36	
3.16	Pipeline supports including anchors	----	kg	1,599.00	1.38	3.22	2,206.62	5,148.78	
3.17	Cable tray including supports and anchors	----	m	639.60	0.35	0.83	226.42	528.31	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	639.60	0.79	7.11	505.28	4,547.56	
Sub-total							77,033.85	195,471.40	
Missing items and construction contingencies		%	2.00%	----->>			1,540.68	3,909.43	
Total Direct Costs							78,574.53	199,380.83	
Overheads, risks and profit		%	52.00%	----->>			14,453.68	130,083.11	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	6,707	----->>		13.87	49.13
AGGREGATE UNIT PRICE				m³	----->>			63.00	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - FIRST SIDE BENCHING (ROCK CLASS III)

SEC 2-06
 ANA 003
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	19.02	0.00	47.25	0.00	898.62
1.02	Gang foreman	1	h	190.18	6.60	0.00	1,255.21	0.00
1.03	Tunnel specialist	1	h	570.55	3.69	0.00	2,105.34	0.00
1.04	Tunneling jumbo operator	1	h	570.55	5.82	0.00	3,320.61	0.00
1.05	Loader operator	1	h	570.55	5.82	0.00	3,320.61	0.00
1.06	Operator of dumpers and other units	---	h	532.09	5.82	0.00	3,096.77	0.00
1.07	Miner	4	h	2,282.21	2.99	0.00	6,823.80	0.00
1.08	Explosive specialist	1	h	570.55	3.69	0.00	2,105.34	0.00
1.09	Electrician	0	h	63.33	3.69	0.00	233.69	0.00
1.10	Mechanic	0	h	63.33	3.69	0.00	233.69	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	29.64	3.69	0.00	109.38	0.00
1.12	Pipe fitter	0	h	63.33	3.69	0.00	233.69	0.00
1.13	Helper	5	h	2,852.76	2.38	0.00	6,789.57	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.99	0.00	12,651.92	0.00	12,532.25
		---	h	168.87	1.95	50.77	329.29	8,573.33
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.96	0.00	187.16	0.00	741.56
		---	h	2.69	0.07	1.53	0.19	4.12
2.03	Hand-held rock drill, medium weight type	3	m.th	2.97	0.00	130.63	0.00	388.18
		---	h	4.04	0.04	2.03	0.16	8.21
2.04	Hand-held breaker, medium weight type	4	m.th	3.96	0.00	46.95	0.00	186.02
		---	h	57.48	0.03	0.91	1.72	52.31
2.05	Diesel powered a. compressor, 15.0 m3/min.	1	m.th	0.99	0.15	24.64	0.15	24.41
		---	h	570.55	0.00	5.46	0.00	3,115.21
2.06	Diesel powered a. compressor, 20.0 m3/min.	1	m.th	0.99	0.20	40.08	0.20	39.70
		---	h	570.55	0.00	7.50	0.00	4,279.14
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.99	0.00	8,943.66	0.00	8,859.07
		---	h	80.66	1.30	33.65	104.86	2,714.33
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	219.40	0.63	62.22	138.22	13,650.94
		s.b	h	43.88	0.00	28.86	0.00	1,266.36
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.99	0.00	0.00	0.00	0.00
		---	h	570.55	0.12	9.00	68.47	5,134.97
2.11	Halogen flood light, 1000 W	2	m.th	1.98	0.00	79.92	0.00	158.33
		---	h	1,141.10	0.01	0.43	11.41	490.67
2.12	Halogen flood light, 2000 W	1	m.th	0.99	0.00	92.77	0.00	91.89
		---	h	570.55	0.01	0.48	5.71	273.86
2.13	Ligthing line along tunnel, 100 m section	6.4	m.th	6.34	0.00	130.82	0.00	828.81
		---	h	3801.30	0.01	0.41	38.01	1,558.53
2.14	Personnel transportation vehicle, 14+1 seats	1	m.th	142.64	0.15	18.51	21.40	2,640.23
		---	h	28.53	0.00	7.46	0.00	212.82
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	107.31	0.32	29.23	34.34	3,136.72
		s.b	h	21.46	0.00	12.36	0.00	265.27
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	837.93	0.26	24.87	217.86	20,839.42
		s.b	h	167.59	0.00	15.28	0.00	2,560.73
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	14.37	0.63	48.81	9.05	701.46
		s.b	h	2.87	0.00	20.84	0.00	59.90
Total to carry forward ----->>							30,608.75	96,287.40

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 003
RC III - T. B

UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - FIRST SIDE BENCHING (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						30,608.75	96,287.40	
2.18	Stand-by motorgenerator, 200 KVA	1	m.th	0.99	0.00	82.94	0.00	82.16	
		---	h	4.95	0.01	4.39	0.05	21.74	
2.19	Integral drill steel grinder	---	h	0.67	0.01	2.29	0.01	1.54	
2.20	Button bits grinder	---	h	24.03	0.04	5.32	0.96	127.82	
2.21	Breaker moil point resharpen	---	h	0.60	0.01	1.57	0.01	0.94	
2.22	Steel structure for ventilation fan support	1	m.th	0.99	0.14	33.45	0.14	33.13	
2.23	Ventilation flexible pipe, 800 mm dia. (L=100 m)	6.4	do	6.34	1.07	72.47	6.78	459.13	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	2.26	1.36	134.52	3.07	303.70	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.4	do	6.34	0.14	13.13	0.89	83.19	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.4	do	6.34	0.37	34.41	2.34	218.00	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.99	2.37	278.28	2.35	275.65	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	6	do	6.34	0.38	38.10	2.41	241.38	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.4	do	6.34	0.55	55.77	3.48	353.33	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.4	do	6.34	0.14	13.50	0.89	85.53	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
							0.00	0.00	
3	Materials						0.00	0.00	
3.01	Explosive, amonite type	----	kg	711	2.31	0.00	1,643.27	0.00	
3.02	Explosive, gramonite type	----	kg	6402	2.06	0.00	13,188.88	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	n.	0	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	2917	0.00	1.98	0.00	5,776.55	
3.06	Blasting connection wire	----	m	2146	0.00	0.13	0.00	279.01	
3.07	Jumbo drill rod R32, length 3090 mm	----	ea.	2.30	0.00	459.99	0.00	1,055.86	
3.08	Jumbo drill rod R32, length 5530 mm	----	ea.	2.30	0.00	808.44	0.00	1,855.69	
3.09	Jumbo drill shank adapter	----	ea.	3.67	0.00	302.37	0.00	1,110.50	
3.10	Jumbo drill bit, 51 mm dia.	----	ea.	11.48	0.00	164.35	0.00	1,886.24	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	ea.	0.54	0.00	586.85	0.00	314.88	
3.12	Integral drill steel, 800 mm	----	ea.	0.11	0.00	132.65	0.00	14.30	
3.13	Integral drill steel, 1600 mm	----	ea.	0.09	0.00	153.97	0.00	14.52	
3.14	Integral drill steel, 2400 mm	----	ea.	0.07	0.00	174.35	0.00	11.75	
3.15	Hand held breaker tool, moil point	----	ea.	1.20	0.00	32.37	0.00	38.77	
3.16	Pipeline supports including anchors	----	kg	1,599.00	1.38	3.22	2,206.62	5,148.78	
3.17	Cable tray including supports and anchors	----	m	639.60	0.35	0.83	226.42	528.31	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	639.60	0.79	7.11	505.28	4,547.56	
Sub-total								48,402.60	121,157.36
Missing items and construction contingencies		%		2.00%			968.05	2,423.15	
Total Direct Costs								49,370.65	123,580.51
Overheads, risks and profit		%		52.00%			8,993.46	80,941.14	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	3,593			16.24	56.93
AGGREGATE UNIT PRICE				m³			73.17		

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 004
RC III - T. A

UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - FIRST CENTRAL BENCHING (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	42.63	0.00	47.25	0.00	2,014.36
1.02	Gang foreman	1	h	426.32	6.60	0.00	2,813.72	0.00
1.03	Tunnel specialist	1	h	426.32	3.69	0.00	1,573.12	0.00
1.04	Crawler drill rig operator	----	h	215.53	5.82	0.00	1,254.38	0.00
1.05	Loader operator	----	h	119.25	5.82	0.00	694.03	0.00
1.06	Operator of dumpers and other units	----	h	855.56	5.82	0.00	4,979.35	0.00
1.07	Miner	3	h	1,278.96	2.99	0.00	3,824.10	0.00
1.08	Explosive specialist	1	h	426.32	3.69	0.00	1,573.12	0.00
1.09	Electrician	0.33	h	46.90	3.69	0.00	173.04	0.00
1.10	Mechanic	0.33	h	46.90	3.69	0.00	173.04	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	23.41	3.69	0.00	86.39	0.00
1.12	Pipe fitter	0.33	h	46.90	3.69	0.00	173.04	0.00
1.13	Helper	5	h	2,131.60	2.38	0.00	5,073.22	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	0.74	0.29	24.56	0.21	18.18
		---	h	195.94	0.00	16.40	0.00	3,213.35
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.96	0.00	187.16	0.00	554.10
		---	h	24.25	0.07	1.53	1.70	37.10
2.03	Hand-held rock drill, medium weight type	4	m.th	2.96	0.00	130.63	0.00	386.74
		---	h	36.38	0.04	2.03	1.46	73.85
2.04	Hand-held breaker, medium weight type	5	m.th	3.70	0.00	46.95	0.00	173.75
		---	h	86.23	0.03	0.91	2.59	78.47
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	426.32	0.15	24.64	63.95	10,504.54
		s.b.	h	85.26	0.00	5.46	0.00	465.54
2.06	Diesel powered compressor, 30.0 m3/min.	Op.	h	195.94	0.33	99.41	64.66	19,478.00
		s.b.	h	39.19	0.00	11.98	0.00	469.46
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	108.41	1.05	95.46	113.83	10,348.60
		s.b.	h	21.68	0.00	36.59	0.00	793.33
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	588.85	0.73	75.31	429.86	44,345.96
		s.b.	h	117.77	0.00	33.01	0.00	3,887.56
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.74	0.00	856.34	0.00	633.81
		----	h	426.32	0.38	29.58	162.00	12,610.56
2.11	Halogen flood light, 1000 W	2	m.th	1.48	0.00	79.92	0.00	118.30
		----	h	852.64	0.01	0.43	8.53	366.64
2.12	Halogen flood light, 2000 W	2	m.th	1.48	0.00	92.77	0.00	137.33
		----	h	852.64	0.01	0.48	8.53	409.27
2.13	Ligthing line along tunnel, 100 m section	10.6	m.th	7.88	0.00	130.82	0.00	1,030.80
		----	h	4,538.61	0.01	0.41	45.39	1,860.83
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	79.94	0.15	18.51	11.99	1,479.60
		s.b.	h	15.99	0.00	7.46	0.00	119.26
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	37.43	0.32	29.23	11.98	1,093.93
		s.b.	h	7.49	0.00	12.36	0.00	92.51
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	30.12	0.33	30.84	9.94	928.89
		s.b.	h	6.02	0.00	19.27	0.00	116.08
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	41.46	0.63	48.81	26.12	2,023.44
		s.b.	h	8.29	0.00	20.84	0.00	172.79
Total to carry forward ----->>>							23,353	120,037

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 004
RC III - T. B

UNDERGROUND EXCAVATION - TRANSFORMER CHAMBER - FIRST CENTRAL BENCHING (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						23,353	120,037
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.74	0.00	82.94	0.00	61.39
		---	h	1.48	0.01	4.39	0.01	6.50
2.19	Integral drill steel grinder	1	h	1.52	0.01	2.29	0.02	3.47
2.20	Button bits grinder	1	h	17.99	0.04	5.32	0.72	95.73
2.21	Breaker tool resharpener	1	h	3.23	0.01	1.57	0.03	5.08
2.22	Steel structure for ventilation fan support	1	m.th	0.74	0.57	133.79	0.42	99.02
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	11	do	7.88	2.21	149.88	17.41	1,180.98
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	2.32	1.36	134.52	3.15	311.55
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	11	do	7.88	0.14	13.13	1.10	103.46
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	11	do	7.88	0.74	69.67	5.83	548.97
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	0	do	0.00	1.40	139.97	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.74	3.15	370.12	2.33	273.94
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11	do	7.88	0.38	38.10	2.99	300.21
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11	do	7.88	0.55	55.77	4.33	439.44
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11	do	7.88	0.14	13.50	1.10	106.37
2.37	Control board, 10 KVA	1	do	0.74	0.24	27.23	0.18	20.15
2.38	Control board, 150 KVA	1	do	0.74	0.67	74.68	0.50	55.27
2.39	Control board, 200 KVA	1	do	0.74	0.79	58.17	0.58	43.05
2.40	Transformer cabin, 200 kVA	2	do	1.48	4.98	611.06	7.37	904.54
2.41	Transformer cabin, 350 kVA	1	do	0.74	6.29	771.86	4.66	571.28
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	5,346.30	2.31	0.00	12,349.96	0.00
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	826.47	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00
3.06	Blasting connection wire	----	m	1,571.85	0.00	0.13	0.00	204.34
3.07	Detonating fuse	----	ea.	11,418.68	0.00	0.82	0.00	9,363.32
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	4.10	0.00	483.24	0.00	1,983.43
3.09	Shank adapter for ditto	----	ea.	2.83	0.00	277.11	0.00	783.52
3.10	Coupling for ditto	----	ea.	4.90	0.00	54.15	0.00	265.18
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	9.00	0.00	291.98	0.00	2,626.94
3.12	Integral drill steel, 800 mm	----	ea.	0.57	0.00	132.65	0.00	75.06
3.13	Integral drill steel, 1600 mm	----	ea.	0.49	0.00	153.97	0.00	74.68
3.14	Integral drill steel, 2400 mm	----	ea.	0.16	0.00	174.35	0.00	28.19
3.15	Hand held breaker tool,moil point	----	ea.	1.08	0.00	32.37	0.00	34.89
3.16	Pipeline supports including anchors	----	kg	2,661.50	1.38	3.22	3,672.87	8,570.03
3.17	Cable tray including supports and anchors	----	m	1,064.60	0.35	0.83	376.87	879.36
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,064.60	0.79	7.11	841.03	7,569.31
Sub-total							40,647	157,626
Missing items and construction contingencies		%		2.00%			813	3,153
Total Direct Costs							41,460	160,778
Overheads, risks and profit		%		52.00%			10,516	94,647
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	10,778			4.82	23.70
AGGREGATE UNIT PRICE			m³					28.52

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 005
RC III - T. A

UNDERGROUND EXCAV. - TRANSFORMER CHAMBER, BENCH FROM EL. 1008.30 TO 9991.30 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	68.65	0.00	47.25	0.00	3,243.50
1.02	Gang foreman	1	h	686.46	6.60	0.00	4,530.61	0.00
1.03	Tunnel specialist	1	h	686.46	3.69	0.00	2,533.02	0.00
1.04	Crawler drill rig operator	----	h	528.99	5.82	0.00	3,078.70	0.00
1.05	Loader operator	----	h	231.10	5.82	0.00	1,345.03	0.00
1.06	Operator of dumpers and other units	----	h	1,609.63	5.82	0.00	9,368.07	0.00
1.07	Miner	3	h	2,059.37	2.99	0.00	6,157.51	0.00
1.08	Explosive specialist	1	h	686.46	3.69	0.00	2,533.02	0.00
1.09	Electrician	0.33	h	75.51	3.69	0.00	278.63	0.00
1.10	Mechanic	0.33	h	75.51	3.69	0.00	278.63	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	39.18	3.69	0.00	144.58	0.00
1.12	Pipe fitter	0.33	h	75.51	3.69	0.00	278.63	0.00
1.13	Helper	5	h	3,432.28	2.38	0.00	8,168.82	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	1.19	0.29	24.56	0.35	29.27
		---	h	480.90	0.00	16.40	0.00	7,886.70
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	4.77	0.00	187.16	0.00	892.20
		---	h	47.87	0.07	1.53	3.35	73.24
2.03	Hand-held rock drill, medium weight type	4	m.th	4.77	0.00	130.63	0.00	622.72
		---	h	71.81	0.04	2.03	2.87	145.77
2.04	Hand-held breaker, medium weight type	5	m.th	5.96	0.00	46.95	0.00	279.77
		---	h	170.21	0.03	0.91	5.11	154.89
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	686.46	0.15	24.64	102.97	16,914.27
		s.b.	h	137.29	0.00	5.46	0.00	749.61
2.06	Diesel powered compressor, 25.0 m3/min.	Op.	h	961.79	0.29	77.99	278.92	75,010.21
		s.b.	h	192.36	0.00	10.73	0.00	2,064.01
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	210.09	1.05	95.46	220.60	20,055.63
		s.b.	h	42.02	0.00	36.59	0.00	1,537.47
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	1178.02	0.73	75.31	859.96	88,717.03
		s.b.	h	235.60	0.00	33.01	0.00	7,777.32
2.10	Sound-proof axial tunnel fan, 175 kW	1	m.th	1.19	0.00	1,027.61	0.00	1,224.67
		----	h	686.46	0.64	51.43	439.33	35,304.42
2.11	Halogen flood light, 1000 W	2	m.th	2.38	0.00	79.92	0.00	190.49
		----	h	1,372.91	0.01	0.43	13.73	590.35
2.12	Halogen flood light, 2000 W	2	m.th	2.38	0.00	92.77	0.00	221.12
		----	h	1,372.91	0.01	0.48	13.73	659.00
2.13	Ligthing line along tunnel, 100 m section	11.4	m.th	13.58	0.00	130.82	0.00	1,776.71
		----	h	7,822.85	0.01	0.41	78.23	3,207.37
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	128.71	0.15	18.51	19.31	2,382.43
		s.b.	h	25.74	0.00	7.46	0.00	192.04
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	37.43	0.32	29.23	11.98	1,093.93
		s.b.	h	7.49	0.00	12.36	0.00	92.51
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	36.00	0.33	30.84	11.88	1,110.38
		s.b.	h	7.20	0.00	19.27	0.00	138.76
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	83.14	0.63	48.81	52.38	4,058.00
		s.b.	h	16.63	0.00	20.84	0.00	346.52
Total to carry forward ----->>							40,810	278,742

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 005
RC III - T. B

UNDERGROUND EXCAV. - TRANSFORMER CHAMBER, BENCH FROM EL. 1008.30 TO 9991.30 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						40,810	278,742
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.19	0.00	82.94	0.00	98.84
		---	h	2.38	0.01	4.39	0.02	10.46
2.19	Integral drill steel grinder	1	h	2.99	0.01	2.29	0.03	6.85
2.20	Button bits grinder	1	h	29.66	0.04	5.32	1.19	157.79
2.21	Breaker tool resharper	1	h	6.38	0.01	1.57	0.06	10.02
2.22	Steel structure for ventilation fan support	1	m.th	1.19	0.71	167.24	0.85	199.31
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	11	do	13.58	2.35	159.52	31.92	2,166.49
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	3.91	1.36	134.52	5.31	525.71
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	11	do	13.58	0.14	13.13	1.90	178.32
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	11	do	13.58	1.40	139.97	19.01	1,900.98
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.19	3.15	370.12	3.75	441.10
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11	do	13.58	0.38	38.10	5.16	517.45
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11	do	13.58	0.14	13.50	1.90	183.35
2.37	Control board, 10 KVA	1	do	1.19	0.24	27.23	0.29	32.45
2.38	Control board, 250 KVA	1	do	1.19	0.87	97.24	1.04	115.89
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	1	do	1.19	5.68	696.82	6.77	830.44
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	10,474.73	2.31	0.00	24,196.64	0.00
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	1,356.66	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00
3.06	Blasting connection wire	----	m	1,996.00	0.00	0.13	0.00	259.48
3.07	Detonating fuse	----	ea.	18,430.29	0.00	0.82	0.00	15,112.84
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	7.76	0.00	483.24	0.00	3,748.53
3.09	Shank adapter for ditto	----	ea.	4.66	0.00	277.11	0.00	1,291.49
3.10	Coupling for ditto	----	ea.	9.26	0.00	54.15	0.00	501.17
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	14.83	0.00	291.98	0.00	4,330.06
3.12	Integral drill steel, 800 mm	----	ea.	1.12	0.00	132.65	0.00	148.17
3.13	Integral drill steel, 1600 mm	----	ea.	0.96	0.00	153.97	0.00	147.42
3.14	Integral drill steel, 2400 mm	----	ea.	0.32	0.00	174.35	0.00	55.64
3.15	Hand held breaker tool,moil point	----	ea.	2.13	0.00	32.37	0.00	68.87
3.16	Pipeline supports including anchors	----	kg	2,849.00	1.38	3.22	3,931.62	9,173.78
3.17	Cable tray including supports and anchors	----	m	1,139.60	0.35	0.83	403.42	941.31
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,139.60	0.79	7.11	900.28	8,102.56
Sub-total							70,321	329,999
Missing items and construction contingencies		%		2.00%			1,406	6,600
Total Direct Costs							71,728	336,599
Overheads, risks and profit		%		52.00%			21,233	191,097
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	21,277			4.37	24.80
AGGREGATE UNIT PRICE			m³					29.17

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-06
ANA 006
RC III - T. A

UNDERGROUND EXCAV. - TRANSFORMER CHAMBER, BENCH FROM EL. 991.30 TO 982.00 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	1	h	77.96	0.00	47.25	0.00	3,683.72
1.02	Gang foreman	1	h	779.62	6.60	0.00	5,145.51	0.00
1.03	Tunnel specialist	1	h	779.62	3.69	0.00	2,876.81	0.00
1.04	Crawler drill rig operator	----	h	609.64	5.82	0.00	3,548.09	0.00
1.05	Loader operator	----	h	283.25	5.82	0.00	1,648.50	0.00
1.06	Operator of dumpers and other units	----	h	1,890.47	5.82	0.00	11,002.56	0.00
1.07	Miner	3	h	2,338.87	2.99	0.00	6,993.21	0.00
1.08	Explosive specialist	1	h	779.62	3.69	0.00	2,876.81	0.00
1.09	Electrician	0.33	h	85.76	3.69	0.00	316.45	0.00
1.10	Mechanic	0.33	h	85.76	3.69	0.00	316.45	0.00
1.11	Bit and intergral drill steel grinder specialist	----	h	49.42	3.69	0.00	182.36	0.00
1.12	Pipe fitter	0.33	h	85.76	3.69	0.00	316.45	0.00
1.13	Helper	5	h	3,898.11	2.38	0.00	9,277.51	0.00
2	Equipment							
2.01	Air pow. crawler drill rig, max. hole dia. 76 mm	1	m.th	1.35	0.29	24.56	0.39	33.24
		---	h	554.22	0.00	16.40	0.00	9,089.13
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	5.41	0.00	187.16	0.00	1,013.29
		---	h	59.19	0.07	1.53	4.14	90.56
2.03	Hand-held rock drill, medium weight type	4	m.th	5.41	0.00	130.63	0.00	707.24
		---	h	88.78	0.04	2.03	3.55	180.23
2.04	Hand-held breaker, medium weight type	5	m.th	6.77	0.00	46.95	0.00	317.74
		---	h	210.45	0.03	0.91	6.31	191.51
2.05	Diesel powered compressor, 10. m3/min.	Op.	h	779.62	0.25	57.86	194.91	45,108.94
		s.b.	h	155.92	0.00	9.26	0.00	1,443.86
2.06	Diesel powered compressor, 25.0 m3/min.	Op.	h	1,108.43	0.29	77.99	321.44	86,446.50
		s.b.	h	221.69	0.00	10.73	0.00	2,378.69
2.07	Wheel loader, 199 kW (4.00 m3 heaped)	Op.	h	257.50	1.05	95.46	270.37	24,580.78
		s.b.	h	51.50	0.00	36.59	0.00	1,884.37
2.08	Wheel loader, 275 kW (5.50 m3 heaped)	Op.	h	0.00	1.35	135.08	0.00	0.00
		s.b.	h	0.00	0.00	44.63	0.00	0.00
2.09	Articulated tunnel dump truch, 25 t pay load	Op.	h	1391.15	0.73	75.31	1,015.54	104,767.67
		s.b.	h	278.23	0.00	33.01	0.00	9,184.39
2.10	Sound-proof axial tunnel fan, 200 kW	1	m.th	1.35	0.00	1,060.23	0.00	1,435.03
		----	h	779.62	0.73	58.70	569.12	45,763.83
2.11	Halogen flood light, 1000 W	2	m.th	2.71	0.00	79.92	0.00	216.35
		----	h	1,559.24	0.01	0.43	15.59	670.48
2.12	Halogen flood light, 2000 W	2	m.th	2.71	0.00	92.77	0.00	251.13
		----	h	1,559.24	0.01	0.48	15.59	748.44
2.13	Ligthing line along tunnel, 100 m section	11.1	m.th	15.03	0.00	130.82	0.00	1,966.14
		----	h	8,656.93	0.01	0.41	86.57	3,549.34
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	146.18	0.15	18.51	21.93	2,705.78
		s.b.	h	29.24	0.00	7.46	0.00	218.10
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	31.95	0.32	29.23	10.22	933.90
		s.b.	h	6.39	0.00	12.36	0.00	78.98
2.16	Extendable lifter with 1000 kg capacity p. 18 m r.	Op.	h	46.32	0.33	30.84	15.29	1,428.66
		s.b.	h	9.26	0.00	19.27	0.00	178.54
2.17	Bulldozer in disposal area, Kw 72 n. p.	Op.	h	103.01	0.63	48.81	64.89	5,027.76
		s.b.	h	20.60	0.00	20.84	0.00	429.33
Total to carry forward ----->>>							47,117	356,704

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAV. - TRANSFORMER CHAMBER, BENCH FROM EL. 991.30 TO 982.00 (ROCK CLASS III)**

**SEC 2-06
ANA 006
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						47,117	356,704
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.35	0.00	82.94	0.00	112.26
		---	h	2.71	0.01	4.39	0.03	11.88
2.19	Integral drill steel grinder	1	h	3.70	0.01	2.29	0.04	8.47
2.20	Button bits grinder	1	h	37.48	0.04	5.32	1.50	199.41
2.21	Breaker tool resharper	1	h	7.89	0.01	1.57	0.08	12.39
2.22	Steel structure for ventilation fan support	1	m.th	1.35	0.71	167.24	0.96	226.36
2.23	Ventilation flexible pipe, 2000 mm dia. (L=100 m)	11	do	15.03	2.35	159.52	35.32	2,397.49
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	4.36	1.36	134.52	5.93	586.42
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	11	do	15.03	0.14	13.13	2.10	197.34
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 200 mm (L=100 m)	0	do	0.00	0.74	69.67	0.00	0.00
2.30	Compressed air pipeline, Ø 250 mm (L=100 m)	11	do	15.03	1.40	139.97	21.04	2,103.66
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	1.35	3.15	370.12	4.26	500.96
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11	do	15.03	0.38	38.10	5.71	572.62
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11	do	15.03	0.14	13.50	2.10	202.90
2.37	Control board, 10 KVA	1	do	1.35	0.24	27.23	0.32	36.86
2.38	Control board, 250 KVA	1	do	1.35	0.87	97.24	1.18	131.62
2.39	Control board, 300 KVA	0	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	1	do	1.35	5.68	696.82	7.69	943.15
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	13,000.89	2.31	0.00	30,032.05	0.00
3.02	Explosive, gramonite type	----	kg	0.00	2.06	0.00	0.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	1,011.75	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	0.00	0.00	1.98	0.00	0.00
3.06	Blasting connection wire	----	m	1,586.85	0.00	0.13	0.00	206.29
3.07	Detonating fuse	----	ea.	21,060.38	0.00	0.82	0.00	17,269.51
3.08	Crawler drill rig rod R32, length 3660 mm	----	ea.	13.69	0.00	483.24	0.00	6,616.18
3.09	Shank adapter for ditto	----	ea.	5.89	0.00	277.11	0.00	1,632.17
3.10	Coupling for ditto	----	ea.	16.34	0.00	54.15	0.00	884.58
3.11	Drill bit for ditto, 64 mm dia.	----	ea.	18.74	0.00	291.98	0.00	5,472.25
3.12	Integral drill steel, 800 mm	----	ea.	1.38	0.00	132.65	0.00	183.20
3.13	Integral drill steel, 1600 mm	----	ea.	1.18	0.00	153.97	0.00	182.27
3.14	Integral drill steel, 2400 mm	----	ea.	0.39	0.00	174.35	0.00	68.80
3.15	Hand held breaker tool,moil point	----	ea.	2.63	0.00	32.37	0.00	85.15
3.16	Pipeline supports including anchors	----	kg	2,776.00	1.38	3.22	3,830.88	8,938.72
3.17	Cable tray including supports and anchors	----	m	1,110.40	0.35	0.83	393.08	917.19
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,110.40	0.79	7.11	877.22	7,894.94
Sub-total							82,338	415,299
Missing items and construction contingencies		%		2.00%			1,647	8,306
Total Direct Costs							83,985	423,605
Overheads, risks and profit		%		52.00%			26,395	237,552
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m ³	26,306			4.20	25.13
AGGREGATE UNIT PRICE			m ³					29.33

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 1 - (ROCK CLASS III)**

**SEC 2-06
ANA 007
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	206.87	0.00	47.25	0.00	9,774.58	
1.02	Gang foreman	1	h	2,068.69	6.60	0.00	13,653.39	0.00	
1.03	Tunnel specialist	1	h	2,068.69	0.00	45.38	0.00	93,877.37	
1.04	Tunneling jumbo operator	1	h	2,068.69	5.82	0.00	12,039.80	0.00	
1.05	Loader operator	1	h	2,068.69	5.82	0.00	12,039.80	0.00	
1.06	Operator of dumper and other units	---	h	2,477.82	5.82	0.00	14,420.93	0.00	
1.07	Miner	3	h	6,206.08	2.99	0.00	18,556.19	0.00	
1.08	Explosive specialist	1	h	2,068.69	3.69	0.00	7,633.48	0.00	
1.09	Electrician	0.33	h	689.50	3.69	0.00	2,544.24	0.00	
1.10	Mechanic	0.33	h	689.50	3.69	0.00	2,544.24	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	112.11	3.69	0.00	413.68	0.00	
1.12	Pipe fitter	0.33	h	689.50	3.69	0.00	2,544.24	0.00	
1.13	Helper	4.0	h	8,274.78	2.38	0.00	19,693.98	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	3.59	0.00	12,651.92	0.00	45,439.17	
		---	h	502.02	1.95	50.77	978.94	25,487.68	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	10.77	0.00	187.16	0.00	2,016.55	
		---	h	140.73	0.07	1.53	9.85	215.32	
2.03	Hand-held rock drill, medium weight type	2	m.th	7.18	0.00	130.63	0.00	938.31	
		---	hr	211.10	0.04	2.03	8.44	428.53	
2.04	Hand-held breaker, medium weight type	2	m.th	7.18	0.00	46.95	0.00	337.24	
		---	h	750.56	0.03	0.91	22.52	683.01	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	2,068.69	0.15	24.64	310.30	50,972.64	
		s.b	h	413.74	0.00	5.46	0.00	2,259.01	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	3.59	0.00	8,943.66	0.00	32,121.01	
		---	h	417.03	1.30	33.65	542.13	14,032.92	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	1,606.16	0.63	62.22	1,011.88	99,935.16	
		s.b	h	321.23	0.00	28.86	0.00	9,270.74	
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	3.59	0.00	856.34	0.00	3,075.53	
		---	h	2,068.69	0.38	29.58	786.10	61,192.00	
2.11	Halogen flood light, 1000 W	1	m.th	3.59	0.00	79.92	0.00	287.03	
		---	h	2,068.69	0.01	0.43	20.69	889.54	
2.12	Halogen flood light, 2000 W	1	m.th	3.59	0.00	92.77	0.00	333.18	
		---	h	2,068.69	0.01	0.48	20.69	992.97	
2.13	Ligthing line along tunnel, 100 m section	14.6	m.th	52.56	0.00	130.82	0.00	6,875.66	
		---	h	30,273.49	0.01	0.41	302.73	12,412.13	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	387.88	0.15	18.51	58.18	7,179.66	
		s.b	h	77.58	0.00	7.46	0.00	578.72	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	169.92	0.32	29.23	54.37	4,966.65	
		s.b	h	33.98	0.00	12.36	0.00	420.03	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	753.16	0.26	24.87	195.82	18,731.09	
		s.b	h	150.63	0.00	15.28	0.00	2,301.66	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	88.61	0.63	48.81	55.83	4,325.17	
		s.b	h	17.72	0.00	20.84	0.00	369.34	
Total to carry forward ----->>								110,462	512,720

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 1 - (ROCK CLASS III)**

**SEC 2-06
ANA 007
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						110,462	512,720
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	3.59	0.00	82.94	0.00	297.88
		---	h	17.96	0.01	4.39	0.18	78.83
2.19	Integral drill steel grinder	---	h	23.46	0.01	2.29	0.23	53.71
2.20	Button bits grinder	---	h	69.97	0.04	5.32	2.80	372.24
2.21	Breaker moil point resharpenner	---	h	7.82	0.01	1.57	0.08	12.27
2.22	Steel structure for ventilation fan support	1	m.th	3.59	0.42	100.34	1.51	360.37
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	14.6	do	52.56	1.73	117.13	90.93	6,156.13
2.24	Compressed air tank, 4 m3 capacity	4	do	14.10	1.07	105.20	15.09	1,483.65
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	14.6	do	52.56	0.14	13.13	7.36	690.09
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	14.6	do	52.56	0.24	22.33	12.61	1,173.62
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.59	2.37	278.28	8.51	999.44
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	14.6	do	52.56	0.55	55.77	28.91	2,931.17
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	14.6	do	52.56	0.83	84.05	43.62	4,417.51
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	14.6	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	7.18	0.24	27.23	1.72	195.59
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	1	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2279.84	2.31	0.00	5,266.43	0.00
3.02	Explosive, gramonite type	----	kg	20518.57	2.06	0.00	42,268.25	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	11095.20	0.00	1.98	0.00	21,968.49
3.06	Blasting connection wire	----	m	4247.90	0.00	0.13	0.00	552.23
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	6.21	0.00	459.99	0.00	2,854.88
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	6.21	0.00	808.44	0.00	5,017.50
3.09	Jumbo drill shank adapter	----	n.	10.73	0.00	302.37	0.00	3,245.74
3.10	Jumbo drill bit, 48 mm dia.	----	n.	34.14	0.00	150.50	0.00	5,137.34
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.85	0.00	586.85	0.00	498.58
3.12	Integral drill steel, 800 mm	----	n.	3.75	0.00	132.65	0.00	497.81
3.13	Integral drill steel, 1600 mm	----	n.	3.28	0.00	153.97	0.00	505.59
3.14	Integral drill steel, 2400 mm	----	n.	2.35	0.00	174.35	0.00	408.94
3.15	Breaker tool, moil point	----	n.	15.64	0.00	32.37	0.00	506.16
3.16	Pipeline supports including anchors	----	kg	2,318.41	1.38	3.22	3,199.40	7,465.27
3.17	Cable tray including supports and anchors	----	m	927.36	0.35	0.83	328.29	766.00
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	927.36	0.79	7.11	732.62	6,593.55
	Sub-total						162,471	587,960
	Missing items and construction contingencies	%		2.00%			3,249	11,759
	Total Direct Costs						165,720	599,719
	Overheads, risks and profit	%		52.00%			39,803	358,226
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	18,764			10.95	51.05
	AGGREGATE UNIT PRICE		m ³					62.00

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - CABLE TUNNEL 1 - (ROCK CLASS IV)

SEC 2-06
 ANA 007
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	132.03	0.00	47.25	0.00	6,238.25
1.02	Gang foreman	1	h	1,320.26	6.60	0.00	8,713.75	0.00
1.03	Tunnel specialist	1	h	1,320.26	0.00	45.38	0.00	59,913.60
1.04	Tunneling jumbo operator	1	h	1,320.26	5.82	0.00	7,683.94	0.00
1.05	Loader operator	1	h	1,320.26	5.82	0.00	7,683.94	0.00
1.06	Operator of dumper and other units	---	h	1,526.51	5.82	0.00	8,884.28	0.00
1.07	Miner	3	h	3,960.79	2.99	0.00	11,842.77	0.00
1.08	Explosive specialist	1	h	1,320.26	3.69	0.00	4,871.78	0.00
1.09	Electrician	0.33	h	440.04	3.69	0.00	1,623.76	0.00
1.10	Mechanic	0.33	h	440.04	3.69	0.00	1,623.76	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	63.74	3.69	0.00	235.21	0.00
1.12	Pipe fitter	0.33	h	440.04	3.69	0.00	1,623.76	0.00
1.13	Helper	4.0	h	5,281.06	2.38	0.00	12,568.92	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	2.29	0.00	12,651.92	0.00	28,999.79
		---	h	304.32	1.95	50.77	593.42	15,450.22
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	6.88	0.00	187.16	0.00	1,286.98
		---	h	81.35	0.07	1.53	5.69	124.46
2.03	Hand-held rock drill, medium weight type	2	m.th	4.58	0.00	130.63	0.00	598.84
		---	hr	122.02	0.04	2.03	4.88	247.70
2.04	Hand-held breaker, medium weight type	2	m.th	4.58	0.00	46.95	0.00	215.23
		---	h	433.85	0.03	0.91	13.02	394.81
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,320.26	0.15	24.64	198.04	32,531.32
		s.b	h	264.05	0.00	5.46	0.00	1,441.73
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	2.29	0.00	8,943.66	0.00	20,499.99
		---	h	254.69	1.30	33.65	331.10	8,570.41
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	973.17	0.63	62.22	613.10	60,550.53
		s.b	h	194.63	0.00	28.86	0.00	5,617.13
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	2.29	0.00	856.34	0.00	1,962.84
		---	h	1,320.26	0.38	29.58	501.70	39,053.42
2.11	Halogen flood light, 1000 W	1	m.th	2.29	0.00	79.92	0.00	183.19
		---	h	1,320.26	0.01	0.43	13.20	567.71
2.12	Halogen flood light, 2000 W	1	m.th	2.29	0.00	92.77	0.00	212.64
		---	h	1,320.26	0.01	0.48	13.20	633.73
2.13	Ligthing line along tunnel, 100 m section	14.6	m.th	33.54	0.00	130.82	0.00	4,388.12
		---	h	19,320.88	0.01	0.41	193.21	7,921.56
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	247.55	0.15	18.51	37.13	4,582.14
		s.b	h	49.51	0.00	7.46	0.00	369.34
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	113.33	0.32	29.23	36.26	3,312.57
		s.b	h	22.67	0.00	12.36	0.00	280.15
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	488.75	0.26	24.87	127.07	12,155.18
		s.b	h	97.75	0.00	15.28	0.00	1,493.62
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	53.69	0.63	48.81	33.82	2,620.61
		s.b	h	10.74	0.00	20.84	0.00	223.78
Total to carry forward ----->>							70,071	322,642

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 1 - (ROCK CLASS IV)**

**SEC 2-06
ANA 007
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						70,071	322,642
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	2.29	0.00	82.94	0.00	190.11
		---	h	11.46	0.01	4.39	0.11	50.31
2.19	Integral drill steel grinder	---	h	13.56	0.01	2.29	0.14	31.05
2.20	Button bits grinder	---	h	39.56	0.04	5.32	1.58	210.46
2.21	Breaker moil point resharpenner	---	h	4.52	0.01	1.57	0.05	7.10
2.22	Steel structure for ventilation fan support	1	m.th	2.29	0.42	100.34	0.96	229.99
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	14.6	do	33.54	1.73	117.13	58.03	3,928.91
2.24	Compressed air tank, 4 m3 capacity	4	do	9.00	1.07	105.20	9.63	946.88
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	14.6	do	33.54	0.14	13.13	4.70	440.42
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	14.6	do	33.54	0.24	22.33	8.05	749.02
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.29	2.37	278.28	5.43	637.85
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	14.6	do	33.54	0.55	55.77	18.45	1,870.70
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	14.6	do	33.54	0.83	84.05	27.84	2,819.31
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	14.6	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	4.58	0.24	27.23	1.10	124.83
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	1	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1244.61	2.31	0.00	2,875.1	0.0
3.02	Explosive, gramonite type	----	kg	11201.51	2.06	0.00	23,075.1	0.0
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.0	0.0
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.0	0.0
3.05	Electric type detonators	----	n.	7230.08	0.00	1.98	0.0	14,315.6
3.06	Blasting connection wire	----	m	2833.19	0.00	0.13	0.0	368.3
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.51	0.00	459.99	0.0	1,613.3
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.51	0.00	808.44	0.0	2,835.3
3.09	Jumbo drill shank adapter	----	n.	6.07	0.00	302.37	0.0	1,834.1
3.10	Jumbo drill bit, 48 mm dia.	----	n.	19.29	0.00	150.50	0.0	2,903.0
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.49	0.00	586.85	0.0	288.2
3.12	Integral drill steel, 800 mm	----	n.	2.17	0.00	132.65	0.0	287.8
3.13	Integral drill steel, 1600 mm	----	n.	1.90	0.00	153.97	0.0	292.3
3.14	Integral drill steel, 2400 mm	----	n.	1.36	0.00	174.35	0.0	236.4
3.15	Breaker tool, moil point	----	n.	9.04	0.00	32.37	0.0	292.6
3.16	Pipeline supports including anchors	----	kg	1,340.12	1.38	3.22	1,849.4	4,315.2
3.17	Cable tray including supports and anchors	----	m	536.05	0.35	0.83	189.8	442.8
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	536.05	0.79	7.11	423.5	3,811.3
	Sub-total						98,620	368,715
	Missing items and construction contingencies	%		2.00%			1,972	7,374
	Total Direct Costs						100,592	376,089
	Overheads, risks and profit	%		52.00%			24,787	223,087
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	10,846			11.56	55.24
	AGGREGATE UNIT PRICE		m³					66.80

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 2 - (ROCK CLASS III)**

**SEC 2-06
ANA 008
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	184.25	0.00	47.25	0.00	8,705.93
1.02	Gang foreman	1	h	1,842.53	6.60	0.00	12,160.67	0.00
1.03	Tunnel specialist	1	h	1,842.53	0.00	45.38	0.00	83,613.79
1.04	Tunneling jumbo operator	1	h	1,842.53	5.82	0.00	10,723.50	0.00
1.05	Loader operator	---	h	3.84	5.82	0.00	22.34	0.00
1.06	Operator of dumpers and other units	---	h	1,713.24	5.82	0.00	9,971.08	0.00
1.07	Miner	4	h	7,370.10	2.99	0.00	22,036.60	0.00
1.08	Explosive specialist	1	h	1,842.53	3.69	0.00	6,798.92	0.00
1.09	Electrician	0.33	h	613.56	3.69	0.00	2,264.04	0.00
1.10	Mechanic	0.33	h	613.56	3.69	0.00	2,264.04	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	127.65	3.69	0.00	471.04	0.00
1.12	Pipe fitter	0.33	h	613.56	3.69	0.00	2,264.04	0.00
1.13	Helper	5	h	9,212.63	2.38	0.00	21,926.05	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	3.20	0.00	19,479.66	0.00	62,312.09
		---	h	338.08	3.17	94.80	1,071.71	32,049.93
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	12.80	0.00	187.16	0.00	2,394.77
		---	h	190.64	0.07	1.53	13.34	291.68
2.03	Hand-held rock drill, medium weight type	3	m.th	9.60	0.00	130.63	0.00	1,253.59
		---	h	285.96	0.04	2.03	11.44	580.50
2.04	Hand-held breaker, medium weight type	4	m.th	12.80	0.00	46.95	0.00	600.74
		---	h	610.05	0.03	0.91	18.30	555.15
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,842.53	0.15	24.64	276.38	45,399.82
		s.b	h	368.51	0.00	5.46	0.00	2,012.04
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	3.20	0.00	12,874.72	0.00	41,184.02
		---	h	339.98	1.95	55.22	662.96	18,773.55
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	944.96	1.12	114.78	1,058.36	108,462.57
		s.b	h	188.99	0.00	50.07	0.00	9,462.83
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	3.20	0.00	978.67	0.00	3,130.60
		---	h	1,842.53	0.55	44.15	1,013.39	81,347.49
2.11	Halogen flood light, 1000 W	2	m.th	6.40	0.00	79.92	0.00	511.30
		---	h	3,685.05	0.01	0.43	36.85	1,584.57
2.12	Halogen flood light, 2000 W	1	m.th	3.20	0.00	92.77	0.00	296.76
		---	h	1,842.53	0.01	0.48	18.43	884.41
2.13	Ligthing line along tunnel, 100 m section	12.5	m.th	39.96	0.00	130.82	0.00	5,227.49
		---	h	23,016.64	0.01	0.41	230.17	9,436.82
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	345.47	0.15	18.51	51.82	6,394.71
		s.b	h	69.09	0.00	7.46	0.00	515.45
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	152.48	0.32	29.23	48.79	4,456.93
		s.b	h	30.50	0.00	12.36	0.00	376.93
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	789.74	0.26	24.87	205.33	19,640.75
		s.b	h	157.95	0.00	15.28	0.00	2,413.43
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	114.58	0.63	48.81	72.19	5,592.80
		s.b	h	22.92	0.00	20.84	0.00	477.58
Total to carry forward ----->>							95,692	559,941

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 2 - (ROCK CLASS III)**

**SEC 2-06
ANA 008
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						95,692	559,941	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.20	0.00	82.94	0.00	265.31	
		---	h	0.00	0.01	4.39	0.00	0.00	
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00	
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00	
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00	
2.22	Steel structure for ventilation fan support	1	m.th	3.20	0.57	133.79	1.82	427.97	
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	12.5	do	39.96	1.93	130.66	77.12	5,221.10	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	3	do	11.19	1.36	134.52	15.22	1,505.38	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12.5	do	39.96	0.14	13.13	5.59	524.67	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	12.5	do	39.96	0.37	34.41	14.78	1,375.00	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	3.20	2.37	278.28	7.58	890.17	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	12.5	do	39.96	0.55	55.77	21.98	2,228.54	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12.5	do	0.00	0.14	13.50	0.00	0.00	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	0	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	2	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00	
2.41	Transformer cabin, 400 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	2859.61	2.31	0.00	6,605.70	0.00	
3.02	Explosive, gramonite type	----	kg	25736.51	2.06	0.00	53,017.21	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	11925.65	0.00	1.98	0.00	23,612.79	
3.06	Blasting connection wire	----	m	3811.95	0.00	0.13	0.00	495.55	
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	6.64	0.00	459.99	0.00	3,055.95	
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	6.64	0.00	808.44	0.00	5,370.88	
3.09	Jumbo drill shank adapter	----	n.	11.49	0.00	302.37	0.00	3,474.34	
3.10	Jumbo drill bit, 51 mm dia.	----	n.	36.54	0.00	164.35	0.00	6,005.24	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.76	0.00	586.85	0.00	447.41	
3.12	Integral drill steel, 800 mm	----	n.	5.08	0.00	132.65	0.00	674.36	
3.13	Integral drill steel, 1600 mm	----	n.	4.45	0.00	153.97	0.00	684.90	
3.14	Integral drill steel, 2400 mm	----	n.	3.18	0.00	174.35	0.00	553.97	
3.15	Breaker tool, moi point	----	n.	12.71	0.00	32.37	0.00	411.40	
3.16	Pipeline supports including anchors	----	kg	2,579.58	1.38	3.22	3,559.82	8,306.24	
3.17	Cable tray including supports and anchors	----	m	1,031.83	0.35	0.83	365.27	852.29	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,031.83	0.79	7.11	815.15	7,336.32	
Sub-total								160,199	633,661
Missing items and construction contingencies		%		2.00%			3,204	12,673	
Total Direct Costs								163,403	646,334
Overheads, risks and profit		%		52.00%			42,106	378,957	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	25,419			8.08	40.34	
AGGREGATE UNIT PRICE			m³					48.42	

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 2 - (ROCK CLASS IV)**

**SEC 2-06
ANA 008
RC IV - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	43.27	0.00	47.25	0.00	2,044.45
1.02	Gang foreman	1	h	432.69	6.60	0.00	2,855.73	0.00
1.03	Tunnel specialist	1	h	432.69	0.00	45.38	0.00	19,635.34
1.04	Tunneling jumbo operator	1	h	432.69	5.82	0.00	2,518.24	0.00
1.05	Loader operator	---	h	0.90	5.82	0.00	5.25	0.00
1.06	Operator of dumpers and other units	---	h	384.83	5.82	0.00	2,239.69	0.00
1.07	Miner	4	h	1,730.75	2.99	0.00	5,174.94	0.00
1.08	Explosive specialist	1	h	432.69	3.69	0.00	1,596.62	0.00
1.09	Electrician	0.33	h	144.08	3.69	0.00	531.67	0.00
1.10	Mechanic	0.33	h	144.08	3.69	0.00	531.67	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	26.46	3.69	0.00	97.65	0.00
1.12	Pipe fitter	0.33	h	144.08	3.69	0.00	531.67	0.00
1.13	Helper	5	h	2,163.44	2.38	0.00	5,148.98	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.75	0.00	19,479.66	0.00	14,632.98
		---	h	75.30	3.17	94.80	238.69	7,138.25
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.00	0.00	187.16	0.00	562.37
		---	h	40.16	0.07	1.53	2.81	61.44
2.03	Hand-held rock drill, medium weight type	3	m.th	2.25	0.00	130.63	0.00	294.38
		---	h	60.24	0.04	2.03	2.41	122.28
2.04	Hand-held breaker, medium weight type	4	m.th	3.00	0.00	46.95	0.00	141.07
		---	h	128.51	0.03	0.91	3.86	116.94
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	432.69	0.15	24.64	64.90	10,661.41
		s.b	h	86.54	0.00	5.46	0.00	472.49
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.75	0.00	12,874.72	0.00	9,671.40
		---	h	75.05	1.95	55.22	146.36	4,144.53
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	206.60	1.12	114.78	231.39	23,713.59
		s.b	h	41.32	0.00	50.07	0.00	2,068.90
2.10	Sound-proof axial tunnel fan, 150 kW	1	m.th	0.75	0.00	978.67	0.00	735.17
		---	h	432.69	0.55	44.15	237.98	19,103.14
2.11	Halogen flood light, 1000 W	2	m.th	1.50	0.00	79.92	0.00	120.07
		---	h	865.37	0.01	0.43	8.65	372.11
2.12	Halogen flood light, 2000 W	1	m.th	0.75	0.00	92.77	0.00	69.69
		---	h	432.69	0.01	0.48	4.33	207.69
2.13	Ligthing line along tunnel, 100 m section	12.5	m.th	9.38	0.00	130.82	0.00	1,227.59
		---	h	5,405.08	0.01	0.41	54.05	2,216.08
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	81.13	0.15	18.51	12.17	1,501.69
		s.b	h	16.23	0.00	7.46	0.00	121.04
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	37.06	0.32	29.23	11.86	1,083.31
		s.b	h	7.41	0.00	12.36	0.00	91.62
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	187.86	0.26	24.87	48.84	4,672.15
		s.b	h	37.57	0.00	15.28	0.00	574.11
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	25.05	0.63	48.81	15.78	1,222.77
		s.b	h	5.01	0.00	20.84	0.00	104.42
Total to carry forward ----->>							22,316	128,904

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 2 - (ROCK CLASS IV)**

**SEC 2-06
ANA 008
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						22,316	128,904
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.75	0.00	82.94	0.00	62.30
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.75	0.57	133.79	0.43	100.50
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	12.5	do	9.38	1.93	130.66	18.11	1,226.09
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	2.63	1.36	134.52	3.57	353.51
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline,Ø 50 mm (L=100 m)	12.5	do	9.38	0.14	13.13	1.31	123.21
2.28	Water steel pipeline,Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline,Ø 125 mm (L=100 m)	12.5	do	9.38	0.37	34.41	3.47	322.90
2.30	Compressed air pipeline,Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.75	2.37	278.28	1.78	209.04
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	12.5	do	9.38	0.55	55.77	5.16	523.34
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12.5	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	0	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	2	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 400 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	568.92	2.31	0.00	1,314.21	0.00
3.02	Explosive, gramonite type	----	kg	5120.30	2.06	0.00	10,547.81	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2830.11	0.00	1.98	0.00	5,603.62
3.06	Blasting connection wire	----	m	926.54	0.00	0.13	0.00	120.45
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.37	0.00	459.99	0.00	628.84
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.37	0.00	808.44	0.00	1,105.19
3.09	Jumbo drill shank adapter	----	n.	2.36	0.00	302.37	0.00	714.93
3.10	Jumbo drill bit, 51 mm dia.	----	n.	7.52	0.00	164.35	0.00	1,235.73
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.16	0.00	586.85	0.00	94.25
3.12	Integral drill steel, 800 mm	----	n.	1.07	0.00	132.65	0.00	142.06
3.13	Integral drill steel, 1600 mm	----	n.	0.94	0.00	153.97	0.00	144.28
3.14	Integral drill steel, 2400 mm	----	n.	0.67	0.00	174.35	0.00	116.70
3.15	Breaker tool, moiil point	----	n.	2.68	0.00	32.37	0.00	86.66
3.16	Pipeline supports including anchors	----	kg	543.40	1.38	3.22	749.89	1,749.74
3.17	Cable tray including supports and anchors	----	m	217.36	0.35	0.83	76.95	179.54
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	217.36	0.79	7.11	171.71	1,545.42
	Sub-total						35,211	145,293
	Missing items and construction contingencies	%		2.00%			704	2,906
	Total Direct Costs						35,915	148,199
	Overheads, risks and profit	%		52.00%			9,574	86,165
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		5,355			8.50	43.77
	AGGREGATE UNIT PRICE	m³						52.26

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 1 & 2 COMMON STRETCH (ROCK CLASS IV)**

**SEC 2-06
ANA 009
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	67.58	0.00	47.25	0.00	3,193.09	
1.02	Gang foreman	1	h	675.79	6.60	0.00	4,460.19	0.00	
1.03	Tunnel specialist	1	h	675.79	0.00	45.38	0.00	30,667.15	
1.04	Tunneling jumbo operator	1	h	675.79	5.82	0.00	3,933.07	0.00	
1.05	Loader operator	---	h	1.41	5.82	0.00	8.19	0.00	
1.06	Operator of dumpers and other units	---	h	594.73	5.82	0.00	3,461.33	0.00	
1.07	Miner	4	h	2,703.14	2.99	0.00	8,082.40	0.00	
1.08	Explosive specialist	1	h	675.79	3.69	0.00	2,493.65	0.00	
1.09	Electrician	0.33	h	225.04	3.69	0.00	830.39	0.00	
1.10	Mechanic	0.33	h	225.04	3.69	0.00	830.39	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	38.85	3.69	0.00	143.35	0.00	
1.12	Pipe fitter	0.33	h	225.04	3.69	0.00	830.39	0.00	
1.13	Helper	5	h	3,378.93	2.38	0.00	8,041.85	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.17	0.00	19,479.66	0.00	22,854.30	
		---	h	110.93	3.17	94.80	351.64	10,515.96	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	4.69	0.00	187.16	0.00	878.33	
		---	h	58.48	0.07	1.53	4.09	89.47	
2.03	Hand-held rock drill, medium weight type	3	m.th	3.52	0.00	130.63	0.00	459.78	
		---	h	87.72	0.04	2.03	3.51	178.06	
2.04	Hand-held breaker, medium weight type	4	m.th	4.69	0.00	46.95	0.00	220.33	
		---	h	187.13	0.03	0.91	5.61	170.29	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	675.79	0.15	24.64	101.37	16,651.36	
		s.b	h	135.16	0.00	5.46	0.00	737.96	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	1.17	0.00	12,874.72	0.00	15,105.12	
		---	h	109.63	1.95	55.22	213.78	6,053.88	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	322.80	1.12	114.78	361.54	37,051.31	
		s.b	h	64.56	0.00	50.07	0.00	3,232.55	
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	1.17	0.00	918.32	0.00	1,077.41	
		---	h	675.79	0.46	36.86	310.86	24,909.46	
2.11	Halogen flood light, 1000 W	2	m.th	2.35	0.00	79.92	0.00	187.53	
		---	h	1,351.57	0.01	0.43	13.52	581.18	
2.12	Halogen flood light, 2000 W	1	m.th	1.17	0.00	92.77	0.00	108.84	
		---	h	675.79	0.01	0.48	6.76	324.38	
2.13	Ligthing line along tunnel, 100 m section	11.9	m.th	13.90	0.00	130.82	0.00	1,818.78	
		---	h	8,008.06	0.01	0.41	80.08	3,283.30	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	126.71	0.15	18.51	19.01	2,345.40	
		s.b	h	25.34	0.00	7.46	0.00	189.05	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	54.59	0.32	29.23	17.47	1,595.68	
		s.b	h	10.92	0.00	12.36	0.00	134.95	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	277.68	0.26	24.87	72.20	6,905.85	
		s.b	h	55.54	0.00	15.28	0.00	848.58	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	36.56	0.63	48.81	23.03	1,784.50	
		s.b	h	7.31	0.00	20.84	0.00	152.38	
Total to carry forward ----->>								34,700	194,306

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CABLE TUNNEL 1 & 2 COMMON STRETCH (ROCK CLASS IV)**

**SEC 2-06
ANA 009
RC IV-T B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						34,699.65	194,306.22
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.17	0.00	82.94	0.00	97.31
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.17	0.57	133.79	0.67	156.97
2.23	Ventilation flexible pipe, 1600 mm dia. (L=100 m)	11.9	do	13.90	1.93	130.66	26.83	1,816.55
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	3	do	3.95	1.36	134.52	5.38	531.87
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	11.9	do	13.90	0.14	13.13	1.95	182.54
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	11.9	do	13.90	0.37	34.41	5.14	478.40
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.17	2.37	278.28	2.78	326.49
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	11.9	do	13.90	0.55	55.77	7.65	775.36
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	11.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 150 KVA	1	do	0.00	0.67	74.68	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 350 kVA	1	do	0.00	6.29	771.86	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	841.68	2.31	0.00	1,944.28	0.00
3.02	Explosive, gramonite type	----	kg	7575.13	2.06	0.00	15,604.77	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	4169.53	0.00	1.98	0.00	8,255.67
3.06	Blasting connection wire	----	m	1364.76	0.00	0.13	0.00	177.42
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.01	0.00	459.99	0.00	926.45
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.01	0.00	808.44	0.00	1,628.25
3.09	Jumbo drill shank adapter	----	n.	3.48	0.00	302.37	0.00	1,053.29
3.10	Jumbo drill bit, 51 mm dia.	----	n.	11.08	0.00	164.35	0.00	1,820.56
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.24	0.00	586.85	0.00	138.82
3.12	Integral drill steel, 800 mm	----	n.	1.56	0.00	132.65	0.00	206.85
3.13	Integral drill steel, 1600 mm	----	n.	1.36	0.00	153.97	0.00	210.09
3.14	Integral drill steel, 2400 mm	----	n.	0.97	0.00	174.35	0.00	169.92
3.15	Breaker tool, moiil point	----	n.	3.90	0.00	32.37	0.00	126.19
3.16	Pipeline supports including anchors	----	kg	2,962.50	1.38	3.22	4,088.25	9,539.25
3.17	Cable tray including supports and anchors	----	m	1,185.00	0.35	0.83	419.49	978.81
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,185.00	0.79	7.11	936.15	8,425.35
	Sub-total						57,742.99	232,328.64
	Missing items and construction contingencies	%		2.00%			1,154.86	4,646.57
	Total Direct Costs						58,897.85	236,975.21
	Overheads, risks and profit	%		52.00%			15,385.40	138,468.59
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		7,797			9.53	48.15
	AGGREGATE UNIT PRICE		m³					57.68

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING GALLERY 1 (ROCK CLASS V)**

**SEC 2-07
ANA 001
RC V - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	138.73	0.00	47.25	0.00	6,554.92	
1.02	Gang foreman	1	h	1,387.28	6.60	0.00	9,156.08	0.00	
1.03	Tunnel specialist	1	h	1,387.28	0.00	45.38	0.00	62,954.96	
1.04	Tunneling jumbo operator	1	h	1,387.28	5.82	0.00	8,073.99	0.00	
1.05	Loader operator	1	h	1,387.28	5.82	0.00	8,073.99	0.00	
1.06	Operator of dumper and other units	---	h	1,353.74	5.82	0.00	7,878.78	0.00	
1.07	Miner	3	h	4,161.85	2.99	0.00	12,443.94	0.00	
1.08	Explosive specialist	1	h	1,387.28	3.69	0.00	5,119.08	0.00	
1.09	Electrician	0.33	h	462.38	3.69	0.00	1,706.19	0.00	
1.10	Mechanic	0.33	h	462.38	3.69	0.00	1,706.19	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	53.22	3.69	0.00	196.39	0.00	
1.12	Pipe fitter	0.33	h	462.38	3.69	0.00	1,706.19	0.00	
1.13	Helper	4.0	h	5,549.14	2.38	0.00	13,206.95	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	2.41	0.00	12,651.92	0.00	30,471.89	
		---	h	294.34	1.95	50.77	573.96	14,943.62	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	7.23	0.00	187.16	0.00	1,352.31	
		---	h	61.33	0.07	1.53	4.29	93.83	
2.03	Hand-held rock drill, light weight type	2	m.th	4.82	0.00	130.63	0.00	629.24	
		---	hr	91.99	0.04	2.03	3.68	186.74	
2.04	Hand-held breaker, medium weight type	2	m.th	4.82	0.00	46.95	0.00	226.16	
		---	h	327.07	0.03	0.91	9.81	297.64	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,387.28	0.15	24.64	208.09	34,182.69	
		s.b	h	277.46	0.00	5.46	0.00	1,514.91	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	173.41	0.20	40.08	34.68	6,950.29	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt	1	m.th	2.41	0.00	8,943.66	0.00	21,540.62	
		---	h	216.61	1.30	33.65	281.59	7,288.96	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	782.92	0.63	62.22	493.24	48,713.36	
		s.b	h	156.58	0.00	28.86	0.00	4,519.02	
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	2.41	0.00	746.05	0.00	1,796.85	
		---	h	1,387.28	0.29	22.25	402.31	30,867.08	
2.11	Halogen flood light, 1000 W	1	m.th	2.41	0.00	79.92	0.00	192.49	
		---	h	1,387.28	0.01	0.43	13.87	596.53	
2.12	Halogen flood light, 2000 W	1	m.th	2.41	0.00	92.77	0.00	223.43	
		---	h	1,387.28	0.01	0.48	13.87	665.90	
2.13	Ligthing line along tunnel, 100 m section	14.5	m.th	35.03	0.00	130.82	0.00	4,582.96	
		---	h	20,178.74	0.01	0.41	201.79	8,273.29	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	260.12	0.15	18.51	39.02	4,814.74	
		s.b	h	52.02	0.00	7.46	0.00	388.09	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	144.12	0.32	29.23	46.12	4,212.53	
		s.b	h	28.82	0.00	12.36	0.00	356.26	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	310.53	0.26	24.87	80.74	7,722.91	
		s.b	h	62.11	0.00	15.28	0.00	948.98	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	43.52	0.63	48.81	27.42	2,124.23	
		s.b	h	8.70	0.00	20.84	0.00	181.39	
Total to carry forward ----->>								71,702	310,369

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING GALLERY 1 (ROCK CLASS V)**

**SEC 2-07
ANA 001
RC V - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						71,702	310,369
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	2.41	0.00	82.94	0.00	199.76
		---	h	12.04	0.01	4.39	0.12	52.87
2.19	Integral drill steel grinder	---	h	10.22	0.01	2.29	0.10	23.41
2.20	Button bits grinder	---	h	34.13	0.04	5.32	1.37	181.58
2.21	Breaker moil point resharpener	---	h	3.41	0.01	1.57	0.03	5.35
2.22	Steel structure for ventilation fan support	1.0	m.th	2.41	0.31	73.58	0.75	177.22
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	14.5	do	35.03	1.51	102.31	52.90	3,584.18
2.24	Compressed air tank, 4 m3 capacity	4	do	9.41	1.07	105.20	10.07	990.46
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	14.5	do	35.03	0.14	13.13	4.90	459.98
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	14.5	do	35.03	0.24	22.33	8.41	782.28
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.41	2.37	278.28	5.71	670.23
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	29.1	do	70.07	0.38	38.10	26.62	2,669.48
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	14.5	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	4.82	0.24	27.23	1.16	131.17
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	1	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1007.39	2.31	0.00	2,327.06	0.00
3.02	Explosive, gramonite type	----	kg	9066.48	2.06	0.00	18,676.95	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	7646.19	0.00	1.98	0.00	15,139.46
3.06	Blasting connection wire	----	m	3602.92	0.00	0.13	0.00	468.38
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	3.01	0.00	459.99	0.00	1,385.11
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	3.01	0.00	808.44	0.00	2,434.35
3.09	Jumbo drill shank adapter	----	n.	5.21	0.00	302.37	0.00	1,574.74
3.10	Jumbo drill bit, 48 mm dia.	----	n.	16.56	0.00	150.50	0.00	2,492.49
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.50	0.00	586.85	0.00	296.01
3.12	Integral drill steel, 800 mm	----	n.	1.64	0.00	132.65	0.00	216.93
3.13	Integral drill steel, 1600 mm	----	n.	1.43	0.00	153.97	0.00	220.32
3.14	Integral drill steel, 2400 mm	----	n.	1.02	0.00	174.35	0.00	178.20
3.15	Breaker tool, moil point	----	n.	6.81	0.00	32.37	0.00	220.57
3.16	Pipeline supports including anchors	----	kg	3636.38	1.38	3.22	5,018.20	11,709.13
3.17	Cable tray including supports and anchors	----	m	1454.55	0.35	0.83	514.91	1,201.46
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1454.55	0.79	7.11	1,149.09	10,341.85
	Sub-total						99,501	368,176
	Missing items and construction contingencies	%		2.00%			1,990	7,364
	Total Direct Costs						101,491	375,539
	Overheads, risks and profit	%		52.00%			24,806	223,250
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	8,177			15.45	73.23
	AGGREGATE UNIT PRICE		m³					88.68

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING GALLERY 2 (ROCK CLASS V)**

**SEC 2-07
ANA 002
RC V - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	95.95	0.00	47.25	0.00	4,533.77
1.02	Gang foreman	1	h	959.53	6.60	0.00	6,332.89	0.00
1.03	Tunnel specialist	1	h	959.53	0.00	45.38	0.00	43,543.42
1.04	Tunneling jumbo operator	1	h	959.53	5.82	0.00	5,584.46	0.00
1.05	Loader operator	1	h	959.53	5.82	0.00	5,584.46	0.00
1.06	Operator of dumper and other units	---	h	853.41	5.82	0.00	4,966.84	0.00
1.07	Miner	3	h	2,878.59	2.99	0.00	8,606.97	0.00
1.08	Explosive specialist	1	h	959.53	3.69	0.00	3,540.66	0.00
1.09	Electrician	0.33	h	319.81	3.69	0.00	1,180.10	0.00
1.10	Mechanic	0.33	h	319.81	3.69	0.00	1,180.10	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	34.69	3.69	0.00	128.00	0.00
1.12	Pipe fitter	0.33	h	319.81	3.69	0.00	1,180.10	0.00
1.13	Helper	4.0	h	3,838.12	2.38	0.00	9,134.71	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.67	0.00	12,651.92	0.00	21,076.18
		---	h	209.31	1.95	50.77	408.15	10,626.43
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	5.00	0.00	187.16	0.00	935.34
		---	h	33.39	0.07	1.53	2.34	51.08
2.03	Hand-held rock drill, light weight type	2	m.th	3.33	0.00	130.63	0.00	435.22
		---	hr	50.08	0.04	2.03	2.00	101.66
2.04	Hand-held breaker, medium weight type	2	m.th	3.33	0.00	46.95	0.00	156.42
		---	h	178.06	0.03	0.91	5.34	162.04
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	959.53	0.15	24.64	143.93	23,642.79
		s.b	h	191.91	0.00	5.46	0.00	1,047.81
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	119.94	0.20	40.08	23.99	4,807.24
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	1.67	0.00	8,943.66	0.00	14,898.78
		---	h	132.79	1.30	33.65	172.63	4,468.36
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	452.62	0.63	62.22	285.15	28,161.79
		s.b	h	90.52	0.00	28.86	0.00	2,612.50
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	1.67	0.00	747.05	0.00	1,244.47
		---	h	959.53	0.29	22.25	278.26	21,349.52
2.11	Halogen flood light, 1000 W	1	m.th	1.67	0.00	79.92	0.00	133.13
		---	h	959.53	0.01	0.43	9.60	412.60
2.12	Halogen flood light, 2000 W	1	m.th	1.67	0.00	92.77	0.00	154.54
		---	h	959.53	0.01	0.48	9.60	460.57
2.13	Ligthing line along tunnel, 100 m section	14.1	m.th	23.52	0.00	130.82	0.00	3,077.03
		---	h	13,548.16	0.01	0.41	135.48	5,554.75
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	179.91	0.15	18.51	26.99	3,330.16
		s.b	h	35.98	0.00	7.46	0.00	268.43
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	117.95	0.32	29.23	37.74	3,447.61
		s.b	h	23.59	0.00	12.36	0.00	291.57
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	220.41	0.26	24.87	57.31	5,481.50
		s.b	h	44.08	0.00	15.28	0.00	673.56
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	25.35	0.63	48.81	15.97	1,237.39
		s.b	h	5.07	0.00	20.84	0.00	105.66
Total to carry forward ----->>							49,034	208,483

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING GALLERY 2 (ROCK CLASS V)**

**SEC 2-07
ANA 002
RC V - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						49,034	208,483
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.67	0.00	82.94	0.00	138.17
		---	h	8.33	0.01	4.39	0.08	36.57
2.19	Integral drill steel grinder	---	h	5.56	0.01	2.29	0.06	12.74
2.20	Button bits grinder	---	h	23.34	0.04	5.32	0.93	124.18
2.21	Breaker moil point resharpenner	---	h	1.85	0.01	1.57	0.02	2.91
2.22	Steel structure for ventilation fan support	1.0	m.th	1.67	0.31	73.58	0.52	122.57
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	14.1	do	23.52	1.31	89.04	30.81	2,094.32
2.24	Compressed air tank, 4 m3 capacity	4	do	6.37	1.07	105.20	6.82	670.13
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	14.1	do	23.52	0.14	13.13	3.29	308.83
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	14.1	do	23.52	0.24	22.33	5.65	525.23
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.67	2.37	278.28	3.95	463.57
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	28.2	do	47.04	0.38	38.10	17.88	1,792.31
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	14.1	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	3.33	0.24	27.23	0.80	90.72
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	694.44	2.31	0.00	1,604.15	0.00
3.02	Explosive, gramonite type	----	kg	6249.93	2.06	0.00	12,874.86	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5164.63	0.00	1.98	0.00	10,225.96
3.06	Blasting connection wire	----	m	2948.69	0.00	0.13	0.00	383.33
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.05	0.00	459.99	0.00	941.60
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.05	0.00	808.44	0.00	1,654.88
3.09	Jumbo drill shank adapter	----	n.	3.54	0.00	302.37	0.00	1,070.52
3.10	Jumbo drill bit, 48 mm dia.	----	n.	11.26	0.00	150.50	0.00	1,694.41
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.41	0.00	586.85	0.00	242.26
3.12	Integral drill steel, 800 mm	----	n.	0.89	0.00	132.65	0.00	118.10
3.13	Integral drill steel, 1600 mm	----	n.	0.78	0.00	153.97	0.00	119.95
3.14	Integral drill steel, 2400 mm	----	n.	0.56	0.00	174.35	0.00	97.02
3.15	Breaker tool, moil point	----	n.	3.71	0.00	32.37	0.00	120.08
3.16	Pipeline supports including anchors	----	kg	3529.90	1.38	3.22	4,871.26	11,366.28
3.17	Cable tray including supports and anchors	----	m	1411.96	0.35	0.83	499.83	1,166.28
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1411.96	0.79	7.11	1,115.45	10,039.04
	Sub-total						70,070	254,105
	Missing items and construction contingencies	%		2.00%			1,401	5,082
	Total Direct Costs						71,472	259,187
	Overheads, risks and profit	%		52.00%			17,194	154,748
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	4,452			19.92	92.99
	AGGREGATE UNIT PRICE		m³					112.91

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 003
RC III - T. A

UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING GALLERY JOINT LEFT-RIGHT (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	113.99	0.00	47.25	0.00	5,385.84
1.02	Gang foreman	1	h	1,139.86	6.60	0.00	7,523.08	0.00
1.03	Tunnel specialist	1	h	1,139.86	0.00	45.38	0.00	51,726.88
1.04	Tunneling jumbo operator	1	h	1,139.86	5.82	0.00	6,633.99	0.00
1.05	Loader operator	---	h	2.37	5.82	0.00	13.82	0.00
1.06	Operator of dumpers and other units	---	h	835.06	5.82	0.00	4,860.06	0.00
1.07	Miner	4	h	4,559.44	2.99	0.00	13,632.73	0.00
1.08	Explosive specialist	1	h	1,139.86	3.69	0.00	4,206.09	0.00
1.09	Electrician	0.33	h	379.57	3.69	0.00	1,400.63	0.00
1.10	Mechanic	0.33	h	379.57	3.69	0.00	1,400.63	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	74.37	3.69	0.00	274.42	0.00
1.12	Pipe fitter	0.33	h	379.57	3.69	0.00	1,400.63	0.00
1.13	Helper	5	h	5,699.30	2.38	0.00	13,564.34	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.98	0.00	19,479.66	0.00	38,548.78
		---	h	214.60	3.17	94.80	680.27	20,343.75
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	7.92	0.00	187.16	0.00	1,481.50
		---	h	97.18	0.07	1.53	6.80	148.69
2.03	Hand-held rock drill, medium weight type	3	m.th	5.94	0.00	130.63	0.00	775.52
		---	h	145.78	0.04	2.03	5.83	295.92
2.04	Hand-held breaker, medium weight type	4	m.th	7.92	0.00	46.95	0.00	371.64
		---	h	310.99	0.03	0.91	9.33	283.00
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,139.86	0.15	24.64	170.98	28,086.17
		s.b	h	227.97	0.00	5.46	0.00	1,244.73
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	1.98	0.00	12,874.72	0.00	25,478.10
		---	h	183.25	1.95	55.22	357.34	10,119.26
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	378.81	1.12	114.78	424.27	43,480.09
		s.b	h	75.76	0.00	50.07	0.00	3,793.43
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	1.98	0.00	440.40	0.00	871.52
		---	h	1,139.86	0.12	9.00	136.78	10,258.75
2.11	Halogen flood light, 1000 W	2	m.th	3.96	0.00	79.92	0.00	316.31
		---	h	2,279.72	0.01	0.43	22.80	980.28
2.12	Halogen flood light, 2000 W	1	m.th	1.98	0.00	92.77	0.00	183.58
		---	h	1,139.86	0.01	0.48	11.40	547.13
2.13	Ligthing line along tunnel, 100 m section	3.4	m.th	6.69	0.00	130.82	0.00	874.64
		---	h	3,851.02	0.01	0.41	38.51	1,578.92
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	213.72	0.15	18.51	32.06	3,956.03
		s.b	h	42.74	0.00	7.46	0.00	318.88
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	106.60	0.32	29.23	34.11	3,115.98
		s.b	h	21.32	0.00	12.36	0.00	263.52
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	482.88	0.26	24.87	125.55	12,009.16
		s.b	h	96.58	0.00	15.28	0.00	1,475.67
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	60.01	0.63	48.81	37.81	2,929.06
		s.b	h	12.00	0.00	20.84	0.00	250.12
Total to carry forward ----->>							57,004	271,493

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 003
RC III - T. B

UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING GALLERY JOINT LEFT-RIGHT (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						57,004	271,493
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.98	0.00	82.94	0.00	164.13
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.98	0.14	33.45	0.28	66.20
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	3.4	do	6.69	1.51	102.31	10.10	684.02
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	3.32	1.36	134.52	4.51	446.08
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.4	do	6.69	0.14	13.13	0.94	87.78
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3.4	do	6.69	0.37	34.41	2.47	230.06
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.98	2.37	278.28	4.69	550.70
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	3.4	do	6.69	0.55	55.77	3.68	372.87
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.4	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1562.71	2.31	0.00	3,609.86	0.00
3.02	Explosive, gramonite type	----	kg	14064.40	2.06	0.00	28,972.67	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	7274.20	0.00	1.98	0.00	14,402.91
3.06	Blasting connection wire	----	m	2665.05	0.00	0.13	0.00	346.46
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.06	0.00	459.99	0.00	1,869.70
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.06	0.00	808.44	0.00	3,286.03
3.09	Jumbo drill shank adapter	----	n.	7.03	0.00	302.37	0.00	2,125.68
3.10	Jumbo drill bit, 51 mm dia.	----	n.	22.36	0.00	164.35	0.00	3,674.14
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.53	0.00	586.85	0.00	312.80
3.12	Integral drill steel, 800 mm	----	n.	2.59	0.00	132.65	0.00	343.77
3.13	Integral drill steel, 1600 mm	----	n.	2.27	0.00	153.97	0.00	349.14
3.14	Integral drill steel, 2400 mm	----	n.	1.62	0.00	174.35	0.00	282.40
3.15	Breaker tool, moiil point	----	n.	6.48	0.00	32.37	0.00	209.72
3.16	Pipeline supports including anchors	----	kg	844.63	1.38	3.22	1,165.58	2,719.69
3.17	Cable tray including supports and anchors	----	m	337.85	0.35	0.83	119.60	279.06
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	337.85	0.79	7.11	266.90	2,402.11
	Sub-total						91,166	306,698
	Missing items and construction contingencies	%		2.00%			1,823	6,134
	Total Direct Costs						92,989	312,832
	Overheads, risks and profit	%		52.00%			21,103	189,924
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m ³		12,958			8.80	38.80
	AGGREGATE UNIT PRICE	m ³						47.60

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 004

UNDERGROUND EXCAVATION - COMBINED SALINE & DAM CURTAIN GROUTING RIGHT BANK (ROCK TYPE III) RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	214.78	0.00	47.25	0.00	10,148.23	
1.02	Gang foreman	1	h	2,147.77	6.60	0.00	14,175.31	0.00	
1.03	Tunnel specialist	1	h	2,147.77	0.00	45.38	0.00	97,465.98	
1.04	Tunneling jumbo operator	1	h	2,147.77	5.82	0.00	12,500.04	0.00	
1.05	Loader operator	---	h	4.47	5.82	0.00	26.04	0.00	
1.06	Operator of dumpers and other units	---	h	1,899.63	5.82	0.00	11,055.84	0.00	
1.07	Miner	4	h	8,591.10	2.99	0.00	25,687.38	0.00	
1.08	Explosive specialist	1	h	2,147.77	3.69	0.00	7,925.29	0.00	
1.09	Electrician	0.33	h	715.21	3.69	0.00	2,639.12	0.00	
1.10	Mechanic	0.33	h	715.21	3.69	0.00	2,639.12	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	139.96	3.69	0.00	516.45	0.00	
1.12	Pipe fitter	0.33	h	715.21	3.69	0.00	2,639.12	0.00	
1.13	Helper	5	h	10,738.87	2.38	0.00	25,558.51	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	3.73	0.00	19,479.66	0.00	72,635.25	
		---	h	426.43	3.17	94.80	1,351.77	40,425.17	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	14.92	0.00	187.16	0.00	2,791.51	
		---	h	169.26	0.07	1.53	11.85	258.96	
2.03	Hand-held rock drill, medium weight type	3	m.th	11.19	0.00	130.63	0.00	1,461.27	
		---	h	253.89	0.04	2.03	10.16	515.39	
2.04	Hand-held breaker, medium weight type	4	m.th	14.92	0.00	46.95	0.00	700.26	
		---	h	541.62	0.03	0.91	16.25	492.88	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	2,147.77	0.15	24.64	322.17	52,921.15	
		s.b	h	429.55	0.00	5.46	0.00	2,345.37	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	3.73	0.00	12,874.72	0.00	48,006.92	
		---	h	332.39	1.95	55.22	648.16	18,354.49	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	990.20	1.12	114.78	1,109.02	113,654.80	
		s.b	h	198.04	0.00	50.07	0.00	9,915.83	
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	3.73	0.00	636.14	0.00	2,372.02	
		---	h	2,147.77	0.20	14.93	429.55	32,066.26	
2.11	Halogen flood light, 1000 W	2	m.th	7.46	0.00	79.92	0.00	596.01	
		---	h	4,295.55	0.01	0.43	42.96	1,847.09	
2.12	Halogen flood light, 2000 W	1	m.th	3.73	0.00	92.77	0.00	345.92	
		---	h	2,147.77	0.01	0.48	21.48	1,030.93	
2.13	Ligthning line along tunnel, 100 m section	6.2	m.th	23.09	0.00	130.82	0.00	3,020.84	
		---	h	13,300.73	0.01	0.41	133.01	5,453.30	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	402.71	0.15	18.51	60.41	7,454.12	
		s.b	h	80.54	0.00	7.46	0.00	600.84	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	227.65	0.32	29.23	72.85	6,654.13	
		s.b	h	45.53	0.00	12.36	0.00	562.74	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	928.49	0.26	24.87	241.41	23,091.64	
		s.b	h	185.70	0.00	15.28	0.00	2,837.48	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	106.38	0.63	48.81	67.02	5,192.61	
		s.b	h	21.28	0.00	20.84	0.00	443.41	
Total to carry forward ----->>								109,900	565,663

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 004
RC III - T. B

UNDERGROUND EXCAVATION - COMBINED SALINE & DAM CURTAIN GROUTING RIGHT BANK (ROCK TYPE III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						109,900	565,663
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.73	0.00	82.94	0.00	309.26
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.73	0.14	33.45	0.52	124.73
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	6.2	do	23.09	1.51	102.31	34.87	2,362.50
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	8.35	1.36	134.52	11.35	1,122.85
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	23.09	0.14	13.13	3.23	303.19
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	23.09	0.37	34.41	8.54	794.58
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.73	2.37	278.28	8.84	1,037.64
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	23.09	0.55	55.77	12.70	1,287.82
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2843.53	2.31	0.00	6,568.55	0.00
3.02	Explosive, gramonite type	----	kg	25591.75	2.06	0.00	52,719.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	13978.24	0.00	1.98	0.00	27,676.92
3.06	Blasting connection wire	----	m	5691.18	0.00	0.13	0.00	739.85
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	7.83	0.00	459.99	0.00	3,602.39
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	7.83	0.00	808.44	0.00	6,331.26
3.09	Jumbo drill shank adapter	----	n.	13.54	0.00	302.37	0.00	4,095.59
3.10	Jumbo drill bit, 51 mm dia.	----	n.	43.07	0.00	164.35	0.00	7,079.04
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.14	0.00	586.85	0.00	667.97
3.12	Integral drill steel, 800 mm	----	n.	4.51	0.00	132.65	0.00	598.72
3.13	Integral drill steel, 1600 mm	----	n.	3.95	0.00	153.97	0.00	608.08
3.14	Integral drill steel, 2400 mm	----	n.	2.82	0.00	174.35	0.00	491.83
3.15	Breaker tool, moiil point	----	n.	11.28	0.00	32.37	0.00	365.26
3.16	Pipeline supports including anchors	----	kg	1,548.20	1.38	3.22	2,136.52	4,985.20
3.17	Cable tray including supports and anchors	----	m	619.28	0.35	0.83	219.23	511.53
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	619.28	0.79	7.11	489.23	4,403.08
	Sub-total						172,113	635,162
	Missing items and construction contingencies	%		2.00%			3,442	12,703
	Total Direct Costs						175,555	647,865
	Overheads, risks and profit	%		52.00%			42,818	385,361
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		22,568			9.68	45.78
	AGGREGATE UNIT PRICE	m³						55.46

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING LEFT BANK, ACTIVE STRETCH (ROCK CLASS III)

SEC 2-07
 ANA 005
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	131.25	0.00	47.25	0.00	6,201.35
1.02	Gang foreman	1	h	1,312.46	6.60	0.00	8,662.20	0.00
1.03	Tunnel specialist	1	h	1,312.46	0.00	45.38	0.00	59,559.22
1.04	Tunneling jumbo operator	1	h	1,312.46	5.82	0.00	7,638.49	0.00
1.05	Loader operator	---	h	2.73	5.82	0.00	15.91	0.00
1.06	Operator of dumpers and other units	---	h	945.56	5.82	0.00	5,503.15	0.00
1.07	Miner	4	h	5,249.82	2.99	0.00	15,696.96	0.00
1.08	Explosive specialist	1	h	1,312.46	3.69	0.00	4,842.96	0.00
1.09	Electrician	0.33	h	437.05	3.69	0.00	1,612.71	0.00
1.10	Mechanic	0.33	h	437.05	3.69	0.00	1,612.71	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	84.17	3.69	0.00	310.60	0.00
1.12	Pipe fitter	0.33	h	437.05	3.69	0.00	1,612.71	0.00
1.13	Helper	5	h	6,562.28	2.38	0.00	15,618.22	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	2.28	0.00	19,479.66	0.00	44,385.73
		---	h	254.84	3.17	94.80	807.84	24,158.73
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	9.11	0.00	187.16	0.00	1,705.83
		---	h	103.60	0.07	1.53	7.25	158.51
2.03	Hand-held rock drill, medium weight type	3	m.th	6.84	0.00	130.63	0.00	892.95
		---	h	155.40	0.04	2.03	6.22	315.46
2.04	Hand-held breaker, medium weight type	4	m.th	9.11	0.00	46.95	0.00	427.92
		---	h	331.52	0.03	0.91	9.95	301.68
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,312.46	0.15	24.64	196.87	32,338.90
		s.b	h	262.49	0.00	5.46	0.00	1,433.20
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	2.28	0.00	12,874.72	0.00	29,335.93
		---	h	202.33	1.95	55.22	394.54	11,172.66
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	412.73	1.12	114.78	462.26	47,373.59
		s.b	h	82.55	0.00	50.07	0.00	4,133.12
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	2.28	0.00	440.40	0.00	1,003.48
		---	h	1,312.46	0.12	9.00	157.49	11,812.10
2.11	Halogen flood light, 1000 W	2	m.th	4.56	0.00	79.92	0.00	364.21
		---	h	2,624.91	0.01	0.43	26.25	1,128.71
2.12	Halogen flood light, 2000 W	1	m.th	2.28	0.00	92.77	0.00	211.38
		---	h	1,312.46	0.01	0.48	13.12	629.98
2.13	Ligthing line along tunnel, 100 m section	3.8	m.th	8.56	0.00	130.82	0.00	1,120.16
		---	h	4,932.08	0.01	0.41	49.32	2,022.15
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	246.09	0.15	18.51	36.91	4,555.04
		s.b	h	49.22	0.00	7.46	0.00	367.16
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	135.82	0.32	29.23	43.46	3,970.13
		s.b	h	27.16	0.00	12.36	0.00	335.76
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	558.65	0.26	24.87	145.25	13,893.70
		s.b	h	111.73	0.00	15.28	0.00	1,707.24
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	64.95	0.63	48.81	40.92	3,170.45
		s.b	h	12.99	0.00	20.84	0.00	270.73
Total to carry forward ----->>							65,524.28	310,457.14

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 005
RC III - T. B

UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING LEFT BANK, ACTIVE STRETCH (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						65,524.28	310,457.14
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	2.28	0.00	82.94	0.00	188.98
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	2.28	0.14	33.45	0.32	76.22
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	3.8	do	8.56	1.51	102.31	12.93	876.04
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	3.99	1.36	134.52	5.43	536.88
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.8	do	8.56	0.14	13.13	1.20	112.43
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3.8	do	8.56	0.37	34.41	3.17	294.64
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.28	2.37	278.28	5.40	634.08
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	3.8	do	8.56	0.55	55.77	4.71	477.54
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.8	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1740.49	2.31	0.00	4,020.52	0.00
3.02	Explosive, gramonite type	----	kg	15664.37	2.06	0.00	32,268.61	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	8360.31	0.00	1.98	0.00	16,553.41
3.06	Blasting connection wire	----	m	3395.59	0.00	0.13	0.00	441.43
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.68	0.00	459.99	0.00	2,154.43
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.68	0.00	808.44	0.00	3,786.45
3.09	Jumbo drill shank adapter	----	n.	8.10	0.00	302.37	0.00	2,449.39
3.10	Jumbo drill bit, 51 mm dia.	----	n.	25.76	0.00	164.35	0.00	4,233.66
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.68	0.00	586.85	0.00	398.54
3.12	Integral drill steel, 800 mm	----	n.	2.76	0.00	132.65	0.00	366.47
3.13	Integral drill steel, 1600 mm	----	n.	2.42	0.00	153.97	0.00	372.20
3.14	Integral drill steel, 2400 mm	----	n.	1.73	0.00	174.35	0.00	301.05
3.15	Breaker tool, moi point	----	n.	6.91	0.00	32.37	0.00	223.57
3.16	Pipeline supports including anchors	----	kg	939.48	1.38	3.22	1,296.48	3,025.11
3.17	Cable tray including supports and anchors	----	m	375.79	0.35	0.83	133.03	310.40
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	375.79	0.79	7.11	296.87	2,671.87
	Sub-total						103,573	350,942
	Missing items and construction contingencies	%		2.00%			2,071	7,019
	Total Direct Costs						105,644	357,961
	Overheads, risks and profit	%		52.00%			24,107	216,967
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		13,813			9.39	41.62
	AGGREGATE UNIT PRICE	m³						51.01

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 006
RC III - T. A

UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING LEFT BANK, PASSIVE STRETCH (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	132.14	0.00	47.25	0.00	6,243.67
1.02	Gang foreman	1	h	1,321.41	6.60	0.00	8,721.31	0.00
1.03	Tunnel specialist	1	h	1,321.41	0.00	45.38	0.00	59,965.65
1.04	Tunneling jumbo operator	1	h	1,321.41	5.82	0.00	7,690.61	0.00
1.05	Loader operator	---	h	2.75	5.82	0.00	16.02	0.00
1.06	Operator of dumpers and other units	---	h	947.70	5.82	0.00	5,515.64	0.00
1.07	Miner	4	h	5,285.65	2.99	0.00	15,804.08	0.00
1.08	Explosive specialist	1	h	1,321.41	3.69	0.00	4,876.01	0.00
1.09	Electrician	0.33	h	440.03	3.69	0.00	1,623.71	0.00
1.10	Mechanic	0.33	h	440.03	3.69	0.00	1,623.71	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	84.77	3.69	0.00	312.81	0.00
1.12	Pipe fitter	0.33	h	440.03	3.69	0.00	1,623.71	0.00
1.13	Helper	5	h	6,607.06	2.38	0.00	15,724.80	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	2.29	0.00	19,479.66	0.00	44,688.62
		---	h	256.65	3.17	94.80	813.57	24,330.17
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	9.18	0.00	187.16	0.00	1,717.47
		---	h	104.34	0.07	1.53	7.30	159.63
2.03	Hand-held rock drill, medium weight type	3	m.th	6.88	0.00	130.63	0.00	899.04
		---	h	156.50	0.04	2.03	6.26	317.70
2.04	Hand-held breaker, medium weight type	4	m.th	9.18	0.00	46.95	0.00	430.84
		---	h	333.87	0.03	0.91	10.02	303.83
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,321.41	0.15	24.64	198.21	32,559.58
		s.b	h	264.28	0.00	5.46	0.00	1,442.98
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	2.29	0.00	12,874.72	0.00	29,536.11
		---	h	203.77	1.95	55.22	397.34	11,251.94
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	411.58	1.12	114.78	460.97	47,241.25
		s.b	h	82.32	0.00	50.07	0.00	4,121.57
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	2.29	0.00	440.40	0.00	1,010.33
		---	h	1,321.41	0.12	9.00	158.57	11,892.70
2.11	Halogen flood light, 1000 W	2	m.th	4.59	0.00	79.92	0.00	366.69
		---	h	2,642.82	0.01	0.43	26.43	1,136.41
2.12	Halogen flood light, 2000 W	1	m.th	2.29	0.00	92.77	0.00	212.83
		---	h	1,321.41	0.01	0.48	13.21	634.28
2.13	Ligthing line along tunnel, 100 m section	3.7	m.th	8.44	0.00	130.82	0.00	1,104.52
		---	h	4,863.20	0.01	0.41	48.63	1,993.91
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	247.76	0.15	18.51	37.16	4,586.12
		s.b	h	49.55	0.00	7.46	0.00	369.66
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	136.79	0.32	29.23	43.77	3,998.30
		s.b	h	27.36	0.00	12.36	0.00	338.14
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	562.62	0.26	24.87	146.28	13,992.29
		s.b	h	112.52	0.00	15.28	0.00	1,719.36
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	65.42	0.63	48.81	41.21	3,192.95
		s.b	h	13.08	0.00	20.84	0.00	272.65
Total to carry forward ----->>							65,941	312,031

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-07
ANA 006
RC III - T. B

UNDERGROUND EXCAVATION - DAM CURTAIN GROUTING LEFT BANK, PASSIVE STRETCH (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						65,941	312,031	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	2.29	0.00	82.94	0.00	190.27	
		---	h	0.00	0.01	4.39	0.00	0.00	
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00	
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00	
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00	
2.22	Steel structure for ventilation fan support	1	m.th	2.29	0.14	33.45	0.32	76.74	
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	3.7	do	8.44	1.51	102.31	12.75	863.81	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	3.98	1.36	134.52	5.42	535.76	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.7	do	8.44	0.14	13.13	1.18	110.86	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3.7	do	8.44	0.37	34.41	3.12	290.53	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	2.29	2.37	278.28	5.44	638.41	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	3.7	do	8.44	0.55	55.77	4.64	470.87	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.7	do	0.00	0.14	13.50	0.00	0.00	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00	
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	1752.84	2.31	0.00	4,049.05	0.00	
3.02	Explosive, gramonite type	----	kg	15775.54	2.06	0.00	32,497.60	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	8419.64	0.00	1.98	0.00	16,670.88	
3.06	Blasting connection wire	----	m	3419.69	0.00	0.13	0.00	444.56	
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.72	0.00	459.99	0.00	2,169.72	
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.72	0.00	808.44	0.00	3,813.32	
3.09	Jumbo drill shank adapter	----	n.	8.16	0.00	302.37	0.00	2,466.77	
3.10	Jumbo drill bit, 51 mm dia.	----	n.	25.94	0.00	164.35	0.00	4,263.71	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.68	0.00	586.85	0.00	401.37	
3.12	Integral drill steel, 800 mm	----	n.	2.78	0.00	132.65	0.00	369.07	
3.13	Integral drill steel, 1600 mm	----	n.	2.43	0.00	153.97	0.00	374.84	
3.14	Integral drill steel, 2400 mm	----	n.	1.74	0.00	174.35	0.00	303.18	
3.15	Breaker tool, moi point	----	n.	6.96	0.00	32.37	0.00	225.16	
3.16	Pipeline supports including anchors	----	kg	920.08	1.38	3.22	1,269.71	2,962.65	
3.17	Cable tray including supports and anchors	----	m	368.03	0.35	0.83	130.28	303.99	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	368.03	0.79	7.11	290.74	2,616.70	
Sub-total								104,212	352,594
Missing items and construction contingencies		%		2.00%			2,084	7,052	
Total Direct Costs								106,296	359,646
Overheads, risks and profit		%		52.00%			24,229	218,061	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	13,911			9.38	41.53	
AGGREGATE UNIT PRICE			m³					50.91	

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE

SEC 2-08
ANA 001
RC III - T. A

UNDERGROUND EXCAVATION - LOW LEVEL DRAINAGE GALLERY OF POWERHOUSE (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	294.81	0.00	47.25	0.00	13,929.93
1.02	Gang foreman	1	h	2,948.13	6.60	0.00	19,457.67	0.00
1.03	Tunnel specialist	1	h	2,948.13	0.00	45.38	0.00	133,786.25
1.04	Tunneling jumbo operator	1	h	2,948.13	5.82	0.00	17,158.13	0.00
1.05	Loader operator	1	h	2,948.13	5.82	0.00	17,158.13	0.00
1.06	Operator of dumper and other units	---	h	2,954.63	5.82	0.00	17,195.93	0.00
1.07	Miner	3	h	8,844.40	2.99	0.00	26,444.75	0.00
1.08	Explosive specialist	1	h	2,948.13	3.69	0.00	10,878.61	0.00
1.09	Electrician	0.33	h	982.61	3.69	0.00	3,625.84	0.00
1.10	Mechanic	0.33	h	982.61	3.69	0.00	3,625.84	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	155.27	3.69	0.00	572.93	0.00
1.12	Pipe fitter	0.33	h	982.61	3.69	0.00	3,625.84	0.00
1.13	Helper	4.0	h	11,792.53	2.38	0.00	28,066.22	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	5.12	0.00	12,651.92	0.00	64,756.14
		---	h	786.83	1.95	50.77	1,534.33	39,947.57
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	15.35	0.00	187.16	0.00	2,873.81
		---	h	149.04	0.07	1.53	10.43	228.03
2.03	Hand-held rock drill, medium weight type	2	m.th	10.24	0.00	130.63	0.00	1,337.20
		---	hr	223.56	0.04	2.03	8.94	453.82
2.04	Hand-held breaker, medium weight type	2	m.th	10.24	0.00	46.95	0.00	480.61
		---	h	794.87	0.03	0.91	23.85	723.33
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	2,948.13	0.15	24.64	442.22	72,641.98
		s.b	h	589.63	0.00	5.46	0.00	3,219.36
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	5.12	0.00	8,943.66	0.00	45,776.20
		---	h	496.84	1.30	33.65	645.89	16,718.65
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	1,692.56	0.63	62.22	1,066.31	105,310.94
		s.b	h	338.51	0.00	28.86	0.00	9,769.44
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	5.12	0.00	636.14	0.00	3,255.95
		---	h	2,948.13	0.20	14.93	589.63	44,015.62
2.11	Halogen flood light, 1000 W	1	m.th	5.12	0.00	79.92	0.00	409.05
		---	h	2,948.13	0.01	0.43	29.48	1,267.70
2.12	Halogen flood light, 2000 W	1	m.th	5.12	0.00	92.77	0.00	474.82
		---	h	2,948.13	0.01	0.48	29.48	1,415.10
2.13	Ligthing line along tunnel, 100 m section	12.0	m.th	61.26	0.00	130.82	0.00	8,013.63
		---	h	35,283.99	0.01	0.41	352.84	14,466.43
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	552.77	0.15	18.51	82.92	10,231.86
		s.b	h	110.55	0.00	7.46	0.00	824.74
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	341.35	0.32	29.23	109.23	9,977.80
		s.b	h	68.27	0.00	12.36	0.00	843.83
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	1,080.21	0.26	24.87	280.85	26,864.75
		s.b	h	216.04	0.00	15.28	0.00	3,301.11
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	99.34	0.63	48.81	62.58	4,848.69
		s.b	h	19.87	0.00	20.84	0.00	414.04
Total to carry forward ----->>							153,079	642,578

ROGUN HYDROELECTRIC POWER PLANT

SEC 2-08

CIVIL WORKS COST ESTIMATE

ANA 001

UNDERGROUND EXCAVATION - LOW LEVEL DRAINAGE GALLERY OF POWERHOUSE (ROCK CLASS III)

RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						153,079	642,578
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	5.12	0.00	82.94	0.00	424.51
		---	h	25.59	0.01	4.39	0.26	112.35
2.19	Integral drill steel grinder	---	h	24.84	0.01	2.29	0.25	56.88
2.20	Button bits grinder	---	h	104.55	0.04	5.32	4.18	556.20
2.21	Breaker moil point resharpen	---	h	8.28	0.01	1.57	0.08	13.00
2.22	Steel structure for ventilation fan support	1	m.th	5.12	0.14	33.45	0.72	171.21
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	12.0	do	61.26	1.31	89.04	80.25	5,454.32
2.24	Compressed air tank, 4 m3 capacity	3	do	17.37	1.07	105.20	18.59	1,827.29
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	12.0	do	61.26	0.14	13.13	8.58	804.30
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	12.0	do	61.26	0.24	22.33	14.70	1,367.87
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	5.12	2.37	278.28	12.13	1,424.32
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	12.0	do	61.26	0.55	55.77	33.69	3,416.30
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	12.0	do	61.26	0.83	84.05	50.84	5,148.64
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	12.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	10.24	0.24	27.23	2.46	278.74
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3308.63	2.31	0.00	7,642.94	0.00
3.02	Explosive, gramonite type	----	kg	29777.70	2.06	0.00	61,342.07	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	16287.04	0.00	1.98	0.00	32,248.34
3.06	Blasting connection wire	----	m	8533.87	0.00	0.13	0.00	1,109.40
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	9.19	0.00	459.99	0.00	4,229.22
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	9.19	0.00	808.44	0.00	7,432.93
3.09	Jumbo drill shank adapter	----	n.	15.90	0.00	302.37	0.00	4,808.24
3.10	Jumbo drill bit, 48 mm dia.	----	n.	50.57	0.00	150.50	0.00	7,610.47
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.71	0.00	586.85	0.00	1,001.62
3.12	Integral drill steel, 800 mm	----	n.	3.97	0.00	132.65	0.00	527.20
3.13	Integral drill steel, 1600 mm	----	n.	3.48	0.00	153.97	0.00	535.44
3.14	Integral drill steel, 2400 mm	----	n.	2.48	0.00	174.35	0.00	433.08
3.15	Breaker tool, moil point	----	n.	16.56	0.00	32.37	0.00	536.04
3.16	Pipeline supports including anchors	----	kg	2,992.06	1.38	3.22	4,129.05	9,634.44
3.17	Cable tray including supports and anchors	----	m	1,196.82	0.35	0.83	423.68	988.58
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	1,196.82	0.79	7.11	945.49	8,509.43
	Sub-total						227,789	743,239
	Missing items and construction contingencies	%		2.00%			4,556	14,865
	Total Direct Costs						232,345	758,104
	Overheads, risks and profit	%		52.00%			51,503	463,530
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	19,872			14.28	61.48
	AGGREGATE UNIT PRICE		m³					75.76

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE

SEC 2-08
ANA 002
RC III - T. A

UNDERGROUND EXCAVATION - MID LEVEL DRAINAGE GALLERY OF POWERHOUSE (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	339.36	0.00	47.25	0.00	16,034.76
1.02	Gang foreman	1	h	3,393.60	6.60	0.00	22,397.76	0.00
1.03	Tunnel specialist	1	h	3,393.60	0.00	45.38	0.00	154,001.59
1.04	Tunneling jumbo operator	1	h	3,393.60	5.82	0.00	19,750.75	0.00
1.05	Loader operator	1	h	3,393.60	5.82	0.00	19,750.75	0.00
1.06	Operator of dumper and other units	---	h	3,329.70	5.82	0.00	19,378.83	0.00
1.07	Miner	3	h	10,180.80	2.99	0.00	30,440.60	0.00
1.08	Explosive specialist	1	h	3,393.60	3.69	0.00	12,522.39	0.00
1.09	Electrician	0.33	h	1,131.09	3.69	0.00	4,173.71	0.00
1.10	Mechanic	0.33	h	1,131.09	3.69	0.00	4,173.71	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	181.11	3.69	0.00	668.30	0.00
1.12	Pipe fitter	0.33	h	1,131.09	3.69	0.00	4,173.71	0.00
1.13	Helper	4.0	h	13,574.40	2.38	0.00	32,307.08	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	5.89	0.00	12,651.92	0.00	74,540.91
		---	h	897.05	1.95	50.77	1,749.25	45,543.30
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	17.68	0.00	187.16	0.00	3,308.05
		---	h	183.35	0.07	1.53	12.83	280.52
2.03	Hand-held rock drill, medium weight type	2	m.th	11.78	0.00	130.63	0.00	1,539.26
		---	hr	275.02	0.04	2.03	11.00	558.29
2.04	Hand-held breaker, medium weight type	2	m.th	11.78	0.00	46.95	0.00	553.23
		---	h	977.84	0.03	0.91	29.34	889.84
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	3,393.60	0.15	24.64	509.04	83,618.32
		s.b	h	678.72	0.00	5.46	0.00	3,705.81
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	5.89	0.00	8,943.66	0.00	52,693.07
		---	h	593.97	1.30	33.65	772.16	19,987.06
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	1,898.37	0.63	62.22	1,195.97	118,116.45
		s.b	h	379.67	0.00	28.86	0.00	10,957.38
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	5.89	0.00	636.14	0.00	3,747.93
		---	h	3,393.60	0.20	14.93	678.72	50,666.46
2.11	Halogen flood light, 1000 W	1	m.th	5.89	0.00	79.92	0.00	470.86
		---	h	3,393.60	0.01	0.43	33.94	1,459.25
2.12	Halogen flood light, 2000 W	1	m.th	5.89	0.00	92.77	0.00	546.57
		---	h	3,393.60	0.01	0.48	33.94	1,628.93
2.13	Ligthing line along tunnel, 100 m section	9.5	m.th	56.11	0.00	130.82	0.00	7,340.53
		---	h	32,320.31	0.01	0.41	323.20	13,251.33
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	636.30	0.15	18.51	95.45	11,777.91
		s.b	h	127.26	0.00	7.46	0.00	949.36
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	371.95	0.32	29.23	119.02	10,872.05
		s.b	h	74.39	0.00	12.36	0.00	919.46
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	1,241.23	0.26	24.87	322.72	30,869.29
		s.b	h	248.25	0.00	15.28	0.00	3,793.19
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	120.38	0.63	48.81	75.84	5,875.74
		s.b	h	24.08	0.00	20.84	0.00	501.74
Total to carry forward ----->>							175,700	730,998

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						175,700	730,998
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	5.89	0.00	82.94	0.00	488.65
		---	h	29.46	0.01	4.39	0.29	129.32
2.19	Integral drill steel grinder	---	h	30.56	0.01	2.29	0.31	69.98
2.20	Button bits grinder	---	h	120.37	0.04	5.32	4.81	640.36
2.21	Breaker moil point resharpenner	---	h	10.19	0.01	1.57	0.10	15.99
2.22	Steel structure for ventilation fan support	1	m.th	5.89	0.14	33.45	0.82	197.08
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	9.5	do	56.11	1.31	89.04	73.51	4,996.18
2.24	Compressed air tank, 4 m3 capacity	3	do	17.11	1.07	105.20	18.31	1,800.39
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	9.5	do	56.11	0.14	13.13	7.86	736.75
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	9.5	do	56.11	0.24	22.33	13.47	1,252.97
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	5.89	2.37	278.28	13.96	1,639.53
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0.0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	9.5	do	56.11	0.55	55.77	30.86	3,129.35
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	9.5	do	56.11	0.83	84.05	46.57	4,716.18
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	9.5	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	11.78	0.24	27.23	2.83	320.86
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	3806.25	2.31	0.00	8,792.44	0.00
3.02	Explosive, gramonite type	----	kg	34256.25	2.06	0.00	70,567.88	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	18821.57	0.00	1.98	0.00	37,266.71
3.06	Blasting connection wire	----	m	9298.71	0.00	0.13	0.00	1,208.83
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	10.60	0.00	459.99	0.00	4,877.94
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	10.60	0.00	808.44	0.00	8,573.06
3.09	Jumbo drill shank adapter	----	n.	18.34	0.00	302.37	0.00	5,545.78
3.10	Jumbo drill bit, 48 mm dia.	----	n.	58.32	0.00	150.50	0.00	8,777.83
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.86	0.00	586.85	0.00	1,091.39
3.12	Integral drill steel, 800 mm	----	n.	4.89	0.00	132.65	0.00	648.55
3.13	Integral drill steel, 1600 mm	----	n.	4.28	0.00	153.97	0.00	658.69
3.14	Integral drill steel, 2400 mm	----	n.	3.06	0.00	174.35	0.00	532.77
3.15	Breaker tool, moil point	----	n.	20.37	0.00	32.37	0.00	659.43
3.16	Pipeline supports including anchors	----	kg	2,380.97	1.38	3.22	3,285.75	7,666.74
3.17	Cable tray including supports and anchors	----	m	952.39	0.35	0.83	337.15	786.67
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	952.39	0.79	7.11	752.39	6,771.49
	Sub-total						259,649	836,198
	Missing items and construction contingencies	%		2.00%			5,193	16,724
	Total Direct Costs						264,842	852,922
	Overheads, risks and profit	%		52.00%			58,124	523,114
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	24,446			13.21	56.29
	AGGREGATE UNIT PRICE		m³					69.50

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE

SEC 2-08
ANA 003
RC III - T. A

UNDERGROUND EXCAVATION - DRAINAGE GALLERIES 1 & 2 OF D.T. U/S GATE CHAMBERS (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	207.77	0.00	47.25	0.00	9,817.24
1.02	Gang foreman	1	h	2,077.72	6.60	0.00	13,712.97	0.00
1.03	Tunnel specialist	1	h	2,077.72	0.00	45.38	0.00	94,287.02
1.04	Tunneling jumbo operator	1	h	2,077.72	5.82	0.00	12,092.34	0.00
1.05	Loader operator	1	h	2,077.72	5.82	0.00	12,092.34	0.00
1.06	Operator of dumper and other units	---	h	2,098.02	5.82	0.00	12,210.47	0.00
1.07	Miner	3	h	6,233.17	2.99	0.00	18,637.17	0.00
1.08	Explosive specialist	1	h	2,077.72	3.69	0.00	7,666.79	0.00
1.09	Electrician	0.33	h	692.50	3.69	0.00	2,555.34	0.00
1.10	Mechanic	0.33	h	692.50	3.69	0.00	2,555.34	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	112.41	3.69	0.00	414.79	0.00
1.12	Pipe fitter	0.33	h	692.50	3.69	0.00	2,555.34	0.00
1.13	Helper	4.0	h	8,310.89	2.38	0.00	19,779.91	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	3.61	0.00	12,651.92	0.00	45,637.45
		---	h	533.30	1.95	50.77	1,039.94	27,075.81
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	10.82	0.00	187.16	0.00	2,025.35
		---	h	124.31	0.07	1.53	8.70	190.19
2.03	Hand-held rock drill, medium weight type	2	m.th	7.21	0.00	130.63	0.00	942.41
		---	hr	186.46	0.04	2.03	7.46	378.52
2.04	Hand-held breaker, medium weight type	2	m.th	7.21	0.00	46.95	0.00	338.71
		---	h	662.98	0.03	0.91	19.89	603.31
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	2,077.72	0.15	24.64	311.66	51,195.07
		s.b	h	415.54	0.00	5.46	0.00	2,268.87
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	3.61	0.00	8,943.66	0.00	32,261.18
		---	h	384.01	1.30	33.65	499.21	12,921.82
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	1,237.46	0.63	62.22	779.60	76,994.62
		s.b	h	247.49	0.00	28.86	0.00	7,142.61
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	3.61	0.00	636.14	0.00	2,294.66
		---	h	2,077.72	0.20	14.93	415.54	31,020.39
2.11	Halogen flood light, 1000 W	1	m.th	3.61	0.00	79.92	0.00	288.28
		---	h	2,077.72	0.01	0.43	20.78	893.42
2.12	Halogen flood light, 2000 W	1	m.th	3.61	0.00	92.77	0.00	334.64
		---	h	2,077.72	0.01	0.48	20.78	997.31
2.13	Ligthing line along tunnel, 100 m section	7.9	m.th	28.37	0.00	130.82	0.00	3,711.40
		---	h	16,341.28	0.01	0.41	163.41	6,699.93
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	389.57	0.15	18.51	58.44	7,210.99
		s.b	h	77.91	0.00	7.46	0.00	581.24
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	200.65	0.32	29.23	64.21	5,864.86
		s.b	h	40.13	0.00	12.36	0.00	495.99
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	745.98	0.26	24.87	193.95	18,552.48
		s.b	h	149.20	0.00	15.28	0.00	2,279.71
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	79.61	0.63	48.81	50.16	3,885.94
		s.b	h	15.92	0.00	20.84	0.00	331.83
Total to carry forward ----->>							107,927	449,523

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE

SEC 2-08
ANA 003

UNDERGROUND EXCAVATION - DRAINAGE GALLERIES 1 & 2 OF D.T. U/S GATE CHAMBERS (ROCK CLASS III) RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						107,927	449,523
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	3.61	0.00	82.94	0.00	299.18
		---	h	18.04	0.01	4.39	0.18	79.18
2.19	Integral drill steel grinder	---	h	20.72	0.01	2.29	0.21	47.44
2.20	Button bits grinder	---	h	72.96	0.04	5.32	2.92	388.13
2.21	Breaker moil point resharpenner	---	h	6.91	0.01	1.57	0.07	10.84
2.22	Steel structure for ventilation fan support	1	m.th	3.61	0.14	33.45	0.51	120.66
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	7.9	do	28.37	1.31	89.04	37.17	2,526.09
2.24	Compressed air tank, 4 m3 capacity	3	do	9.28	1.07	105.20	9.93	976.38
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.9	do	28.37	0.14	13.13	3.97	372.50
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	7.9	do	28.37	0.24	22.33	6.81	633.51
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.61	2.37	278.28	8.55	1,003.80
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	15.7	do	56.74	0.38	38.10	21.56	2,161.82
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.9	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	7.21	0.24	27.23	1.73	196.45
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2267.39	2.31	0.00	5,237.66	0.00
3.02	Explosive, gramonite type	----	kg	20406.47	2.06	0.00	42,037.34	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	11490.54	0.00	1.98	0.00	22,751.27
3.06	Blasting connection wire	----	m	5016.13	0.00	0.13	0.00	652.10
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	6.45	0.00	459.99	0.00	2,966.92
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	6.45	0.00	808.44	0.00	5,214.42
3.09	Jumbo drill shank adapter	----	n.	11.16	0.00	302.37	0.00	3,373.12
3.10	Jumbo drill bit, 48 mm dia.	----	n.	35.47	0.00	150.50	0.00	5,338.96
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	1.00	0.00	586.85	0.00	588.74
3.12	Integral drill steel, 800 mm	----	n.	3.31	0.00	132.65	0.00	439.72
3.13	Integral drill steel, 1600 mm	----	n.	2.90	0.00	153.97	0.00	446.59
3.14	Integral drill steel, 2400 mm	----	n.	2.07	0.00	174.35	0.00	361.22
3.15	Breaker tool, moil point	----	n.	13.81	0.00	32.37	0.00	447.10
3.16	Pipeline supports including anchors	----	kg	1,966.25	1.38	3.22	2,713.42	6,331.32
3.17	Cable tray including supports and anchors	----	m	786.50	0.35	0.83	278.42	649.65
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	786.50	0.79	7.11	621.33	5,592.01
	Sub-total						158,908	513,492
	Missing items and construction contingencies	%		2.00%			3,178	10,270
	Total Direct Costs						162,086	523,762
	Overheads, risks and profit	%		52.00%			35,664	320,977
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	16,574			11.93	50.97
	AGGREGATE UNIT PRICE		m³					62.90

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE

SEC 2-08
ANA 004

UNDERGROUND EXCAV.- DRAINAGE GALLERIES 3 & 4 OF STAGE 1 TUNNEL GATE CHAMBER (ROCK CLASS III) RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	66.06	0.00	47.25	0.00	3,121.56
1.02	Gang foreman	1	h	660.65	6.60	0.00	4,360.27	0.00
1.03	Tunnel specialist	1	h	660.65	0.00	45.38	0.00	29,980.19
1.04	Tunneling jumbo operator	1	h	660.65	5.82	0.00	3,844.97	0.00
1.05	Loader operator	1	h	660.65	5.82	0.00	3,844.97	0.00
1.06	Operator of dumper and other units	---	h	589.71	5.82	0.00	3,432.10	0.00
1.07	Miner	3	h	1,981.94	2.99	0.00	5,926.01	0.00
1.08	Explosive specialist	1	h	660.65	3.69	0.00	2,437.79	0.00
1.09	Electrician	0.33	h	220.19	3.69	0.00	812.52	0.00
1.10	Mechanic	0.33	h	220.19	3.69	0.00	812.52	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	32.43	3.69	0.00	119.66	0.00
1.12	Pipe fitter	0.33	h	220.19	3.69	0.00	812.52	0.00
1.13	Helper	4.0	h	2,642.59	2.38	0.00	6,289.36	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	1.15	0.00	12,651.92	0.00	14,511.22
		---	h	167.03	1.95	50.77	325.71	8,480.03
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	3.44	0.00	187.16	0.00	643.99
		---	h	29.92	0.07	1.53	2.09	45.77
2.03	Hand-held rock drill, medium weight type	2	m.th	2.29	0.00	130.63	0.00	299.65
		---	hr	44.88	0.04	2.03	1.80	91.10
2.04	Hand-held breaker, medium weight type	2	m.th	2.29	0.00	46.95	0.00	107.70
		---	h	159.56	0.03	0.91	4.79	145.20
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	660.65	0.15	24.64	99.10	16,278.36
		s.b	h	132.13	0.00	5.46	0.00	721.43
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	1.15	0.00	8,943.66	0.00	10,258.00
		---	h	101.97	1.30	33.65	132.57	3,431.45
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	317.29	0.63	62.22	199.89	19,741.88
		s.b	h	63.46	0.00	28.86	0.00	1,831.41
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	1.15	0.00	440.40	0.00	505.12
		---	h	660.65	0.12	9.00	79.28	5,945.83
2.11	Halogen flood light, 1000 W	1	m.th	1.15	0.00	79.92	0.00	91.66
		---	h	660.65	0.01	0.43	6.61	284.08
2.12	Halogen flood light, 2000 W	1	m.th	1.15	0.00	92.77	0.00	106.40
		---	h	660.65	0.01	0.48	6.61	317.11
2.13	Ligthing line along tunnel, 100 m section	7.0	m.th	8.07	0.00	130.82	0.00	1,056.03
		---	h	4,649.70	0.01	0.41	46.50	1,906.38
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	123.87	0.15	18.51	18.58	2,292.86
		s.b	h	24.77	0.00	7.46	0.00	184.82
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	74.76	0.32	29.23	23.92	2,185.15
		s.b	h	14.95	0.00	12.36	0.00	184.80
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	228.15	0.26	24.87	59.32	5,674.18
		s.b	h	45.63	0.00	15.28	0.00	697.24
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	20.18	0.63	48.81	12.71	984.89
		s.b	h	4.04	0.00	20.84	0.00	84.10
Total to carry forward ----->>							33,712	132,190

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE

SEC 2-08
ANA 004

UNDERGROUND EXCAV.- DRAINAGE GALLERIES 3 & 4 OF STAGE 1 TUNNEL GATE CHAMBER (ROCK CLASS III) RC III-T B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						33,712	132,190
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	1.15	0.00	82.94	0.00	95.13
		---	h	5.73	0.01	4.39	0.06	25.18
2.19	Integral drill steel grinder	---	h	4.99	0.01	2.29	0.05	11.42
2.20	Button bits grinder	---	h	22.04	0.04	5.32	0.88	117.24
2.21	Breaker moil point resharpenner	---	h	1.66	0.01	1.57	0.02	2.61
2.22	Steel structure for ventilation fan support	1	m.th	1.15	0.14	33.45	0.16	38.37
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	7.0	do	8.07	1.31	89.04	10.57	718.77
2.24	Compressed air tank, 4 m3 capacity	2	do	2.76	1.07	105.20	2.95	290.50
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	7.0	do	8.07	0.14	13.13	1.13	105.99
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	7.0	do	8.07	0.24	22.33	1.94	180.26
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.15	2.37	278.28	2.72	319.18
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	7.0	do	8.07	0.38	38.10	3.07	307.56
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	7.0	do	8.07	0.83	84.05	6.70	678.49
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	7.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	2.29	0.24	27.23	0.55	62.46
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	700.07	2.31	0.00	1,617.17	0.00
3.02	Explosive, gramonite type	----	kg	6300.65	2.06	0.00	12,979.33	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3423.68	0.00	1.98	0.00	6,778.88
3.06	Blasting connection wire	----	m	1868.92	0.00	0.13	0.00	242.96
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.94	0.00	459.99	0.00	890.27
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.94	0.00	808.44	0.00	1,564.67
3.09	Jumbo drill shank adapter	----	n.	3.35	0.00	302.37	0.00	1,012.16
3.10	Jumbo drill bit, 48 mm dia.	----	n.	10.64	0.00	150.50	0.00	1,602.04
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.37	0.00	586.85	0.00	219.36
3.12	Integral drill steel, 800 mm	----	n.	0.80	0.00	132.65	0.00	105.83
3.13	Integral drill steel, 1600 mm	----	n.	0.70	0.00	153.97	0.00	107.48
3.14	Integral drill steel, 2400 mm	----	n.	0.50	0.00	174.35	0.00	86.94
3.15	Breaker tool, moil point	----	n.	3.32	0.00	32.37	0.00	107.60
3.16	Pipeline supports including anchors	----	kg	1,759.53	1.38	3.22	2,428.14	5,665.67
3.17	Cable tray including supports and anchors	----	m	703.81	0.35	0.83	249.15	581.35
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	703.81	0.79	7.11	556.01	5,004.09
	Sub-total						51,573	159,112
	Missing items and construction contingencies	%		2.00%			1,031	3,182
	Total Direct Costs						52,604	162,294
	Overheads, risks and profit	%		52.00%			11,175	100,572
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	3,989			15.99	65.90
	AGGREGATE UNIT PRICE		m³					81.89

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - STAGE 1 POWER TUNNEL (ROCK CLASS III)**

**SEC 2-09
ANA 001
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	172.85	0.00	47.25	0.00	8,167.00
1.02	Gang foreman	1	h	1,728.47	6.60	0.00	11,407.87	0.00
1.03	Tunnel specialist	1	h	1,728.47	0.00	45.38	0.00	78,437.76
1.04	Tunneling jumbo operator	1	h	1,728.47	5.82	0.00	10,059.67	0.00
1.05	Loader operator	---	h	432.46	5.82	0.00	2,516.89	0.00
1.06	Operator of dumpers and other units	---	h	1,250.35	5.82	0.00	7,277.05	0.00
1.07	Miner	4	h	6,913.86	2.99	0.00	20,672.45	0.00
1.08	Explosive specialist	1	h	1,728.47	3.69	0.00	6,378.04	0.00
1.09	Electrician	0.33	h	575.58	3.69	0.00	2,123.89	0.00
1.10	Mechanic	0.33	h	575.58	3.69	0.00	2,123.89	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	114.12	3.69	0.00	421.09	0.00
1.12	Pipe fitter	0.33	h	575.58	3.69	0.00	2,123.89	0.00
1.13	Helper	5	h	8,642.33	2.38	0.00	20,568.74	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	3.00	0.00	19,479.66	0.00	58,454.72
		---	h	301.32	3.17	94.80	955.20	28,565.53
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	12.00	0.00	187.16	0.00	2,246.52
		---	h	172.51	0.07	1.53	12.08	263.94
2.03	Hand-held rock drill, medium weight type	3	m.th	9.00	0.00	130.63	0.00	1,175.99
		---	h	258.77	0.04	2.03	10.35	525.29
2.04	Hand-held breaker, medium weight type	4	m.th	12.00	0.00	46.95	0.00	563.55
		---	h	552.03	0.03	0.91	16.56	502.35
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	1,728.47	0.15	24.64	259.27	42,589.39
		s.b	h	345.69	0.00	5.46	0.00	1,887.48
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kW, 3.10 m3 heaped rock bucket	Op.	h	360.38	0.75	70.52	270.28	25,414.00
		s.b	h	72.08	0.00	26.87	0.00	1,936.68
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	572.17	1.12	114.78	640.83	65,673.23
		s.b	h	114.43	0.00	50.07	0.00	5,729.67
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	3.00	0.00	747.05	0.00	2,241.75
		---	h	1,728.47	0.29	22.25	501.25	38,458.35
2.11	Halogen flood light, 1000 W	2	m.th	6.00	0.00	79.92	0.00	479.65
		---	h	3,456.93	0.01	0.43	34.57	1,486.48
2.12	Halogen flood light, 2000 W	1	m.th	3.00	0.00	92.77	0.00	278.38
		---	h	1,728.47	0.01	0.48	17.28	829.66
2.13	Ligthning line along tunnel, 100 m section	3.4	m.th	10.15	0.00	130.82	0.00	1,327.27
		---	h	5,843.96	0.01	0.41	58.44	2,396.02
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	324.09	0.15	18.51	48.61	5,998.85
		s.b	h	64.82	0.00	7.46	0.00	483.54
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	136.82	0.32	29.23	43.78	3,999.17
		s.b	h	27.36	0.00	12.36	0.00	338.21
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	708.20	0.26	24.87	184.13	17,613.01
		s.b	h	141.64	0.00	15.28	0.00	2,164.27
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	103.61	0.63	48.81	65.28	5,057.34
		s.b	h	20.72	0.00	20.84	0.00	431.86
Total to carry forward ----->>							88,791	405,717

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - STAGE 1 POWER TUNNEL (ROCK CLASS III)**

**SEC 2-09
ANA 001
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						88,791	405,717
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	3.00	0.00	82.94	0.00	248.89
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	3.00	0.31	73.58	0.93	220.80
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	3.4	do	10.15	1.73	117.13	17.55	1,188.37
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	5.03	1.36	134.52	6.84	676.63
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	3.4	do	10.15	0.14	13.13	1.42	133.21
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	3.4	do	10.15	0.37	34.41	3.75	349.12
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	3.00	2.37	278.28	7.11	835.06
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	3.4	do	10.15	0.55	55.77	5.58	565.83
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	3.4	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	2608.36	2.31	0.00	6,025.31	0.00
3.02	Explosive, gramonite type	----	kg	23475.23	2.06	0.00	48,358.97	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	10601.52	0.00	1.98	0.00	20,991.01
3.06	Blasting connection wire	----	m	3420.43	0.00	0.13	0.00	444.66
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	5.91	0.00	459.99	0.00	2,717.17
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	5.91	0.00	808.44	0.00	4,775.48
3.09	Jumbo drill shank adapter	----	n.	10.22	0.00	302.37	0.00	3,089.18
3.10	Jumbo drill bit, 51 mm dia.	----	n.	32.49	0.00	164.35	0.00	5,339.51
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.68	0.00	586.85	0.00	401.46
3.12	Integral drill steel, 800 mm	----	n.	4.60	0.00	132.65	0.00	610.23
3.13	Integral drill steel, 1600 mm	----	n.	4.03	0.00	153.97	0.00	619.77
3.14	Integral drill steel, 2400 mm	----	n.	2.88	0.00	174.35	0.00	501.29
3.15	Breaker tool, moi point	----	n.	11.50	0.00	32.37	0.00	372.28
3.16	Pipeline supports including anchors	----	kg	845.25	1.38	3.22	1,166.44	2,721.70
3.17	Cable tray including supports and anchors	----	m	338.10	0.35	0.83	119.69	279.27
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	338.10	0.79	7.11	267.10	2,403.89
	Sub-total						144,772	455,202
	Missing items and construction contingencies	%		2.00%			2,895	9,104
	Total Direct Costs						147,668	464,306
	Overheads, risks and profit	%		52.00%			31,823	286,403
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	23,001.40			7.80	32.64
	AGGREGATE UNIT PRICE		m ³					40.44

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - VENTILATION ADIT PARALLEL TO T3 (ROCK CLASS III)

SEC 2-09
 ANA 002
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	145.43	0.00	47.25	0.00	6,871.74
1.02	Gang foreman	1	h	1,454.34	6.60	0.00	9,598.62	0.00
1.03	Tunnel specialist	1	h	1,454.34	0.00	45.38	0.00	65,997.80
1.04	Tunneling jumbo operator	1	h	1,454.34	5.82	0.00	8,464.24	0.00
1.05	Loader operator	1	h	1,454.34	5.82	0.00	8,464.24	0.00
1.06	Operator of dumper and other units	---	h	1,637.90	5.82	0.00	9,532.60	0.00
1.07	Miner	3	h	4,363.01	2.99	0.00	13,045.40	0.00
1.08	Explosive specialist	1	h	1,454.34	3.69	0.00	5,366.50	0.00
1.09	Electrician	0.33	h	484.73	3.69	0.00	1,788.66	0.00
1.10	Mechanic	0.33	h	484.73	3.69	0.00	1,788.66	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	75.48	3.69	0.00	278.52	0.00
1.12	Pipe fitter	0.33	h	484.73	3.69	0.00	1,788.66	0.00
1.13	Helper	4.0	h	5,817.35	2.38	0.00	13,845.29	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	2.52	0.00	12,651.92	0.00	31,944.71
		---	h	392.65	1.95	50.77	765.67	19,934.91
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	7.57	0.00	187.16	0.00	1,417.68
		---	h	66.73	0.07	1.53	4.67	102.09
2.03	Hand-held rock drill, medium weight type	2	m.th	5.05	0.00	130.63	0.00	659.65
		---	hr	100.09	0.04	2.03	4.00	203.18
2.04	Hand-held breaker, medium weight type	2	m.th	5.05	0.00	46.95	0.00	237.09
		---	h	355.87	0.03	0.91	10.68	323.85
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	1,454.34	0.15	24.64	218.15	35,834.86
		s.b	h	290.87	0.00	5.46	0.00	1,588.14
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	2.52	0.00	8,943.66	0.00	22,581.76
		---	h	231.20	1.30	33.65	300.56	7,779.90
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	994.74	0.63	62.22	626.69	61,892.95
		s.b	h	198.95	0.00	28.86	0.00	5,741.66
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	2.52	0.00	440.40	0.00	1,111.96
		---	h	1,454.34	0.12	9.00	174.52	13,089.03
2.11	Halogen flood light, 1000 W	1	m.th	2.52	0.00	79.92	0.00	201.79
		---	h	1,454.34	0.01	0.43	14.54	625.36
2.12	Halogen flood light, 2000 W	1	m.th	2.52	0.00	92.77	0.00	234.23
		---	h	1,454.34	0.01	0.48	14.54	698.08
2.13	Ligthing line along tunnel, 100 m section	5.7	m.th	14.36	0.00	130.82	0.00	1,879.11
		---	h	8,273.72	0.01	0.41	82.74	3,392.23
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	272.69	0.15	18.51	40.90	5,047.46
		s.b	h	54.54	0.00	7.46	0.00	406.85
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	176.12	0.32	29.23	56.36	5,147.99
		s.b	h	35.22	0.00	12.36	0.00	435.37
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	530.75	0.26	24.87	138.00	13,199.86
		s.b	h	106.15	0.00	15.28	0.00	1,621.99
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	45.45	0.63	48.81	28.63	2,218.47
		s.b	h	9.09	0.00	20.84	0.00	189.44
Total to carry forward ----->>							76,442	312,611

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - VENTILATION ADIT PARALLEL TO T3 (ROCK CLASS III)

SEC 2-09
 ANA 002
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						76,442	312,611
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	2.52	0.00	82.94	0.00	209.41
		---	h	12.62	0.01	4.39	0.13	55.42
2.19	Integral drill steel grinder	---	h	11.12	0.01	2.29	0.11	25.47
2.20	Button bits grinder	---	h	51.78	0.04	5.32	2.07	275.47
2.21	Breaker moil point resharpenner	---	h	3.71	0.01	1.57	0.04	5.82
2.22	Steel structure for ventilation fan support	1	m.th	2.52	0.14	33.45	0.35	84.46
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	5.7	do	14.36	1.31	89.04	18.82	1,278.98
2.24	Compressed air tank, 4 m3 capacity	2	do	5.40	1.07	105.20	5.78	567.84
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.7	do	14.36	0.14	13.13	2.01	188.60
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	5.7	do	14.36	0.24	22.33	3.45	320.75
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	2.52	2.37	278.28	5.98	702.63
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11.4	do	28.73	0.38	38.10	10.92	1,094.54
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.7	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	5.05	0.24	27.23	1.21	137.51
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1601.43	2.31	0.00	3,699.31	0.00
3.02	Explosive, gramonite type	----	kg	14412.88	2.06	0.00	29,690.54	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	8042.80	0.00	1.98	0.00	15,924.75
3.06	Blasting connection wire	----	m	4403.00	0.00	0.13	0.00	572.39
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	4.55	0.00	459.99	0.00	2,091.62
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	4.55	0.00	808.44	0.00	3,676.05
3.09	Jumbo drill shank adapter	----	n.	7.86	0.00	302.37	0.00	2,377.98
3.10	Jumbo drill bit, 48 mm dia.	----	n.	25.01	0.00	150.50	0.00	3,763.86
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.88	0.00	586.85	0.00	516.78
3.12	Integral drill steel, 800 mm	----	n.	1.78	0.00	132.65	0.00	236.03
3.13	Integral drill steel, 1600 mm	----	n.	1.56	0.00	153.97	0.00	239.72
3.14	Integral drill steel, 2400 mm	----	n.	1.11	0.00	174.35	0.00	193.90
3.15	Breaker tool, moil point	----	n.	7.41	0.00	32.37	0.00	239.99
3.16	Pipeline supports including anchors	----	kg	1,061.00	1.38	3.22	1,464.18	3,416.42
3.17	Cable tray including supports and anchors	----	m	424.40	0.35	0.83	150.24	350.55
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	424.40	0.79	7.11	335.28	3,017.48
	Sub-total						111,832	354,176
	Missing items and construction contingencies	%		2.00%			2,237	7,084
	Total Direct Costs						114,069	361,259
	Overheads, risks and profit	%		52.00%			24,717	222,454
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	8,897			15.60	65.61
	AGGREGATE UNIT PRICE		m ³					81.21

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - VENTILATION ADIT PARALLEL TO T3 (ROCK CLASS IV)

SEC 2-09
 ANA 002
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	54.95	0.00	47.25	0.00	2,596.19
1.02	Gang foreman	1	h	549.46	6.60	0.00	3,626.43	0.00
1.03	Tunnel specialist	1	h	549.46	0.00	45.38	0.00	24,934.43
1.04	Tunneling jumbo operator	1	h	549.46	5.82	0.00	3,197.85	0.00
1.05	Loader operator	1	h	549.46	5.82	0.00	3,197.85	0.00
1.06	Operator of dumper and other units	---	h	604.72	5.82	0.00	3,519.49	0.00
1.07	Miner	3	h	1,648.38	2.99	0.00	4,928.64	0.00
1.08	Explosive specialist	1	h	549.46	3.69	0.00	2,027.50	0.00
1.09	Electrician	0.33	h	183.13	3.69	0.00	675.77	0.00
1.10	Mechanic	0.33	h	183.13	3.69	0.00	675.77	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	25.26	3.69	0.00	93.20	0.00
1.12	Pipe fitter	0.33	h	183.13	3.69	0.00	675.77	0.00
1.13	Helper	4.0	h	2,197.83	2.38	0.00	5,230.85	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.95	0.00	12,651.92	0.00	12,068.93
		---	h	141.01	1.95	50.77	274.98	7,159.29
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	2.86	0.00	187.16	0.00	535.61
		---	h	22.72	0.07	1.53	1.59	34.76
2.03	Hand-held rock drill, medium weight type	2	m.th	1.91	0.00	130.63	0.00	249.22
		---	hr	34.08	0.04	2.03	1.36	69.18
2.04	Hand-held breaker, medium weight type	2	m.th	1.91	0.00	46.95	0.00	89.57
		---	h	121.17	0.03	0.91	3.64	110.26
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	549.46	0.15	24.64	82.42	13,538.66
		s.b	h	109.89	0.00	5.46	0.00	600.01
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt	1	m.th	0.95	0.00	8,943.66	0.00	8,531.55
		---	h	84.94	1.30	33.65	110.42	2,858.15
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	361.04	0.63	62.22	227.45	22,463.73
		s.b	h	72.21	0.00	28.86	0.00	2,083.91
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.95	0.00	440.40	0.00	420.11
		---	h	549.46	0.12	9.00	65.94	4,945.13
2.11	Halogen flood light, 1000 W	1	m.th	0.95	0.00	79.92	0.00	76.24
		---	h	549.46	0.01	0.43	5.49	236.27
2.12	Halogen flood light, 2000 W	1	m.th	0.95	0.00	92.77	0.00	88.50
		---	h	549.46	0.01	0.48	5.49	263.74
2.13	Ligthing line along tunnel, 100 m section	5.7	m.th	5.43	0.00	130.82	0.00	709.94
		---	h	3,125.87	0.01	0.41	31.26	1,281.61
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	103.02	0.15	18.51	15.45	1,906.96
		s.b	h	20.60	0.00	7.46	0.00	153.71
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	69.19	0.32	29.23	22.14	2,022.46
		s.b	h	13.84	0.00	12.36	0.00	171.04
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	203.73	0.26	24.87	52.97	5,066.71
		s.b	h	40.75	0.00	15.28	0.00	622.59
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	16.50	0.63	48.81	10.39	805.18
		s.b	h	3.30	0.00	20.84	0.00	68.76
Total to carry forward ----->>							28,760	116,762

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - VENTILATION ADIT PARALLEL TO T3 (ROCK CLASS IV)**

**SEC 2-09
ANA 002
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						28,760	116,762
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.95	0.00	82.94	0.00	79.12
		---	h	4.77	0.01	4.39	0.05	20.94
2.19	Integral drill steel grinder	---	h	3.79	0.01	2.29	0.04	8.67
2.20	Button bits grinder	---	h	17.26	0.04	5.32	0.69	91.83
2.21	Breaker moil point resharpenner	---	h	1.26	0.01	1.57	0.01	1.98
2.22	Steel structure for ventilation fan support	1	m.th	0.95	0.14	33.45	0.13	31.91
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	5.7	do	5.43	1.31	89.04	7.11	483.21
2.24	Compressed air tank, 4 m3 capacity	2	do	2.04	1.07	105.20	2.18	214.53
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.7	do	5.43	0.14	13.13	0.76	71.25
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	5.7	do	5.43	0.24	22.33	1.30	121.18
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.95	2.37	278.28	2.26	265.46
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	11.4	do	10.85	0.38	38.10	4.12	413.53
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.7	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.91	0.24	27.23	0.46	51.95
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	514.97	2.31	0.00	1,189.6	0.0
3.02	Explosive, gramonite type	----	kg	4634.71	2.06	0.00	9,547.5	0.0
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.0	0.0
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.0	0.0
3.05	Electric type detonators	----	n.	3088.81	0.00	1.98	0.0	6,115.8
3.06	Blasting connection wire	----	m	1729.78	0.00	0.13	0.0	224.9
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.51	0.00	459.99	0.0	696.7
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.51	0.00	808.44	0.0	1,224.5
3.09	Jumbo drill shank adapter	----	n.	2.62	0.00	302.37	0.0	792.1
3.10	Jumbo drill bit, 48 mm dia.	----	n.	8.33	0.00	150.50	0.0	1,253.8
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.30	0.00	586.85	0.0	176.0
3.12	Integral drill steel, 800 mm	----	n.	0.61	0.00	132.65	0.0	80.4
3.13	Integral drill steel, 1600 mm	----	n.	0.53	0.00	153.97	0.0	81.6
3.14	Integral drill steel, 2400 mm	----	n.	0.38	0.00	174.35	0.0	66.0
3.15	Breaker tool, moil point	----	n.	2.52	0.00	32.37	0.0	81.7
3.16	Pipeline supports including anchors	----	kg	361.25	1.38	3.22	498.5	1,163.2
3.17	Cable tray including supports and anchors	----	m	144.50	0.35	0.83	51.2	119.4
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	144.50	0.79	7.11	114.2	1,027.4
	Sub-total						40,180	131,721
	Missing items and construction contingencies	%		2.00%			804	2,634
	Total Direct Costs						40,984	134,356
	Overheads, risks and profit	%		52.00%			9,118	82,059
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	3,029			16.54	71.44
	AGGREGATE UNIT PRICE		m³					87.98

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - EXPLOSIVE WAREHOUSE T4 (ROCK CLASS II)

SEC 2-09
 ANA 003
 RC II - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	33.27	0.00	47.25	0.00	1,572.15
1.02	Gang foreman	1	h	332.73	6.60	0.00	2,196.03	0.00
1.03	Tunnel specialist	1	h	332.73	0.00	45.38	0.00	15,099.34
1.04	Tunneling jumbo operator	1	h	332.73	5.82	0.00	1,936.50	0.00
1.05	Loader operator	1	h	332.73	5.82	0.00	1,936.50	0.00
1.06	Operator of dumper and other units	---	h	417.77	5.82	0.00	2,431.40	0.00
1.07	Miner	3	h	998.19	2.99	0.00	2,984.60	0.00
1.08	Explosive specialist	1	h	332.73	3.69	0.00	1,227.78	0.00
1.09	Electrician	0.33	h	110.90	3.69	0.00	409.22	0.00
1.10	Mechanic	0.33	h	110.90	3.69	0.00	409.22	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	22.23	3.69	0.00	82.02	0.00
1.12	Pipe fitter	0.33	h	110.90	3.69	0.00	409.22	0.00
1.13	Helper	4.0	h	1,330.92	2.38	0.00	3,167.60	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.58	0.00	12,651.92	0.00	7,308.49
		---	h	91.58	1.95	50.77	178.59	4,649.67
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.73	0.00	187.16	0.00	324.34
		---	h	35.62	0.07	1.53	2.49	54.50
2.03	Hand-held rock drill, medium weight type	2	m.th	1.16	0.00	130.63	0.00	150.92
		---	hr	534.32	0.04	2.03	21.37	1,084.66
2.04	Hand-held breaker, medium weight type	2	m.th	1.16	0.00	46.95	0.00	54.24
		---	h	63.33	0.03	0.91	1.90	57.63
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	332.73	0.15	24.64	49.91	8,198.50
		s.b	h	66.55	0.00	5.46	0.00	363.34
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro-powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.58	0.00	8,943.66	0.00	5,166.38
		---	h	42.30	1.30	33.65	54.99	1,423.41
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	263.71	0.63	62.22	166.14	16,408.11
		s.b	h	52.74	0.00	28.86	0.00	1,522.14
2.10	Sound-proof axial tunnel fan, 30 kW (24 kW act.)	1	m.th	0.58	0.00	352.32	0.00	203.52
		---	h	332.73	0.10	7.20	31.94	2,395.66
2.11	Halogen flood light, 1000 W	1	m.th	0.58	0.00	79.92	0.00	46.17
		---	h	332.73	0.01	0.43	3.33	143.07
2.12	Halogen flood light, 2000 W	1	m.th	0.58	0.00	92.77	0.00	53.59
		---	h	332.73	0.01	0.48	3.33	159.71
2.13	Ligthing line along tunnel, 100 m section	4.7	m.th	2.74	0.00	130.82	0.00	358.77
		---	h	1,579.64	0.01	0.41	15.80	647.65
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	62.39	0.15	18.51	9.36	1,154.79
		s.b	h	12.48	0.00	7.46	0.00	93.08
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	45.99	0.32	29.23	14.72	1,344.31
		s.b	h	9.20	0.00	12.36	0.00	113.69
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	101.77	0.26	24.87	26.46	2,531.12
		s.b	h	20.35	0.00	15.28	0.00	311.02
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	7.70	0.63	48.81	4.85	375.74
		s.b	h	1.54	0.00	20.84	0.00	32.09
Total to carry forward ----->>>							17,775	73,402

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - EXPLOSIVE WAREHOUSE T4 (ROCK CLASS II)**

**SEC 2-09
ANA 003
RC II - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						17,775	73,402
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.58	0.00	82.94	0.00	47.91
		---	h	2.89	0.01	4.39	0.03	12.68
2.19	Integral drill steel grinder	---	h	5.94	0.01	2.29	0.06	13.60
2.20	Button bits grinder	---	h	12.59	0.04	5.32	0.50	66.96
2.21	Breaker moil point resharpen	---	h	0.66	0.01	1.57	0.01	1.04
2.22	Fan supporting steel structure	1	m.th	0.58	0.14	33.45	0.08	19.32
2.23	Ventilation flexible pipe, 400 mm dia. (L=100 m)	4.7	do	2.74	0.63	0.00	1.73	0.00
2.24	Compressed air tank, 4 m3 capacity	2	do	1.13	1.07	105.20	1.20	118.47
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	4.7	do	2.74	0.14	13.13	0.38	36.01
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	4.7	do	2.74	0.24	22.33	0.66	61.24
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.58	2.37	278.28	1.37	160.75
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4.7	do	2.74	0.38	38.10	1.04	104.49
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.7	do	2.74	0.83	84.05	2.28	230.50
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	4.7	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.16	0.24	27.23	0.28	31.46
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	1	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	399.27	2.31	0.00	922.32	0.00
3.02	Explosive, gramonite type	----	kg	3,593.46	2.06	0.00	7,402.53	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,644.71	0.00	1.98	0.00	3,256.52
3.06	Blasting connection wire	----	m	1,149.77	0.00	0.13	0.00	149.47
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.10	0.00	459.99	0.00	503.88
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.10	0.00	808.44	0.00	885.57
3.09	Jumbo drill shank adapter	----	n.	1.89	0.00	302.37	0.00	572.86
3.10	Jumbo drill bit, 48 mm dia.	----	n.	6.02	0.00	150.50	0.00	906.73
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.27	0.00	586.85	0.00	157.44
3.12	Integral drill steel, 800 mm	----	n.	0.95	0.00	132.65	0.00	126.00
3.13	Integral drill steel, 1600 mm	----	n.	0.83	0.00	153.97	0.00	127.97
3.14	Integral drill steel, 2400 mm	----	n.	0.59	0.00	174.35	0.00	103.51
3.15	Breaker tool, moil point	----	n.	1.32	0.00	32.37	0.00	42.71
3.16	Pipeline supports including anchors	----	kg	1,186.88	1.38	3.22	1,637.89	3,821.74
3.17	Cable tray including supports and anchors	----	m	474.75	0.35	0.83	168.06	392.14
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	474.75	0.79	7.11	375.05	3,375.47
	Sub-total						28,291	88,728
	Missing items and construction contingencies	%		5.00%			1,415	4,436
	Total Direct Costs						29,705	93,165
	Overheads, risks and profit	%		52.00%			6,389	57,503
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	1,583			22.80	95.17
	AGGREGATE UNIT PRICE		m³					117.97

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - EXPLOSIVE WHAREHOUSE T5A (ROCK CLASS IV)

SEC 2-09
 ANA 004
 RC II - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	43.39	0.00	47.25	0.00	2,050.16
1.02	Gang foreman	1	h	433.90	6.60	0.00	2,863.72	0.00
1.03	Tunnel specialist	1	h	433.90	0.00	45.38	0.00	19,690.25
1.04	Tunneling jumbo operator	1	h	433.90	5.82	0.00	2,525.28	0.00
1.05	Loader operator	1	h	433.90	5.82	0.00	2,525.28	0.00
1.06	Operator of dumper and other units	---	h	430.20	5.82	0.00	2,503.78	0.00
1.07	Miner	3	h	1,301.69	2.99	0.00	3,892.06	0.00
1.08	Explosive specialist	1	h	433.90	3.69	0.00	1,601.08	0.00
1.09	Electrician	0.33	h	144.62	3.69	0.00	533.64	0.00
1.10	Mechanic	0.33	h	144.62	3.69	0.00	533.64	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	21.65	3.69	0.00	79.88	0.00
1.12	Pipe fitter	0.33	h	144.62	3.69	0.00	533.64	0.00
1.13	Helper	4.0	h	1,735.59	2.38	0.00	4,130.70	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.75	0.00	12,651.92	0.00	9,530.61
		---	h	104.46	1.95	50.77	203.70	5,303.57
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	2.26	0.00	187.16	0.00	422.96
		---	h	35.62	0.07	1.53	2.49	54.50
2.03	Hand-held rock drill, medium weight type	2	m.th	1.51	0.00	130.63	0.00	196.81
		---	hr	53.43	0.04	2.03	2.14	108.47
2.04	Hand-held breaker, medium weight type	2	m.th	1.51	0.00	46.95	0.00	70.73
		---	h	63.33	0.03	0.91	1.90	57.63
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	433.90	0.15	24.64	65.08	10,691.23
		s.b	h	86.78	0.00	5.46	0.00	473.82
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.75	0.00	8,943.66	0.00	6,737.20
		---	h	53.11	1.30	33.65	69.04	1,787.12
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	238.35	0.63	62.22	150.16	14,830.12
		s.b	h	47.67	0.00	28.86	0.00	1,375.76
2.10	Sound-proof axial tunnel fan, 30 kW (15 kW act.)	1	m.th	0.75	0.00	220.20	0.00	165.88
		---	h	433.90	0.06	4.50	26.03	1,952.54
2.11	Halogen flood light, 1000 W	1	m.th	0.75	0.00	79.92	0.00	60.20
		---	h	433.90	0.01	0.43	4.34	186.58
2.12	Halogen flood light, 2000 W	1	m.th	0.75	0.00	92.77	0.00	69.88
		---	h	433.90	0.01	0.48	4.34	208.27
2.13	Ligthing line along tunnel, 100 m section	2.2	m.th	1.69	0.00	130.82	0.00	221.48
		---	h	975.18	0.01	0.41	9.75	399.83
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	81.36	0.15	18.51	12.20	1,505.89
		s.b	h	16.27	0.00	7.46	0.00	121.38
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	61.91	0.32	29.23	19.81	1,809.65
		s.b	h	12.38	0.00	12.36	0.00	153.04
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	145.96	0.26	24.87	37.95	3,630.04
		s.b	h	29.19	0.00	15.28	0.00	446.06
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	9.48	0.63	48.81	5.97	462.62
		s.b	h	1.90	0.00	20.84	0.00	39.50
Total to carry forward ----->>>							22,337.63	84,813.78

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - EXPLOSIVE WHAREHOUSE T5A (ROCK CLASS IV)

SEC 2-09
 ANA 004
 RC II - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						22,337.63	84,813.78
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.75	0.00	82.94	0.00	62.48
		---	h	3.77	0.01	4.39	0.04	16.53
2.19	Integral drill steel grinder	---	h	5.94	0.01	2.29	0.06	13.60
2.20	Button bits grinder	---	h	12.10	0.04	5.32	0.48	64.39
2.21	Breaker moil point resharpenner	---	h	0.66	0.01	1.57	0.01	1.04
2.22	Steel structure for ventilation fan support	1	m.th	0.75	0.14	33.45	0.11	25.20
2.23	Ventilation flexible pipe, 600 mm dia. (L=100 m)	2.2	do	1.69	0.87	58.95	1.47	99.80
2.24	Compressed air tank, 4 m3 capacity	1	do	1.09	1.07	105.20	1.17	114.87
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	2.2	do	1.69	0.14	13.13	0.24	22.23
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	2.2	do	1.69	0.24	22.33	0.41	37.81
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.75	2.37	278.28	1.79	209.63
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	2.2	do	1.69	0.38	38.10	0.64	64.50
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	2.2	do	1.69	0.83	84.05	1.41	142.30
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	2.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.51	0.24	27.23	0.36	41.02
2.38	Control board, 50 KVA	0	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	1	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	349.88	2.31	0.00	808.22	0.00
3.02	Explosive, gramonite type	----	kg	3148.91	2.06	0.00	6,486.75	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2121.17	0.00	1.98	0.00	4,199.91
3.06	Blasting connection wire	----	m	1547.77	0.00	0.13	0.00	201.21
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.05	0.00	459.99	0.00	483.68
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.05	0.00	808.44	0.00	850.08
3.09	Jumbo drill shank adapter	----	n.	1.82	0.00	302.37	0.00	549.91
3.10	Jumbo drill bit, 48 mm dia.	----	n.	5.78	0.00	150.50	0.00	870.39
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.27	0.00	586.85	0.00	157.44
3.12	Integral drill steel, 800 mm	----	n.	0.95	0.00	132.65	0.00	126.00
3.13	Integral drill steel, 1600 mm	----	n.	0.83	0.00	153.97	0.00	127.97
3.14	Integral drill steel, 2400 mm	----	n.	0.59	0.00	174.35	0.00	103.51
3.15	Breaker tool, moil point	----	n.	1.32	0.00	32.37	0.00	42.71
3.16	Pipeline supports including anchors	----	kg	561.88	1.38	3.22	775.39	1,809.24
3.17	Cable tray including supports and anchors	----	m	224.75	0.35	0.83	79.56	185.64
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	224.75	0.79	7.11	177.55	1,597.97
	Sub-total						30,673.27	97,034.84
	Missing items and construction contingencies	%		5.00%			1,533.66	4,851.74
	Total Direct Costs						32,206.94	101,886.58
	Overheads, risks and profit	%		52.00%			6,972.86	62,755.77
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	1,583			24.75	104.00
	AGGREGATE UNIT PRICE		m ³					128.74

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CROSS SLIT 1 (ROCK CLASS III)**

**SEC 2-09
ANA 005
RC III - T. A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	41.65	0.00	47.25	0.00	1,967.79
1.02	Gang foreman	1	hr	416.46	6.60	0.00	2,748.65	0.00
1.03	Tunnel specialist	1	hr	258.37	0.00	45.38	0.00	11,725.03
1.04	Tunneling jumbo operator	1	hr	258.37	5.82	0.00	1,503.74	0.00
1.05	Loader operator	---	hr	63.74	5.82	0.00	370.96	0.00
1.06	Operator of dumpers and other units	---	h	209.22	5.82	0.00	1,217.68	0.00
1.07	Miner	5	hr	1,291.87	2.99	0.00	3,862.70	0.00
1.08	Explosive specialist	1	hr	258.37	3.69	0.00	953.40	0.00
1.09	Electrician	0.33	hr	86.04	3.69	0.00	317.48	0.00
1.10	Mechanic	0.33	hr	86.04	3.69	0.00	317.48	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	16.31	3.69	0.00	60.17	0.00
1.12	Pipe fitter	0.33	hr	86.04	3.69	0.00	317.48	0.00
1.13	Helper	6	hr	1,550.25	2.38	0.00	3,689.59	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.45	0.00	21,868.22	0.00	9,809.35
		---	h	27.84	3.71	122.14	103.27	3,399.87
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	2.24	0.00	187.16	0.00	419.77
		---	h	31.79	0.07	1.53	2.23	48.63
2.03	Hand-held rock drill, medium weight type	4	m.th	1.79	0.00	130.63	0.00	234.39
		---	h	47.68	0.04	2.03	1.91	96.79
2.04	Hand-held breaker, medium weight type	5	m.th	2.24	0.00	46.95	0.00	105.30
		---	h	101.72	0.03	0.91	3.05	92.56
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	258.37	0.29	77.99	74.93	20,150.62
		s.b	h	51.67	0.00	10.73	0.00	554.47
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	53.12	1.05	95.46	55.77	5,070.41
		---	h	10.62	0.00	36.59	0.00	388.70
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	8.86	0.70	64.44	6.21	571.23
		s.b	h	1.77	0.00	40.23	0.00	71.32
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	106.41	1.12	114.78	119.18	12,213.56
		s.b	h	21.28	0.00	50.07	0.00	1,065.57
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.45	0.00	636.14	0.00	285.35
		---	h	258.37	0.20	14.93	51.67	3,857.53
2.11	Halogen flood light, 1000 W	2	m.th	0.90	0.00	79.92	0.00	71.70
		---	h	516.75	0.01	0.43	5.17	222.20
2.12	Halogen flood light, 2000 W	2	m.th	0.90	0.00	92.77	0.00	83.23
		---	h	516.75	0.01	0.48	5.17	248.04
2.13	Ligthing line along tunnel, 100 m section	4.2	m.th	1.87	0.00	130.82	0.00	244.41
		---	h	1,076.13	0.01	0.41	10.76	441.21
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	48.45	0.15	18.51	7.27	896.72
		s.b	h	9.69	0.00	7.46	0.00	72.28
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	16.79	0.32	29.23	5.37	490.65
		s.b	h	3.36	0.00	12.36	0.00	41.49
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	86.12	0.33	30.84	28.42	2,655.81
		s.b	h	17.22	0.00	19.27	0.00	331.89
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	18.56	0.63	48.81	11.70	906.11
		s.b	h	3.71	0.00	20.84	0.00	77.37
Total to carry forward ----->>							15,851	78,911

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CROSS SLIT 1 (ROCK CLASS III)**

**SEC 2-09
ANA 005
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						15,851	78,911
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.45	0.00	128.05	0.00	57.44
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.45	0.14	33.45	0.06	15.00
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	4.2	do	1.87	2.21	149.88	4.13	280.02
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	0.82	2.01	198.33	1.65	163.07
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4.2	do	1.87	0.20	18.98	0.37	35.46
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	4.2	do	1.87	0.37	34.41	0.69	64.29
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.45	3.15	370.12	1.41	166.02
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4.2	do	1.87	0.38	38.10	0.71	71.18
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.2	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	4.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	431.02	2.31	0.00	995.66	0.00
3.02	Explosive, gramonite type	----	kg	3,879.20	2.06	0.00	7,991.15	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,325.70	0.00	1.98	0.00	2,624.89
3.06	Blasting connection wire	----	m	419.65	0.00	0.13	0.00	54.55
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.74	0.00	459.99	0.00	339.64
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.74	0.00	808.44	0.00	596.93
3.09	Jumbo drill shank adapter	----	n.	1.28	0.00	302.37	0.00	386.14
3.10	Jumbo drill bit, 51 mm dia.	----	n.	4.06	0.00	164.35	0.00	667.43
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.08	0.00	586.85	0.00	49.25
3.12	Integral drill steel, 800 mm	----	n.	0.85	0.00	132.65	0.00	112.44
3.13	Integral drill steel, 1600 mm	----	n.	0.74	0.00	153.97	0.00	114.20
3.14	Integral drill steel, 2400 mm	----	n.	0.53	0.00	174.35	0.00	92.37
3.15	Breaker tool, moi point	----	n.	2.12	0.00	32.37	0.00	68.59
3.16	Pipeline supports including anchors	----	kg	873.92	1.38	3.22	1,206.01	2,814.03
3.17	Cable tray including supports and anchors	----	m	349.57	0.35	0.83	123.75	288.74
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	349.57	0.79	7.11	276.16	2,485.43
	Sub-total						26,453	90,458
	Missing items and construction contingencies	%		2.00%			529	1,809
	Total Direct Costs						26,982	92,268
	Overheads, risks and profit	%		52.00%			6,201	55,809
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		4,238			7.83	34.94
	AGGREGATE UNIT PRICE		m³					42.77

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - CROSS SLIT 1 (ROCK CLASS IV)

SEC 2-09
 ANA 005
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	hr	8.77	0.00	47.25	0.00	414.19
1.02	Gang foreman	1	hr	87.66	6.60	0.00	578.55	0.00
1.03	Tunnel specialist	1	hr	54.56	0.00	45.38	0.00	2,475.96
1.04	Tunneling jumbo operator	1	hr	54.56	5.82	0.00	317.54	0.00
1.05	Loader operator	---	hr	12.68	5.82	0.00	73.78	0.00
1.06	Operator of dumpers and other units	---	h	42.47	5.82	0.00	247.20	0.00
1.07	Miner	5	hr	272.80	2.99	0.00	815.68	0.00
1.08	Explosive specialist	1	hr	54.56	3.69	0.00	201.33	0.00
1.09	Electrician	0.33	hr	18.17	3.69	0.00	67.04	0.00
1.10	Mechanic	0.33	hr	18.17	3.69	0.00	67.04	0.00
1.11	Bit and intergral drill steel grinder specialist	---	hr	3.08	3.69	0.00	11.37	0.00
1.12	Pipe fitter	0.33	hr	18.17	3.69	0.00	67.04	0.00
1.13	Helper	6	hr	327.36	2.38	0.00	779.13	0.00
2	Equipment							
2.01	Three-boom hydraulic tunneling jumbo	1	m.th	0.09	0.00	21,868.22	0.00	2,071.43
		---	h	5.68	3.71	122.14	21.06	693.43
2.02	Hand-held rock drill, feed pusher leg type	5	m.th	0.47	0.00	187.16	0.00	88.64
		---	h	6.09	0.07	1.53	0.43	9.31
2.03	Hand-held rock drill, medium weight type	4	m.th	0.38	0.00	130.63	0.00	49.49
		---	h	9.13	0.04	2.03	0.37	18.53
2.04	Hand-held breaker, medium weight type	5	m.th	0.47	0.00	46.95	0.00	22.24
		---	h	19.48	0.03	0.91	0.58	17.72
2.05	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.25	57.86	0.00	0.00
		s.b	h	0.00	0.00	9.26	0.00	0.00
2.06	Diesel powered a. compressor, 25.0 m3/min	Op.	h	54.56	0.29	77.99	15.82	4,255.19
		s.b	h	0.00	0.00	10.73	0.00	0.00
2.07	Wheel loader, 199 kw, 4.00 heaped rock bucket	1	h	10.56	1.05	95.46	11.09	1,008.43
		---	h	2.11	0.00	36.59	0.00	77.31
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	1.89	0.70	64.44	1.33	122.09
		s.b	h	0.38	0.00	40.23	0.00	15.24
2.09	Articulated tunnel dump truck, 42.00 t pay load	Op.	h	21.01	1.12	114.78	23.53	2,411.47
		s.b	h	4.20	0.00	50.07	0.00	210.39
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.09	0.00	636.14	0.00	60.26
		---	h	54.56	0.20	14.93	10.91	814.59
2.11	Halogen flood light, 1000 W	2	m.th	0.19	0.00	79.92	0.00	15.14
		---	h	109.12	0.01	0.43	1.09	46.92
2.12	Halogen flood light, 2000 W	2	m.th	0.19	0.00	92.77	0.00	17.57
		---	h	109.12	0.01	0.48	1.09	52.38
2.13	Ligthing line along tunnel, 100 m section	4.2	m.th	0.39	0.00	130.82	0.00	51.61
		---	h	227.25	0.01	0.41	2.27	93.17
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	10.23	0.15	18.51	1.53	189.36
		s.b	h	2.05	0.00	7.46	0.00	15.26
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	3.71	0.32	29.23	1.19	108.40
		s.b	h	0.74	0.00	12.36	0.00	9.17
2.16	Extendable lifter with 1000 kg capacity platform	Op.	h	18.86	0.33	30.84	6.22	581.74
		s.b	h	3.77	0.00	19.27	0.00	72.70
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.67	0.63	48.81	2.31	178.90
		s.b	h	0.73	0.00	20.84	0.00	15.28
Total to carry forward ----->>							3,327	16,284

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - CROSS SLIT 1 (ROCK CLASS IV)**

**SEC 2-09
ANA 005
RC IV - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						3,327	16,284
2.18	Stand-by motorgenerator, 50 KVA	1	m.th	0.09	0.00	128.05	0.00	12.13
		---	h	0.00	0.03	8.70	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.09	0.14	33.45	0.01	3.17
2.23	Ventilation flexible pipe, 1800 mm dia. (L=100 m)	4.2	do	0.39	2.21	149.88	0.87	59.13
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	2	do	0.17	2.01	198.33	0.35	34.44
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	0	do	0.00	0.14	13.13	0.00	0.00
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	4.2	do	0.39	0.20	18.98	0.08	7.49
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	4.2	do	0.39	0.37	34.41	0.15	13.58
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	0	do	0.00	2.37	278.28	0.00	0.00
2.32	Steel water tank, 100 m3 capacity	1	do	0.09	3.15	370.12	0.30	35.06
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	4.2	do	0.39	0.38	38.10	0.15	15.03
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	4.2	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x16 mm2 (L=100 m)	4.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.39	Control board, 300 KVA	1	do	0.00	0.95	105.80	0.00	0.00
2.40	Transformer cabin, 300 kVA	2	do	0.00	5.68	696.82	0.00	0.00
2.41	Transformer cabin, 450 kVA	0	do	0.00	7.43	911.23	0.00	0.00
2.42	Transformer cabin, 500 kVA	1	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	77.94	2.31	0.00	180.05	0.00
3.02	Explosive, gramonite type	----	kg	701.48	2.06	0.00	1,445.06	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	286.35	0.00	1.98	0.00	566.97
3.06	Blasting connection wire	----	m	92.71	0.00	0.13	0.00	12.05
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.14	0.00	459.99	0.00	63.61
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.14	0.00	808.44	0.00	111.80
3.09	Jumbo drill shank adapter	----	n.	0.24	0.00	302.37	0.00	72.32
3.10	Jumbo drill bit, 51 mm dia.	----	n.	0.76	0.00	164.35	0.00	125.00
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	9.43
3.12	Integral drill steel, 800 mm	----	n.	0.16	0.00	132.65	0.00	21.53
3.13	Integral drill steel, 1600 mm	----	n.	0.14	0.00	153.97	0.00	21.87
3.14	Integral drill steel, 2400 mm	----	n.	0.10	0.00	174.35	0.00	17.69
3.15	Breaker tool, moi point	----	n.	0.41	0.00	32.37	0.00	13.13
3.16	Pipeline supports including anchors	----	kg	167.33	1.38	3.22	230.91	538.80
3.17	Cable tray including supports and anchors	----	m	66.93	0.35	0.83	23.69	55.29
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	66.93	0.79	7.11	52.88	475.88
	Sub-total						5,261	18,569
	Missing items and construction contingencies	%		2.00%			105	371
	Total Direct Costs						5,366	18,940
	Overheads, risks and profit	%		52.00%			1,264	11,375
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		811			8.17	37.36
	AGGREGATE UNIT PRICE		m³					45.53

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAVATION - TUNNEL FOR CONVEYOR LINE 7A (ROCK CLASS III)

SEC 2-09
 ANA 006
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	82.23	0.00	47.25	0.00	3,885.17
1.02	Gang foreman	1	h	822.26	6.60	0.00	5,426.90	0.00
1.03	Tunnel specialist	1	h	822.26	0.00	45.38	0.00	37,314.05
1.04	Tunneling jumbo operator	1	h	822.26	5.82	0.00	4,785.54	0.00
1.05	Loader operator	---	h	1.71	5.82	0.00	9.97	0.00
1.06	Operator of dumpers and other units	---	h	491.35	5.82	0.00	2,859.66	0.00
1.07	Miner	4	h	3,289.03	2.99	0.00	9,834.20	0.00
1.08	Explosive specialist	1	h	822.26	3.69	0.00	3,034.13	0.00
1.09	Electrician	0.33	h	273.81	3.69	0.00	1,010.37	0.00
1.10	Mechanic	0.33	h	273.81	3.69	0.00	1,010.37	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	52.41	3.69	0.00	193.41	0.00
1.12	Pipe fitter	0.33	h	273.81	3.69	0.00	1,010.37	0.00
1.13	Helper	5	h	4,111.29	2.38	0.00	9,784.87	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	1.43	0.00	19,479.66	0.00	27,807.81
		---	h	152.87	3.17	94.80	484.59	14,491.87
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	5.71	0.00	187.16	0.00	1,068.71
		---	h	67.84	0.07	1.53	4.75	103.80
2.03	Hand-held rock drill, medium weight type	3	m.th	4.28	0.00	130.63	0.00	559.43
		---	h	101.76	0.04	2.03	4.07	206.57
2.04	Hand-held breaker, medium weight type	4	m.th	5.71	0.00	46.95	0.00	268.09
		---	h	217.09	0.03	0.91	6.51	197.55
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	822.26	0.15	24.64	123.34	20,260.43
		s.b	h	164.45	0.00	5.46	0.00	897.91
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	1.43	0.00	12,874.72	0.00	18,379.06
		---	h	128.82	1.95	55.22	251.21	7,113.69
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	173.08	1.12	114.78	193.85	19,866.27
		s.b	h	34.62	0.00	50.07	0.00	1,733.24
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	1.43	0.00	440.40	0.00	628.68
		---	h	822.26	0.12	9.00	98.67	7,400.32
2.11	Halogen flood light, 1000 W	2	m.th	2.86	0.00	79.92	0.00	228.18
		---	h	1,644.52	0.01	0.43	16.45	707.14
2.12	Halogen flood light, 2000 W	1	m.th	1.43	0.00	92.77	0.00	132.43
		---	h	822.26	0.01	0.48	8.22	394.68
2.13	Ligthing line along tunnel, 100 m section	2.0	m.th	2.86	0.00	130.82	0.00	373.50
		---	h	1,644.52	0.01	0.41	16.45	674.25
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	154.17	0.15	18.51	23.13	2,853.75
		s.b	h	30.83	0.00	7.46	0.00	230.03
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	77.42	0.32	29.23	24.77	2,262.97
		s.b	h	15.48	0.00	12.36	0.00	191.38
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	341.71	0.26	24.87	88.84	8,498.26
		s.b	h	68.34	0.00	15.28	0.00	1,044.26
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	42.01	0.63	48.81	26.46	2,050.39
		s.b	h	8.40	0.00	20.84	0.00	175.09
Total to carry forward ----->>							40,331	181,999

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND EXCAVATION - TUNNEL FOR CONVEYOR LINE 7A (ROCK CLASS III)**

**SEC 2-09
ANA 006
RC III - T. B**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						40,331	181,999
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	1.43	0.00	82.94	0.00	118.40
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	1.43	0.14	33.45	0.20	47.75
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	2.0	do	2.86	1.51	102.31	4.31	292.10
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	1	do	2.00	1.36	134.52	2.72	268.84
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	2.0	do	2.86	0.14	13.13	0.40	37.49
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	2.0	do	2.86	0.37	34.41	1.06	98.24
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	1.43	2.37	278.28	3.38	397.25
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	2.0	do	2.86	0.55	55.77	1.57	159.23
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	2.0	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 250 kVA	1	do	0.00	5.27	646.44	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	1090.88	2.31	0.00	2,519.93	0.00
3.02	Explosive, gramonite type	----	kg	9817.89	2.06	0.00	20,224.86	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	5137.16	0.00	1.98	0.00	10,171.59
3.06	Blasting connection wire	----	m	1935.48	0.00	0.13	0.00	251.61
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	2.87	0.00	459.99	0.00	1,321.31
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	2.87	0.00	808.44	0.00	2,322.22
3.09	Jumbo drill shank adapter	----	n.	4.97	0.00	302.37	0.00	1,502.21
3.10	Jumbo drill bit, 51 mm dia.	----	n.	15.80	0.00	164.35	0.00	2,596.50
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.39	0.00	586.85	0.00	227.17
3.12	Integral drill steel, 800 mm	----	n.	1.81	0.00	132.65	0.00	239.97
3.13	Integral drill steel, 1600 mm	----	n.	1.58	0.00	153.97	0.00	243.73
3.14	Integral drill steel, 2400 mm	----	n.	1.13	0.00	174.35	0.00	197.13
3.15	Breaker tool, moiil point	----	n.	4.52	0.00	32.37	0.00	146.40
3.16	Pipeline supports including anchors	----	kg	500.00	1.38	3.22	690.00	1,610.00
3.17	Cable tray including supports and anchors	----	m	200.00	0.35	0.83	70.80	165.20
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	200.00	0.79	7.11	158.00	1,422.00
	Sub-total						64,008	205,835
	Missing items and construction contingencies	%		2.00%			1,280	4,117
	Total Direct Costs						65,288	209,952
	Overheads, risks and profit	%		52.00%			14,313	128,813
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		9,045			8.80	37.45
	AGGREGATE UNIT PRICE	m³						46.25

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC II - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	10.82	0.00	47.25	0.00	511.23	
1.02	Gang foreman	1	h	108.20	6.60	0.00	714.10	0.00	
1.03	Tunnel specialist	1	h	108.20	0.00	45.38	0.00	4,910.01	
1.04	Tunneling jumbo operator	1	h	108.20	5.82	0.00	629.71	0.00	
1.05	Loader operator	1	h	108.20	5.82	0.00	629.71	0.00	
1.06	Operator of dumper and other units	---	h	100.92	5.82	0.00	587.34	0.00	
1.07	Miner	3	h	324.59	2.99	0.00	970.53	0.00	
1.08	Explosive specialist	1	h	108.20	3.69	0.00	399.25	0.00	
1.09	Electrician	0.33	h	36.06	3.69	0.00	133.07	0.00	
1.10	Mechanic	0.33	h	36.06	3.69	0.00	133.07	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	6.13	3.69	0.00	22.63	0.00	
1.12	Pipe fitter	0.33	h	36.06	3.69	0.00	133.07	0.00	
1.13	Helper	4.0	h	432.79	2.38	0.00	1,030.04	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.19	0.00	12,651.92	0.00	2,376.57	
		---	h	30.80	1.95	50.77	60.07	1,563.90	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.56	0.00	187.16	0.00	105.47	
		---	h	4.94	0.07	1.53	0.35	7.57	
2.03	Hand-held rock drill, medium weight type	2	m.th	0.38	0.00	130.63	0.00	49.08	
		---	hr	74.17	0.04	2.03	2.97	150.57	
2.04	Hand-held breaker, medium weight type	2	m.th	0.38	0.00	46.95	0.00	17.64	
		---	h	26.37	0.03	0.91	0.79	24.00	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	108.20	0.15	24.64	16.23	2,665.99	
		s.b	h	21.64	0.00	5.46	0.00	118.15	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro-powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.19	0.00	8,943.66	0.00	1,680.00	
		---	h	16.36	1.30	33.65	21.26	550.35	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	53.60	0.63	62.22	33.77	3,334.78	
		s.b	h	10.72	0.00	28.86	0.00	309.36	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.19	0.00	440.40	0.00	82.73	
		---	h	108.20	0.12	9.00	12.98	973.78	
2.11	Halogen flood light, 1000 W	1	m.th	0.19	0.00	79.92	0.00	15.01	
		---	h	108.20	0.01	0.43	1.08	46.52	
2.12	Halogen flood light, 2000 W	1	m.th	0.19	0.00	92.77	0.00	17.43	
		---	h	108.20	0.01	0.48	1.08	51.93	
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	1.16	0.00	130.82	0.00	152.36	
		---	h	670.82	0.01	0.41	6.71	275.04	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	20.29	0.15	18.51	3.04	375.51	
		s.b	h	4.06	0.00	7.46	0.00	30.27	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04	
		s.b	h	2.95	0.00	12.36	0.00	36.45	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	35.05	0.26	24.87	9.11	871.76	
		s.b	h	7.01	0.00	15.28	0.00	107.12	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.11	0.63	48.81	1.96	151.92	
		s.b	h	0.62	0.00	20.84	0.00	12.97	
Total to carry forward ----->>>								5,558.64	22,006.53

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS II)

RC II - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						5,559	22,007
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.19	0.00	82.94	0.00	15.58
		---	h	0.94	0.01	4.39	0.01	4.12
2.19	Integral drill steel grinder	---	h	0.82	0.01	2.29	0.01	1.89
2.20	Button bits grinder	---	h	4.29	0.04	5.32	0.17	22.80
2.21	Breaker moil point resharpenner	---	h	0.27	0.01	1.57	0.00	0.43
2.22	Fan supporting steel structure	1	m.th	0.19	0.14	33.45	0.03	6.28
2.23	Ventilation flexible pipe, 800 mm dia. (L=100 m)	6.2	do	1.16	1.07	0.00	1.25	0.00
2.24	Compressed air tank, 4 m3 capacity	2	do	0.42	1.07	105.20	0.45	44.26
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	1.16	0.14	13.13	0.16	15.29
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	1.16	0.24	22.33	0.28	26.01
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.19	2.37	278.28	0.45	52.27
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	2.33	0.38	38.10	0.89	88.74
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.38	0.24	27.23	0.09	10.23
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	153.49	2.31	0.00	354.57	0.00
3.02	Explosive, gramonite type	----	kg	1,381.42	2.06	0.00	2,845.73	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	563.20	0.00	1.98	0.00	1,115.14
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.37	0.00	459.99	0.00	172.05
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.37	0.00	808.44	0.00	302.39
3.09	Jumbo drill shank adapter	----	n.	0.65	0.00	302.37	0.00	195.61
3.10	Jumbo drill bit, 48 mm dia.	----	n.	2.06	0.00	150.50	0.00	309.61
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.13	0.00	132.65	0.00	17.49
3.13	Integral drill steel, 1600 mm	----	n.	0.12	0.00	153.97	0.00	17.77
3.14	Integral drill steel, 2400 mm	----	n.	0.08	0.00	174.35	0.00	14.37
3.15	Breaker tool, moil point	----	n.	0.55	0.00	32.37	0.00	17.79
3.16	Pipeline supports including anchors	----	kg	310.00	1.38	3.22	427.80	998.20
3.17	Cable tray including supports and anchors	----	m	124.00	0.35	0.83	43.90	102.42
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	124.00	0.79	7.11	97.96	881.64
	Sub-total						9,332.38	26,537.33
	Missing items and construction contingencies	%		2.00%			186.65	530.75
	Total Direct Costs						9,519.02	27,068.08
	Overheads, risks and profit	%		52.00%			1,902.53	17,122.76
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	659.33			17.32	67.02
	AGGREGATE UNIT PRICE		m ³					84.35

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC III - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	29.34	0.00	47.25	0.00	1,386.08
1.02	Gang foreman	1	h	293.35	6.60	0.00	1,936.11	0.00
1.03	Tunnel specialist	1	h	293.35	0.00	45.38	0.00	13,312.25
1.04	Tunneling jumbo operator	1	h	293.35	5.82	0.00	1,707.30	0.00
1.05	Loader operator	1	h	293.35	5.82	0.00	1,707.30	0.00
1.06	Operator of dumper and other units	---	h	260.31	5.82	0.00	1,515.02	0.00
1.07	Miner	3	h	880.05	2.99	0.00	2,631.35	0.00
1.08	Explosive specialist	1	h	293.35	3.69	0.00	1,082.46	0.00
1.09	Electrician	0.33	h	97.77	3.69	0.00	360.79	0.00
1.10	Mechanic	0.33	h	97.77	3.69	0.00	360.79	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	13.58	3.69	0.00	50.09	0.00
1.12	Pipe fitter	0.33	h	97.77	3.69	0.00	360.79	0.00
1.13	Helper	4.0	h	1,173.40	2.38	0.00	2,792.70	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.51	0.00	12,651.92	0.00	6,443.49
		---	h	74.47	1.95	50.77	145.22	3,780.89
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.53	0.00	187.16	0.00	285.96
		---	h	11.13	0.07	1.53	0.78	17.02
2.03	Hand-held rock drill, medium weight type	2	m.th	1.02	0.00	130.63	0.00	133.06
		---	hr	16.69	0.04	2.03	0.67	33.88
2.04	Hand-held breaker, medium weight type	2	m.th	1.02	0.00	46.95	0.00	47.82
		---	h	59.34	0.03	0.91	1.78	54.00
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	293.35	0.15	24.64	44.00	7,228.16
		s.b	h	58.67	0.00	5.46	0.00	320.34
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.51	0.00	8,943.66	0.00	4,554.91
		---	h	41.52	1.30	33.65	53.98	1,397.24
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	135.09	0.63	62.22	85.11	8,405.34
		s.b	h	27.02	0.00	28.86	0.00	779.74
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.51	0.00	440.40	0.00	224.29
		---	h	293.35	0.12	9.00	35.20	2,640.15
2.11	Halogen flood light, 1000 W	1	m.th	0.51	0.00	79.92	0.00	40.70
		---	h	293.35	0.01	0.43	2.93	126.14
2.12	Halogen flood light, 2000 W	1	m.th	0.51	0.00	92.77	0.00	47.25
		---	h	293.35	0.01	0.48	2.93	140.81
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	3.16	0.00	130.82	0.00	413.08
		---	h	1,818.77	0.01	0.41	18.19	745.70
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	55.00	0.15	18.51	8.25	1,018.11
		s.b	h	11.00	0.00	7.46	0.00	82.06
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	102.32	0.26	24.87	26.60	2,544.67
		s.b	h	20.46	0.00	15.28	0.00	312.69
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	7.85	0.63	48.81	4.94	382.92
		s.b	h	1.57	0.00	20.84	0.00	32.70
Total to carry forward ----->>							14,947.68	58,158.61

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						14,947.68	58,158.61
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.51	0.00	82.94	0.00	42.24
		---	h	2.55	0.01	4.39	0.03	11.18
2.19	Integral drill steel grinder	---	h	1.85	0.01	2.29	0.02	4.25
2.20	Button bits grinder	---	h	9.46	0.04	5.32	0.38	50.32
2.21	Breaker moil point resharpenner	---	h	0.62	0.01	1.57	0.01	0.97
2.22	Steel structure for ventilation fan support	1	m.th	0.51	0.14	33.45	0.07	17.04
2.23	Ventilation flexible pipe, 800 mm dia. (L=100 m)	6.2	do	3.16	1.07	72.47	3.38	228.83
2.24	Compressed air tank, 4 m3 capacity	2	do	1.14	1.07	105.20	1.22	120.01
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	3.16	0.14	13.13	0.44	41.46
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	3.16	0.24	22.33	0.76	70.51
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.51	2.37	278.28	1.21	141.72
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	6.32	0.38	38.10	2.40	240.61
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.02	0.24	27.23	0.24	27.74
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	320.43	2.31	0.00	740.20	0.00
3.02	Explosive, gramonite type	----	kg	2883.90	2.06	0.00	5,940.84	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1447.43	0.00	1.98	0.00	2,865.92
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.82	0.00	459.99	0.00	379.35
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.82	0.00	808.44	0.00	666.72
3.09	Jumbo drill shank adapter	----	n.	1.43	0.00	302.37	0.00	431.29
3.10	Jumbo drill bit, 48 mm dia.	----	n.	4.54	0.00	150.50	0.00	682.64
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	0.30	0.00	132.65	0.00	39.36
3.13	Integral drill steel, 1600 mm	----	n.	0.26	0.00	153.97	0.00	39.97
3.14	Integral drill steel, 2400 mm	----	n.	0.19	0.00	174.35	0.00	32.33
3.15	Breaker tool, moil point	----	n.	1.24	0.00	32.37	0.00	40.02
3.16	Pipeline supports including anchors	----	kg	697.50	1.38	3.22	962.55	2,245.95
3.17	Cable tray including supports and anchors	----	m	279.00	0.35	0.83	98.77	230.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	279.00	0.79	7.11	220.41	1,983.69
	Sub-total						22,920.59	69,032.57
	Missing items and construction contingencies	%		2.00%			458.41	1,380.65
	Total Direct Costs						23,379.00	70,413.22
	Overheads, risks and profit	%		52.00%			4,877.20	43,894.76
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	1,483.49			19.05	77.05
	AGGREGATE UNIT PRICE		m³					96.10

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC IV - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	21.66	0.00	47.25	0.00	1,023.57
1.02	Gang foreman	1	h	216.63	6.60	0.00	1,429.75	0.00
1.03	Tunnel specialist	1	h	216.63	0.00	45.38	0.00	9,830.63
1.04	Tunneling jumbo operator	1	h	216.63	5.82	0.00	1,260.78	0.00
1.05	Loader operator	1	h	216.63	5.82	0.00	1,260.78	0.00
1.06	Operator of dumper and other units	---	h	189.98	5.82	0.00	1,105.67	0.00
1.07	Miner	3	h	649.89	2.99	0.00	1,943.16	0.00
1.08	Explosive specialist	1	h	216.63	3.69	0.00	799.36	0.00
1.09	Electrician	0.33	h	72.20	3.69	0.00	266.43	0.00
1.10	Mechanic	0.33	h	72.20	3.69	0.00	266.43	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	8.90	3.69	0.00	32.85	0.00
1.12	Pipe fitter	0.33	h	72.20	3.69	0.00	266.43	0.00
1.13	Helper	4.0	h	866.52	2.38	0.00	2,062.31	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.38	0.00	12,651.92	0.00	4,758.29
		---	h	52.59	1.95	50.77	102.54	2,669.85
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.13	0.00	187.16	0.00	211.17
		---	h	7.42	0.07	1.53	0.52	11.35
2.03	Hand-held rock drill, medium weight type	2	m.th	0.75	0.00	130.63	0.00	98.26
		---	hr	11.13	0.04	2.03	0.45	22.59
2.04	Hand-held breaker, medium weight type	2	m.th	0.75	0.00	46.95	0.00	35.32
		---	h	39.56	0.03	0.91	1.19	36.00
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	216.63	0.15	24.64	32.49	5,337.74
		s.b	h	43.33	0.00	5.46	0.00	236.56
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.38	0.00	8,943.66	0.00	3,363.64
		---	h	30.12	1.30	33.65	39.16	1,013.66
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	96.70	0.63	62.22	60.92	6,016.43
		s.b	h	19.34	0.00	28.86	0.00	558.13
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.38	0.00	440.40	0.00	165.63
		---	h	216.63	0.12	9.00	26.00	1,949.66
2.11	Halogen flood light, 1000 W	1	m.th	0.38	0.00	79.92	0.00	30.06
		---	h	216.63	0.01	0.43	2.17	93.15
2.12	Halogen flood light, 2000 W	1	m.th	0.38	0.00	92.77	0.00	34.89
		---	h	216.63	0.01	0.48	2.17	103.98
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	2.33	0.00	130.82	0.00	305.04
		---	h	1,343.10	0.01	0.41	13.43	550.67
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	40.62	0.15	18.51	6.09	751.84
		s.b	h	8.12	0.00	7.46	0.00	60.60
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	76.84	0.26	24.87	19.98	1,910.97
		s.b	h	15.37	0.00	15.28	0.00	234.82
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	5.62	0.63	48.81	3.54	274.09
		s.b	h	1.12	0.00	20.84	0.00	23.41
Total to carry forward ----->>							11,014.11	42,655.96

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						11,014.11	42,655.96
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.38	0.00	82.94	0.00	31.19
		---	h	1.88	0.01	4.39	0.02	8.26
2.19	Integral drill steel grinder	---	h	1.24	0.01	2.29	0.01	2.83
2.20	Button bits grinder	---	h	6.18	0.04	5.32	0.25	32.89
2.21	Breaker moil point resharpenner	---	h	0.41	0.01	1.57	0.00	0.65
2.22	Steel structure for ventilation fan support	1	m.th	0.38	0.14	33.45	0.05	12.58
2.23	Ventilation flexible pipe, 800 mm dia. (L=100 m)	6.2	do	2.33	1.07	72.47	2.49	168.98
2.24	Compressed air tank, 4 m3 capacity	2	do	0.84	1.07	105.20	0.90	88.63
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	2.33	0.14	13.13	0.33	30.62
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	2.33	0.24	22.33	0.56	52.07
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.38	2.37	278.28	0.89	104.66
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	4.66	0.38	38.10	1.77	177.68
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.75	0.24	27.23	0.18	20.48
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	201.75	2.31	0.00	466.05	0.00
3.02	Explosive, gramonite type	----	kg	1815.79	2.06	0.00	3,740.53	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1089.59	0.00	1.98	0.00	2,157.38
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.54	0.00	459.99	0.00	247.72
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.54	0.00	808.44	0.00	435.38
3.09	Jumbo drill shank adapter	----	n.	0.93	0.00	302.37	0.00	281.64
3.10	Jumbo drill bit, 48 mm dia.	----	n.	2.96	0.00	150.50	0.00	445.78
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.20	0.00	132.65	0.00	26.24
3.13	Integral drill steel, 1600 mm	----	n.	0.17	0.00	153.97	0.00	26.65
3.14	Integral drill steel, 2400 mm	----	n.	0.12	0.00	174.35	0.00	21.55
3.15	Breaker tool, moil point	----	n.	0.82	0.00	32.37	0.00	26.68
3.16	Pipeline supports including anchors	----	kg	465.00	1.38	3.22	641.70	1,497.30
3.17	Cable tray including supports and anchors	----	m	186.00	0.35	0.83	65.84	153.64
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	186.00	0.79	7.11	146.94	1,322.46
	Sub-total						16,082.63	50,202.38
	Missing items and construction contingencies	%		2.00%			321.65	1,004.05
	Total Direct Costs						16,404.28	51,206.42
	Overheads, risks and profit	%		52.00%			3,516	31,642
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	988.99			20.14	83.77
	AGGREGATE UNIT PRICE		m³					103.91

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC V - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	4.39	0.00	47.25	0.00	207.27
1.02	Gang foreman	1	h	43.87	6.60	0.00	289.52	0.00
1.03	Tunnel specialist	1	h	43.87	0.00	45.38	0.00	1,990.70
1.04	Tunneling jumbo operator	1	h	43.87	5.82	0.00	255.31	0.00
1.05	Loader operator	1	h	43.87	5.82	0.00	255.31	0.00
1.06	Operator of dumper and other units	---	h	35.86	5.82	0.00	208.72	0.00
1.07	Miner	3	h	131.60	2.99	0.00	393.49	0.00
1.08	Explosive specialist	1	h	43.87	3.69	0.00	161.87	0.00
1.09	Electrician	0.33	h	14.62	3.69	0.00	53.95	0.00
1.10	Mechanic	0.33	h	14.62	3.69	0.00	53.95	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	1.46	3.69	0.00	5.38	0.00
1.12	Pipe fitter	0.33	h	14.62	3.69	0.00	53.95	0.00
1.13	Helper	4.0	h	175.47	2.38	0.00	417.62	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.08	0.00	12,651.92	0.00	963.55
		---	h	9.48	1.95	50.77	18.49	481.50
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.23	0.00	187.16	0.00	42.76
		---	h	1.24	0.07	1.53	0.09	1.89
2.03	Hand-held rock drill, light weight type	2	m.th	0.15	0.00	130.63	0.00	19.90
		---	hr	1.85	0.04	2.03	0.07	3.76
2.04	Hand-held breaker, medium weight type	2	m.th	0.15	0.00	46.95	0.00	7.15
		---	h	6.59	0.03	0.91	0.20	6.00
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	43.87	0.15	24.64	6.58	1,080.89
		s.b	h	8.77	0.00	5.46	0.00	47.90
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	5.48	0.20	40.08	1.10	219.78
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.08	0.00	8,943.66	0.00	681.14
		---	h	5.53	1.30	33.65	7.19	186.13
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	17.23	0.63	62.22	10.86	1,072.20
		s.b	h	3.45	0.00	28.86	0.00	99.47
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.08	0.00	440.40	0.00	33.54
		---	h	43.87	0.12	9.00	5.26	394.81
2.11	Halogen flood light, 1000 W	1	m.th	0.08	0.00	79.92	0.00	6.09
		---	h	43.87	0.01	0.43	0.44	18.86
2.12	Halogen flood light, 2000 W	1	m.th	0.08	0.00	92.77	0.00	7.07
		---	h	43.87	0.01	0.48	0.44	21.06
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	0.47	0.00	130.82	0.00	61.77
		---	h	271.98	0.01	0.41	2.72	111.51
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	8.23	0.15	18.51	1.23	152.25
		s.b	h	1.65	0.00	7.46	0.00	12.27
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60
		s.b	h	1.23	0.00	12.36	0.00	15.19
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	10.12	0.26	24.87	2.63	251.77
		s.b	h	2.02	0.00	15.28	0.00	30.94
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	1.00	0.63	48.81	0.63	48.85
		s.b	h	0.20	0.00	20.84	0.00	4.17
Total to carry forward ----->>							2,208.98	8,461.72

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 15-20 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						2,208.98	8,461.72
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.08	0.00	82.94	0.00	6.32
		---	h	0.38	0.01	4.39	0.00	1.67
2.19	Integral drill steel grinder	---	h	0.21	0.01	2.29	0.00	0.47
2.20	Button bits grinder	---	h	1.01	0.04	5.32	0.04	5.37
2.21	Breaker moil point resharpenner	---	h	0.07	0.01	1.57	0.00	0.11
2.22	Steel structure for ventilation fan support	1.0	m.th	0.08	0.14	33.45	0.01	2.55
2.23	Ventilation flexible pipe, 800 mm dia. (L=100 m)	6.2	do	0.47	1.07	72.47	0.51	34.22
2.24	Compressed air tank, 4 m3 capacity	2	do	0.17	1.07	105.20	0.18	17.95
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	0.47	0.14	13.13	0.07	6.20
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	0.47	0.24	22.33	0.11	10.54
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.08	2.37	278.28	0.18	21.19
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	0.94	0.38	38.10	0.36	35.98
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.15	0.24	27.23	0.04	4.15
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	31.65	2.31	0.00	73.11	0.00
3.02	Explosive, gramonite type	----	kg	284.83	2.06	0.00	586.75	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	219.92	0.00	1.98	0.00	435.44
3.06	Blasting connection wire	----	m	153.61	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.09	0.00	459.99	0.00	40.42
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.09	0.00	808.44	0.00	71.05
3.09	Jumbo drill shank adapter	----	n.	0.15	0.00	302.37	0.00	45.96
3.10	Jumbo drill bit, 48 mm dia.	----	n.	0.48	0.00	150.50	0.00	72.74
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.03	0.00	132.65	0.00	4.37
3.13	Integral drill steel, 1600 mm	----	n.	0.03	0.00	153.97	0.00	4.44
3.14	Integral drill steel, 2400 mm	----	n.	0.02	0.00	174.35	0.00	3.59
3.15	Breaker tool, moil point	----	n.	0.14	0.00	32.37	0.00	4.45
3.16	Pipeline supports including anchors	----	kg	77.50	1.38	3.22	106.95	249.55
3.17	Cable tray including supports and anchors	----	m	31.00	0.35	0.83	10.97	25.61
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	31.00	0.79	7.11	24.49	220.41
	Sub-total						3,012.75	9,819.06
	Missing items and construction contingencies	%		2.00%			60.25	196.38
	Total Direct Costs						3,073.00	10,015.44
	Overheads, risks and profit	%		52.00%			680.60	6,125.39
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	164.83			22.77	97.92
	AGGREGATE UNIT PRICE		m³					120.70

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS II)

SEC 2-10
 ANA 002
 RC II - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	12.95	0.00	47.25	0.00	611.73	
1.02	Gang foreman	1	h	129.47	6.60	0.00	854.47	0.00	
1.03	Tunnel specialist	1	h	129.47	0.00	45.38	0.00	5,875.16	
1.04	Tunneling jumbo operator	1	h	129.47	5.82	0.00	753.49	0.00	
1.05	Loader operator	1	h	129.47	5.82	0.00	753.49	0.00	
1.06	Operator of dumper and other units	---	h	134.15	5.82	0.00	780.75	0.00	
1.07	Miner	3	h	388.40	2.99	0.00	1,161.31	0.00	
1.08	Explosive specialist	1	h	129.47	3.69	0.00	477.73	0.00	
1.09	Electrician	0.33	h	43.15	3.69	0.00	159.23	0.00	
1.10	Mechanic	0.33	h	43.15	3.69	0.00	159.23	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	7.86	3.69	0.00	28.99	0.00	
1.12	Pipe fitter	0.33	h	43.15	3.69	0.00	159.23	0.00	
1.13	Helper	4.0	h	517.86	2.38	0.00	1,232.51	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.22	0.00	12,651.92	0.00	2,843.73	
		---	h	36.59	1.95	50.77	71.35	1,857.58	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.67	0.00	187.16	0.00	126.20	
		---	h	7.51	0.07	1.53	0.53	11.48	
2.03	Hand-held rock drill, medium weight type	2	m.th	0.45	0.00	130.63	0.00	58.72	
		---	hr	112.58	0.04	2.03	4.50	228.53	
2.04	Hand-held breaker, medium weight type	2	m.th	0.45	0.00	46.95	0.00	21.11	
		---	h	40.03	0.03	0.91	1.20	36.43	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	129.47	0.15	24.64	19.42	3,190.04	
		s.b	h	25.89	0.00	5.46	0.00	141.38	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro-powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.22	0.00	8,943.66	0.00	2,010.24	
		---	h	22.59	1.30	33.65	29.37	760.22	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	78.38	0.63	62.22	49.38	4,876.85	
		s.b	h	15.68	0.00	28.86	0.00	452.41	
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.22	0.00	440.40	0.00	98.99	
		---	h	129.47	0.12	9.00	15.54	1,165.19	
2.11	Halogen flood light, 1000 W	1	m.th	0.22	0.00	79.92	0.00	17.96	
		---	h	129.47	0.01	0.43	1.29	55.67	
2.12	Halogen flood light, 2000 W	1	m.th	0.22	0.00	92.77	0.00	20.85	
		---	h	129.47	0.01	0.48	1.29	62.14	
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	1.39	0.00	130.82	0.00	182.30	
		---	h	802.69	0.01	0.41	8.03	329.10	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	24.27	0.15	18.51	3.64	449.33	
		s.b	h	4.85	0.00	7.46	0.00	36.22	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04	
		s.b	h	2.95	0.00	12.36	0.00	36.45	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	41.89	0.26	24.87	10.89	1,041.87	
		s.b	h	8.38	0.00	15.28	0.00	128.02	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	4.55	0.63	48.81	2.87	222.18	
		s.b	h	0.91	0.00	20.84	0.00	18.97	
Total to carry forward ----->>>								6,744.44	27,398.10

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS II)

SEC 2-10
 ANA 002
 RC II - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						6,744.44	27,398.10
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.22	0.00	82.94	0.00	18.64
		---	h	1.12	0.01	4.39	0.01	4.93
2.19	Integral drill steel grinder	---	h	1.25	0.01	2.29	0.01	2.86
2.20	Button bits grinder	---	h	5.30	0.04	5.32	0.21	28.17
2.21	Breaker moil point resharpen	---	h	0.42	0.01	1.57	0.00	0.65
2.22	Fan supporting steel structure	1	m.th	0.22	0.14	33.45	0.03	7.52
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	1.39	1.31	0.00	1.83	0.00
2.24	Compressed air tank, 4 m3 capacity	2	do	0.50	1.07	105.20	0.54	52.97
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	1.39	0.14	13.13	0.20	18.30
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	1.39	0.24	22.33	0.33	31.12
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.22	2.37	278.28	0.53	62.55
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	2.79	0.38	38.10	1.06	106.19
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.45	0.24	27.23	0.11	12.24
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	186.37	2.31	0.00	430.52	0.00
3.02	Explosive, gramonite type	----	kg	1,677.33	2.06	0.00	3,455.31	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	707.34	0.00	1.98	0.00	1,400.52
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.47	0.00	459.99	0.00	214.25
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.47	0.00	808.44	0.00	376.54
3.09	Jumbo drill shank adapter	----	n.	0.81	0.00	302.37	0.00	243.58
3.10	Jumbo drill bit, 48 mm dia.	----	n.	2.56	0.00	150.50	0.00	385.54
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.20	0.00	132.65	0.00	26.55
3.13	Integral drill steel, 1600 mm	----	n.	0.18	0.00	153.97	0.00	26.96
3.14	Integral drill steel, 2400 mm	----	n.	0.13	0.00	174.35	0.00	21.81
3.15	Breaker tool, moil point	----	n.	0.83	0.00	32.37	0.00	26.99
3.16	Pipeline supports including anchors	----	kg	310.00	1.38	3.22	427.80	998.20
3.17	Cable tray including supports and anchors	----	m	124.00	0.35	0.83	43.90	102.42
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	124.00	0.79	7.11	97.96	881.64
	Sub-total						11,204.78	32,547.65
	Missing items and construction contingencies	%		2.00%			224.10	650.95
	Total Direct Costs						11,428.88	33,198.61
	Overheads, risks and profit	%		52.00%			2,320.63	20,885.66
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	1,000.70			13.74	54.05
	AGGREGATE UNIT PRICE		m³					67.79

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS III)

SEC 2-10
 ANA 002
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	35.03	0.00	47.25	0.00	1,655.25
1.02	Gang foreman	1	h	350.32	6.60	0.00	2,312.09	0.00
1.03	Tunnel specialist	1	h	350.32	0.00	45.38	0.00	15,897.40
1.04	Tunneling jumbo operator	1	h	350.32	5.82	0.00	2,038.85	0.00
1.05	Loader operator	1	h	350.32	5.82	0.00	2,038.85	0.00
1.06	Operator of dumper and other units	---	h	340.38	5.82	0.00	1,981.03	0.00
1.07	Miner	3	h	1,050.95	2.99	0.00	3,142.35	0.00
1.08	Explosive specialist	1	h	350.32	3.69	0.00	1,292.67	0.00
1.09	Electrician	0.33	h	116.76	3.69	0.00	430.85	0.00
1.10	Mechanic	0.33	h	116.76	3.69	0.00	430.85	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	17.38	3.69	0.00	64.14	0.00
1.12	Pipe fitter	0.33	h	116.76	3.69	0.00	430.85	0.00
1.13	Helper	4.0	h	1,401.27	2.38	0.00	3,335.02	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.61	0.00	12,651.92	0.00	7,694.77
		---	h	88.09	1.95	50.77	171.77	4,472.23
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.82	0.00	187.16	0.00	341.49
		---	h	16.89	0.07	1.53	1.18	25.84
2.03	Hand-held rock drill, medium weight type	2	m.th	1.22	0.00	130.63	0.00	158.90
		---	hr	25.33	0.04	2.03	1.01	51.42
2.04	Hand-held breaker, medium weight type	2	m.th	1.22	0.00	46.95	0.00	57.11
		---	h	90.06	0.03	0.91	2.70	81.96
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	350.32	0.15	24.64	52.55	8,631.82
		s.b	h	70.06	0.00	5.46	0.00	382.55
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.61	0.00	8,943.66	0.00	5,439.44
		---	h	56.29	1.30	33.65	73.18	1,894.32
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	193.79	0.63	62.22	122.09	12,057.70
		s.b	h	38.76	0.00	28.86	0.00	1,118.56
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.61	0.00	440.40	0.00	267.85
		---	h	350.32	0.12	9.00	42.04	3,152.86
2.11	Halogen flood light, 1000 W	1	m.th	0.61	0.00	79.92	0.00	48.61
		---	h	350.32	0.01	0.43	3.50	150.64
2.12	Halogen flood light, 2000 W	1	m.th	0.61	0.00	92.77	0.00	56.42
		---	h	350.32	0.01	0.48	3.50	168.15
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	3.77	0.00	130.82	0.00	493.29
		---	h	2,171.97	0.01	0.41	21.72	890.51
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	65.68	0.15	18.51	9.85	1,215.82
		s.b	h	13.14	0.00	7.46	0.00	98.00
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	122.42	0.26	24.87	31.83	3,044.62
		s.b	h	24.48	0.00	15.28	0.00	374.12
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	11.25	0.63	48.81	7.09	549.31
		s.b	h	2.25	0.00	20.84	0.00	46.91
Total to carry forward ----->>							18,053.95	71,745.01

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS III)

SEC 2-10
 ANA 002
 RC III - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						18,053.95	71,745.01
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.61	0.00	82.94	0.00	50.44
		---	h	3.04	0.01	4.39	0.03	13.35
2.19	Integral drill steel grinder	---	h	2.81	0.01	2.29	0.03	6.45
2.20	Button bits grinder	---	h	11.67	0.04	5.32	0.47	62.09
2.21	Breaker moil point resharpenner	---	h	0.94	0.01	1.57	0.01	1.47
2.22	Steel structure for ventilation fan support	1	m.th	0.61	0.14	33.45	0.09	20.34
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	3.77	1.31	89.04	4.94	335.75
2.24	Compressed air tank, 4 m3 capacity	2	do	1.36	1.07	105.20	1.46	143.32
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	3.77	0.14	13.13	0.53	49.51
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	3.77	0.24	22.33	0.90	84.20
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.61	2.37	278.28	1.44	169.25
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	7.54	0.38	38.10	2.87	287.33
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.22	0.24	27.23	0.29	33.12
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	389.07	2.31	0.00	898.76	0.00
3.02	Explosive, gramonite type	----	kg	3501.65	2.06	0.00	7,213.40	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1816.11	0.00	1.98	0.00	3,595.90
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.03	0.00	459.99	0.00	471.86
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.03	0.00	808.44	0.00	829.29
3.09	Jumbo drill shank adapter	----	n.	1.77	0.00	302.37	0.00	536.46
3.10	Jumbo drill bit, 48 mm dia.	----	n.	5.64	0.00	150.50	0.00	849.10
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	0.45	0.00	132.65	0.00	59.73
3.13	Integral drill steel, 1600 mm	----	n.	0.39	0.00	153.97	0.00	60.67
3.14	Integral drill steel, 2400 mm	----	n.	0.28	0.00	174.35	0.00	49.07
3.15	Breaker tool, moil point	----	n.	1.88	0.00	32.37	0.00	60.74
3.16	Pipeline supports including anchors	----	kg	697.50	1.38	3.22	962.55	2,245.95
3.17	Cable tray including supports and anchors	----	m	279.00	0.35	0.83	98.77	230.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	279.00	0.79	7.11	220.41	1,983.69
	Sub-total						27,460.88	84,213.94
	Missing items and construction contingencies	%		2.00%			549.22	1,684.28
	Total Direct Costs						28,010.10	85,898.22
	Overheads, risks and profit	%		52.00%			5,923.23	53,309.09
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	2,251.58			15.07	61.83
	AGGREGATE UNIT PRICE		m ³					76.90

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS IV)

SEC 2-10
 ANA 002
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	25.79	0.00	47.25	0.00	1,218.50
1.02	Gang foreman	1	h	257.88	6.60	0.00	1,702.04	0.00
1.03	Tunnel specialist	1	h	257.88	0.00	45.38	0.00	11,702.80
1.04	Tunneling jumbo operator	1	h	257.88	5.82	0.00	1,500.89	0.00
1.05	Loader operator	1	h	257.88	5.82	0.00	1,500.89	0.00
1.06	Operator of dumper and other units	---	h	245.53	5.82	0.00	1,428.97	0.00
1.07	Miner	3	h	773.65	2.99	0.00	2,313.22	0.00
1.08	Explosive specialist	1	h	257.88	3.69	0.00	951.59	0.00
1.09	Electrician	0.33	h	85.95	3.69	0.00	317.17	0.00
1.10	Mechanic	0.33	h	85.95	3.69	0.00	317.17	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	11.39	3.69	0.00	42.04	0.00
1.12	Pipe fitter	0.33	h	85.95	3.69	0.00	317.17	0.00
1.13	Helper	4.0	h	1,031.54	2.38	0.00	2,455.06	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.45	0.00	12,651.92	0.00	5,664.47
		---	h	61.92	1.95	50.77	120.74	3,143.57
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.34	0.00	187.16	0.00	251.38
		---	h	11.26	0.07	1.53	0.79	17.22
2.03	Hand-held rock drill, medium weight type	2	m.th	0.90	0.00	130.63	0.00	116.97
		---	hr	16.89	0.04	2.03	0.68	34.28
2.04	Hand-held breaker, medium weight type	2	m.th	0.90	0.00	46.95	0.00	42.04
		---	h	60.04	0.03	0.91	1.80	54.64
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	257.88	0.15	24.64	38.68	6,354.27
		s.b	h	51.58	0.00	5.46	0.00	281.61
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.45	0.00	8,943.66	0.00	4,004.22
		---	h	40.29	1.30	33.65	52.38	1,355.92
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	137.11	0.63	62.22	86.38	8,531.23
		s.b	h	27.42	0.00	28.86	0.00	791.42
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.45	0.00	440.40	0.00	197.17
		---	h	257.88	0.12	9.00	30.95	2,320.96
2.11	Halogen flood light, 1000 W	1	m.th	0.45	0.00	79.92	0.00	35.78
		---	h	257.88	0.01	0.43	2.58	110.89
2.12	Halogen flood light, 2000 W	1	m.th	0.45	0.00	92.77	0.00	41.53
		---	h	257.88	0.01	0.48	2.58	123.78
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	2.78	0.00	130.82	0.00	363.14
		---	h	1,598.88	0.01	0.41	15.99	655.54
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	48.35	0.15	18.51	7.25	895.02
		s.b	h	9.67	0.00	7.46	0.00	72.14
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	91.84	0.26	24.87	23.88	2,284.04
		s.b	h	18.37	0.00	15.28	0.00	280.66
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	7.96	0.63	48.81	5.02	388.66
		s.b	h	1.59	0.00	20.84	0.00	33.19
Total to carry forward ----->>							13,245.42	52,311.05

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS IV)

SEC 2-10
 ANA 002
 RC IV - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						13,245.42	52,311.05	
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.45	0.00	82.94	0.00	37.13	
		---	h	2.24	0.01	4.39	0.02	9.83	
2.19	Integral drill steel grinder	---	h	1.88	0.01	2.29	0.02	4.30	
2.20	Button bits grinder	---	h	7.62	0.04	5.32	0.30	40.53	
2.21	Breaker moil point resharpenner	---	h	0.63	0.01	1.57	0.01	0.98	
2.22	Steel structure for ventilation fan support	1	m.th	0.45	0.14	33.45	0.06	14.98	
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	2.78	1.31	89.04	3.64	247.16	
2.24	Compressed air tank, 4 m3 capacity	2	do	1.00	1.07	105.20	1.07	105.50	
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	2.78	0.14	13.13	0.39	36.45	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	2.78	0.24	22.33	0.67	61.98	
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.45	2.37	278.28	1.06	124.59	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	5.55	0.38	38.10	2.11	211.52	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00	
2.37	Control board, 10 KVA	2	do	0.90	0.24	27.23	0.21	24.38	
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00	
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00	
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00	
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00	
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	244.97	2.31	0.00	565.88	0.00	
3.02	Explosive, gramonite type	----	kg	2204.74	2.06	0.00	4,541.77	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	1365.74	0.00	1.98	0.00	2,704.17	
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77	
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.67	0.00	459.99	0.00	307.77	
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.67	0.00	808.44	0.00	540.91	
3.09	Jumbo drill shank adapter	----	n.	1.16	0.00	302.37	0.00	349.91	
3.10	Jumbo drill bit, 48 mm dia.	----	n.	3.68	0.00	150.50	0.00	553.83	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72	
3.12	Integral drill steel, 800 mm	----	n.	0.30	0.00	132.65	0.00	39.82	
3.13	Integral drill steel, 1600 mm	----	n.	0.26	0.00	153.97	0.00	40.45	
3.14	Integral drill steel, 2400 mm	----	n.	0.19	0.00	174.35	0.00	32.71	
3.15	Breaker tool, moil point	----	n.	1.25	0.00	32.37	0.00	40.49	
3.16	Pipeline supports including anchors	----	kg	465.00	1.38	3.22	641.70	1,497.30	
3.17	Cable tray including supports and anchors	----	m	186.00	0.35	0.83	65.84	153.64	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	186.00	0.79	7.11	146.94	1,322.46	
Sub-total								19,217.12	60,986.35
Missing items and construction contingencies		%		2.00%			384.34	1,219.73	
Total Direct Costs								19,601.46	62,206.08
Overheads, risks and profit		%		52.00%			4,253.99	38,285.93	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m³	1,501.05			15.89	66.95
AGGREGATE UNIT PRICE				m³			82.84		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS V)

SEC 2-10
 ANA 002
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	5.14	0.00	47.25	0.00	242.98
1.02	Gang foreman	1	h	51.42	6.60	0.00	339.40	0.00
1.03	Tunnel specialist	1	h	51.42	0.00	45.38	0.00	2,333.66
1.04	Tunneling jumbo operator	1	h	51.42	5.82	0.00	299.29	0.00
1.05	Loader operator	1	h	51.42	5.82	0.00	299.29	0.00
1.06	Operator of dumper and other units	---	h	45.50	5.82	0.00	264.84	0.00
1.07	Miner	3	h	154.27	2.99	0.00	461.28	0.00
1.08	Explosive specialist	1	h	51.42	3.69	0.00	189.76	0.00
1.09	Electrician	0.33	h	17.14	3.69	0.00	63.25	0.00
1.10	Mechanic	0.33	h	17.14	3.69	0.00	63.25	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	1.87	3.69	0.00	6.89	0.00
1.12	Pipe fitter	0.33	h	17.14	3.69	0.00	63.25	0.00
1.13	Helper	4.0	h	205.70	2.38	0.00	489.56	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.09	0.00	12,651.92	0.00	1,129.55
		---	h	11.09	1.95	50.77	21.62	562.85
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.27	0.00	187.16	0.00	50.13
		---	h	1.88	0.07	1.53	0.13	2.87
2.03	Hand-held rock drill, light weight type	2	m.th	0.18	0.00	130.63	0.00	23.33
		---	hr	2.81	0.04	2.03	0.11	5.71
2.04	Hand-held breaker, medium weight type	2	m.th	0.18	0.00	46.95	0.00	8.38
		---	h	10.01	0.03	0.91	0.30	9.11
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	51.42	0.15	24.64	7.71	1,267.11
		s.b	h	10.28	0.00	5.46	0.00	56.16
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	6.43	0.20	40.08	1.29	257.64
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.09	0.00	8,943.66	0.00	798.48
		---	h	7.28	1.30	33.65	9.46	244.94
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	24.18	0.63	62.22	15.23	1,504.32
		s.b	h	4.84	0.00	28.86	0.00	139.55
2.10	Sound-proof axial tunnel fan, 30 kW	1	m.th	0.09	0.00	440.40	0.00	39.32
		---	h	51.42	0.12	9.00	6.17	462.82
2.11	Halogen flood light, 1000 W	1	m.th	0.09	0.00	79.92	0.00	7.14
		---	h	51.42	0.01	0.43	0.51	22.11
2.12	Halogen flood light, 2000 W	1	m.th	0.09	0.00	92.77	0.00	8.28
		---	h	51.42	0.01	0.48	0.51	24.68
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	0.55	0.00	130.82	0.00	72.41
		---	h	318.83	0.01	0.41	3.19	130.72
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	9.64	0.15	18.51	1.45	178.48
		s.b	h	1.93	0.00	7.46	0.00	14.39
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60
		s.b	h	1.23	0.00	12.36	0.00	15.19
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	11.73	0.26	24.87	3.05	291.71
		s.b	h	2.35	0.00	15.28	0.00	35.85
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	1.40	0.63	48.81	0.88	68.53
		s.b	h	0.28	0.00	20.84	0.00	5.85
Total to carry forward ----->>							2,613.65	10,193.85

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 20-30 M2 (ROCK CLASS V)

SEC 2-10
 ANA 002
 RC V - T. B

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						2,613.65	10,193.85
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.09	0.00	82.94	0.00	7.40
		---	h	0.45	0.01	4.39	0.00	1.96
2.19	Integral drill steel grinder	---	h	0.31	0.01	2.29	0.00	0.72
2.20	Button bits grinder	---	h	1.24	0.04	5.32	0.05	6.61
2.21	Breaker moil point resharpenner	---	h	0.10	0.01	1.57	0.00	0.16
2.22	Steel structure for ventilation fan support	1.0	m.th	0.09	0.14	33.45	0.01	2.99
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	0.55	1.31	89.04	0.73	49.29
2.24	Compressed air tank, 4 m3 capacity	2	do	0.20	1.07	105.20	0.21	21.04
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	0.55	0.14	13.13	0.08	7.27
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	0.55	0.24	22.33	0.13	12.36
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.09	2.37	278.28	0.21	24.84
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	1.11	0.38	38.10	0.42	42.18
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.18	0.24	27.23	0.04	4.86
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	38.43	2.31	0.00	88.77	0.00
3.02	Explosive, gramonite type	----	kg	345.84	2.06	0.00	712.43	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	275.37	0.00	1.98	0.00	545.23
3.06	Blasting connection wire	----	m	153.61	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.11	0.00	459.99	0.00	50.16
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.11	0.00	808.44	0.00	88.16
3.09	Jumbo drill shank adapter	----	n.	0.19	0.00	302.37	0.00	57.03
3.10	Jumbo drill bit, 48 mm dia.	----	n.	0.60	0.00	150.50	0.00	90.27
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.05	0.00	132.65	0.00	6.64
3.13	Integral drill steel, 1600 mm	----	n.	0.04	0.00	153.97	0.00	6.74
3.14	Integral drill steel, 2400 mm	----	n.	0.03	0.00	174.35	0.00	5.45
3.15	Breaker tool, moil point	----	n.	0.21	0.00	32.37	0.00	6.75
3.16	Pipeline supports including anchors	----	kg	77.50	1.38	3.22	106.95	249.55
3.17	Cable tray including supports and anchors	----	m	31.00	0.35	0.83	10.97	25.61
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	31.00	0.79	7.11	24.49	220.41
	Sub-total						3,559.16	11,760.12
	Missing items and construction contingencies	%		2.00%			71.18	235.20
	Total Direct Costs						3,630.34	11,995.32
	Overheads, risks and profit	%		52.00%			812.53	7,312.81
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	250.18			17.76	77.18
	AGGREGATE UNIT PRICE		m³					94.94

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC II - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	15.10	0.00	47.25	0.00	713.42
1.02	Gang foreman	1	h	150.99	6.60	0.00	996.52	0.00
1.03	Tunnel specialist	1	h	150.99	0.00	45.38	0.00	6,851.86
1.04	Tunneling jumbo operator	1	h	150.99	5.82	0.00	878.75	0.00
1.05	Loader operator	1	h	150.99	5.82	0.00	878.75	0.00
1.06	Operator of dumper and other units	---	h	171.88	5.82	0.00	1,000.35	0.00
1.07	Miner	3	h	452.97	2.99	0.00	1,354.37	0.00
1.08	Explosive specialist	1	h	150.99	3.69	0.00	557.15	0.00
1.09	Electrician	0.33	h	50.32	3.69	0.00	185.70	0.00
1.10	Mechanic	0.33	h	50.32	3.69	0.00	185.70	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	9.56	3.69	0.00	35.28	0.00
1.12	Pipe fitter	0.33	h	50.32	3.69	0.00	185.70	0.00
1.13	Helper	4.0	h	603.95	2.38	0.00	1,437.41	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.26	0.00	12,651.92	0.00	3,316.48
		---	h	41.87	1.95	50.77	81.64	2,125.55
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.79	0.00	187.16	0.00	147.18
		---	h	10.51	0.07	1.53	0.74	16.07
2.03	Hand-held rock drill, medium weight type	2	m.th	0.52	0.00	130.63	0.00	68.48
		---	hr	157.58	0.04	2.03	6.30	319.88
2.04	Hand-held breaker, medium weight type	2	m.th	0.52	0.00	46.95	0.00	24.61
		---	h	56.03	0.03	0.91	1.68	50.99
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	150.99	0.15	24.64	22.65	3,720.36
		s.b	h	30.20	0.00	5.46	0.00	164.88
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro-powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.26	0.00	8,943.66	0.00	2,344.43
		---	h	29.79	1.30	33.65	38.73	1,002.45
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	106.99	0.63	62.22	67.40	6,656.65
		s.b	h	21.40	0.00	28.86	0.00	617.52
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.26	0.00	747.05	0.00	195.83
		---	h	150.99	0.29	22.25	43.79	3,359.49
2.11	Halogen flood light, 1000 W	1	m.th	0.26	0.00	79.92	0.00	20.95
		---	h	150.99	0.01	0.43	1.51	64.93
2.12	Halogen flood light, 2000 W	1	m.th	0.26	0.00	92.77	0.00	24.32
		---	h	150.99	0.01	0.48	1.51	72.47
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	1.63	0.00	130.82	0.00	212.61
		---	h	936.13	0.01	0.41	9.36	383.81
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	28.31	0.15	18.51	4.25	524.02
		s.b	h	5.66	0.00	7.46	0.00	42.24
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04
		s.b	h	2.95	0.00	12.36	0.00	36.45
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	48.46	0.26	24.87	12.60	1,205.14
		s.b	h	9.69	0.00	15.28	0.00	148.09
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	6.21	0.63	48.81	3.91	303.26
		s.b	h	1.24	0.00	20.84	0.00	25.90
Total to carry forward ----->>>							7,996.45	35,191.36

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC II - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						7,996	35,191
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.26	0.00	82.94	0.00	21.74
		---	h	1.31	0.01	4.39	0.01	5.75
2.19	Integral drill steel grinder	---	h	1.75	0.01	2.29	0.02	4.01
2.20	Button bits grinder	---	h	6.22	0.04	5.32	0.25	33.07
2.21	Breaker moil point resharpenner	---	h	0.58	0.01	1.57	0.01	0.92
2.22	Fan supporting steel structure	1	m.th	0.26	0.14	33.45	0.04	8.77
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	1.63	1.31	0.00	2.13	0.00
2.24	Compressed air tank, 4 m3 capacity	2	do	0.59	1.07	105.20	0.63	61.77
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	1.63	0.14	13.13	0.23	21.34
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	1.63	0.24	22.33	0.39	36.29
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.26	2.37	278.28	0.62	72.95
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	3.25	0.38	38.10	1.24	123.84
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.52	0.24	27.23	0.13	14.28
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	203.80	2.31	0.00	470.78	0.00
3.02	Explosive, gramonite type	----	kg	1,834.20	2.06	0.00	3,778.45	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	838.85	0.00	1.98	0.00	1,660.92
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.55	0.00	459.99	0.00	252.74
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.55	0.00	808.44	0.00	444.20
3.09	Jumbo drill shank adapter	----	n.	0.95	0.00	302.37	0.00	287.35
3.10	Jumbo drill bit, 48 mm dia.	----	n.	3.02	0.00	150.50	0.00	454.81
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.28	0.00	132.65	0.00	37.16
3.13	Integral drill steel, 1600 mm	----	n.	0.25	0.00	153.97	0.00	37.74
3.14	Integral drill steel, 2400 mm	----	n.	0.18	0.00	174.35	0.00	30.53
3.15	Breaker tool, moil point	----	n.	1.17	0.00	32.37	0.00	37.78
3.16	Pipeline supports including anchors	----	kg	310.00	1.38	3.22	427.80	998.20
3.17	Cable tray including supports and anchors	----	m	124.00	0.35	0.83	43.90	102.42
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	124.00	0.79	7.11	97.96	881.64
	Sub-total						12,821.02	40,919.98
	Missing items and construction contingencies	%		2.00%			256.42	818.40
	Total Direct Costs						13,077.44	41,738.38
	Overheads, risks and profit	%		52.00%			2,850.42	25,653.81
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	1,401			11.37	48.11
	AGGREGATE UNIT PRICE		m³					59.49

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC III - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	40.76	0.00	47.25	0.00	1,925.76
1.02	Gang foreman	1	h	407.57	6.60	0.00	2,689.95	0.00
1.03	Tunnel specialist	1	h	407.57	0.00	45.38	0.00	18,495.45
1.04	Tunneling jumbo operator	1	h	407.57	5.82	0.00	2,372.05	0.00
1.05	Loader operator	1	h	407.57	5.82	0.00	2,372.05	0.00
1.06	Operator of dumper and other units	---	h	430.42	5.82	0.00	2,505.06	0.00
1.07	Miner	3	h	1,222.70	2.99	0.00	3,655.89	0.00
1.08	Explosive specialist	1	h	407.57	3.69	0.00	1,503.93	0.00
1.09	Electrician	0.33	h	135.84	3.69	0.00	501.26	0.00
1.10	Mechanic	0.33	h	135.84	3.69	0.00	501.26	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	21.16	3.69	0.00	78.06	0.00
1.12	Pipe fitter	0.33	h	135.84	3.69	0.00	501.26	0.00
1.13	Helper	4.0	h	1,630.27	2.38	0.00	3,880.05	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.71	0.00	12,651.92	0.00	8,952.29
		---	h	100.52	1.95	50.77	196.01	5,103.24
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	2.12	0.00	187.16	0.00	397.29
		---	h	23.64	0.07	1.53	1.65	36.16
2.03	Hand-held rock drill, medium weight type	2	m.th	1.42	0.00	130.63	0.00	184.86
		---	hr	35.45	0.04	2.03	1.42	71.97
2.04	Hand-held breaker, medium weight type	2	m.th	1.42	0.00	46.95	0.00	66.44
		---	h	126.06	0.03	0.91	3.78	114.72
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	407.57	0.15	24.64	61.14	10,042.48
		s.b	h	81.51	0.00	5.46	0.00	445.06
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.71	0.00	8,943.66	0.00	6,328.39
		---	h	73.21	1.30	33.65	95.17	2,463.50
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	261.01	0.63	62.22	164.43	16,239.81
		s.b	h	52.20	0.00	28.86	0.00	1,506.53
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.71	0.00	747.05	0.00	528.60
		---	h	407.57	0.29	22.25	118.19	9,068.39
2.11	Halogen flood light, 1000 W	1	m.th	0.71	0.00	79.92	0.00	56.55
		---	h	407.57	0.01	0.43	4.08	175.25
2.12	Halogen flood light, 2000 W	1	m.th	0.71	0.00	92.77	0.00	65.64
		---	h	407.57	0.01	0.48	4.08	195.63
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	4.39	0.00	130.82	0.00	573.91
		---	h	2,526.92	0.01	0.41	25.27	1,036.04
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	76.42	0.15	18.51	11.46	1,414.52
		s.b	h	15.28	0.00	7.46	0.00	114.02
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	141.80	0.26	24.87	36.87	3,526.49
		s.b	h	28.36	0.00	15.28	0.00	433.33
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	15.16	0.63	48.81	9.55	739.84
		s.b	h	3.03	0.00	20.84	0.00	63.18
Total to carry forward ----->>							21,306.29	91,592.55

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						21,306	91,593
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.71	0.00	82.94	0.00	58.69
		---	h	3.54	0.01	4.39	0.04	15.53
2.19	Integral drill steel grinder	---	h	3.94	0.01	2.29	0.04	9.02
2.20	Button bits grinder	---	h	13.69	0.04	5.32	0.55	72.83
2.21	Breaker moil point resharpenner	---	h	1.31	0.01	1.57	0.01	2.06
2.22	Steel structure for ventilation fan support	1	m.th	0.71	0.14	33.45	0.10	23.67
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	4.39	1.31	89.04	5.75	390.62
2.24	Compressed air tank, 4 m3 capacity	2	do	1.58	1.07	105.20	1.70	166.74
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	4.39	0.14	13.13	0.61	57.60
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	4.39	0.24	22.33	1.05	97.96
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.71	2.37	278.28	1.68	196.91
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	8.77	0.38	38.10	3.33	334.29
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.42	0.24	27.23	0.34	38.54
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	425.46	2.31	0.00	982.81	0.00
3.02	Explosive, gramonite type	----	kg	3829.13	2.06	0.00	7,888.01	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2152.62	0.00	1.98	0.00	4,262.19
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.21	0.00	459.99	0.00	556.29
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.21	0.00	808.44	0.00	977.69
3.09	Jumbo drill shank adapter	----	n.	2.09	0.00	302.37	0.00	632.45
3.10	Jumbo drill bit, 48 mm dia.	----	n.	6.65	0.00	150.50	0.00	1,001.04
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	0.63	0.00	132.65	0.00	83.61
3.13	Integral drill steel, 1600 mm	----	n.	0.55	0.00	153.97	0.00	84.92
3.14	Integral drill steel, 2400 mm	----	n.	0.39	0.00	174.35	0.00	68.68
3.15	Breaker tool, moil point	----	n.	2.63	0.00	32.37	0.00	85.01
3.16	Pipeline supports including anchors	----	kg	697.50	1.38	3.22	962.55	2,245.95
3.17	Cable tray including supports and anchors	----	m	279.00	0.35	0.83	98.77	230.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	279.00	0.79	7.11	220.41	1,983.69
	Sub-total						31,474.03	105,508.37
	Missing items and construction contingencies	%		2.00%			629.48	2,110.17
	Total Direct Costs						32,103.51	107,618.54
	Overheads, risks and profit	%		52.00%			7,266	65,390
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	3,152			12.49	54.90
	AGGREGATE UNIT PRICE		m³					67.39

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC IV - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	299.93	0.00	47.25	0.00	1,414.08
1.02	Gang foreman	1	h	299.28	6.60	0.00	1,975.23	0.00
1.03	Tunnel specialist	1	h	299.28	0.00	45.38	0.00	13,581.20
1.04	Tunneling jumbo operator	1	h	299.28	5.82	0.00	1,741.79	0.00
1.05	Loader operator	1	h	299.28	5.82	0.00	1,741.79	0.00
1.06	Operator of dumper and other units	---	h	307.67	5.82	0.00	1,790.64	0.00
1.07	Miner	3	h	897.83	2.99	0.00	2,684.52	0.00
1.08	Explosive specialist	1	h	299.28	3.69	0.00	1,104.33	0.00
1.09	Electrician	0.33	h	99.75	3.69	0.00	368.07	0.00
1.10	Mechanic	0.33	h	99.75	3.69	0.00	368.07	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	13.87	3.69	0.00	51.17	0.00
1.12	Pipe fitter	0.33	h	99.75	3.69	0.00	368.07	0.00
1.13	Helper	4.0	h	1,197.11	2.38	0.00	2,849.12	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.52	0.00	12,651.92	0.00	6,573.66
		---	h	70.44	1.95	50.77	137.35	3,576.12
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.56	0.00	187.16	0.00	291.73
		---	h	15.76	0.07	1.53	1.10	24.11
2.03	Hand-held rock drill, medium weight type	2	m.th	1.04	0.00	130.63	0.00	135.75
		---	hr	23.64	0.04	2.03	0.95	47.98
2.04	Hand-held breaker, medium weight type	2	m.th	1.04	0.00	46.95	0.00	48.79
		---	h	84.04	0.03	0.91	2.52	76.48
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	299.28	0.15	24.64	44.89	7,374.19
		s.b	h	59.86	0.00	5.46	0.00	326.81
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.52	0.00	8,943.66	0.00	4,646.93
		---	h	51.89	1.30	33.65	67.45	1,745.94
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	183.17	0.63	62.22	115.40	11,396.95
		s.b	h	36.63	0.00	28.86	0.00	1,057.27
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.52	0.00	747.05	0.00	388.15
		---	h	299.28	0.29	22.25	86.79	6,658.92
2.11	Halogen flood light, 1000 W	1	m.th	0.52	0.00	79.92	0.00	41.52
		---	h	299.28	0.01	0.43	2.99	128.69
2.12	Halogen flood light, 2000 W	1	m.th	0.52	0.00	92.77	0.00	48.20
		---	h	299.28	0.01	0.48	2.99	143.65
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	3.22	0.00	130.82	0.00	421.42
		---	h	1,855.52	0.01	0.41	18.56	760.76
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	56.11	0.15	18.51	8.42	1,038.68
		s.b	h	11.22	0.00	7.46	0.00	83.72
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	106.37	0.26	24.87	27.66	2,645.44
		s.b	h	21.27	0.00	15.28	0.00	325.07
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	10.64	0.63	48.81	6.70	519.21
		s.b	h	2.13	0.00	20.84	0.00	44.34
Total to carry forward ----->>							15,576.11	66,509.76

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						15,576.11	66,509.76
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.52	0.00	82.94	0.00	43.09
		---	h	2.60	0.01	4.39	0.03	11.40
2.19	Integral drill steel grinder	---	h	2.63	0.01	2.29	0.03	6.01
2.20	Button bits grinder	---	h	8.93	0.04	5.32	0.36	47.50
2.21	Breaker moil point resharpenner	---	h	0.88	0.01	1.57	0.01	1.37
2.22	Steel structure for ventilation fan support	1	m.th	0.52	0.14	33.45	0.07	17.38
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	3.22	1.31	89.04	4.22	286.83
2.24	Compressed air tank, 4 m3 capacity	2	do	1.16	1.07	105.20	1.25	122.44
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	3.22	0.14	13.13	0.45	42.30
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	3.22	0.24	22.33	0.77	71.93
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.52	2.37	278.28	1.23	144.59
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	6.44	0.38	38.10	2.45	245.47
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.04	0.24	27.23	0.25	28.30
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	267.88	2.31	0.00	618.81	0.00
3.02	Explosive, gramonite type	----	kg	2410.93	2.06	0.00	4,966.52	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1617.90	0.00	1.98	0.00	3,203.44
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.79	0.00	459.99	0.00	362.60
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.79	0.00	808.44	0.00	637.28
3.09	Jumbo drill shank adapter	----	n.	1.36	0.00	302.37	0.00	412.25
3.10	Jumbo drill bit, 48 mm dia.	----	n.	4.34	0.00	150.50	0.00	652.50
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.42	0.00	132.65	0.00	55.74
3.13	Integral drill steel, 1600 mm	----	n.	0.37	0.00	153.97	0.00	56.61
3.14	Integral drill steel, 2400 mm	----	n.	0.26	0.00	174.35	0.00	45.79
3.15	Breaker tool, moil point	----	n.	1.75	0.00	32.37	0.00	56.68
3.16	Pipeline supports including anchors	----	kg	465.00	1.38	3.22	641.70	1,497.30
3.17	Cable tray including supports and anchors	----	m	186.00	0.35	0.83	65.84	153.64
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	186.00	0.79	7.11	146.94	1,322.46
	Sub-total						22,027.04	76,207.16
	Missing items and construction contingencies	%		2.00%			440.54	1,524.14
	Total Direct Costs						22,467.58	77,731.31
	Overheads, risks and profit	%		52.00%			5,210.34	46,893.08
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	2,101			13.17	59.32
	AGGREGATE UNIT PRICE		m³					72.49

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC V - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	5.89	0.00	47.25	0.00	278.40
1.02	Gang foreman	1	h	58.92	6.60	0.00	388.87	0.00
1.03	Tunnel specialist	1	h	58.92	0.00	45.38	0.00	2,673.79
1.04	Tunneling jumbo operator	1	h	58.92	5.82	0.00	342.91	0.00
1.05	Loader operator	1	h	58.92	5.82	0.00	342.91	0.00
1.06	Operator of dumper and other units	---	h	56.22	5.82	0.00	327.21	0.00
1.07	Miner	3	h	176.76	2.99	0.00	528.51	0.00
1.08	Explosive specialist	1	h	58.92	3.69	0.00	217.41	0.00
1.09	Electrician	0.33	h	19.64	3.69	0.00	72.46	0.00
1.10	Mechanic	0.33	h	19.64	3.69	0.00	72.46	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	2.27	3.69	0.00	8.38	0.00
1.12	Pipe fitter	0.33	h	19.64	3.69	0.00	72.46	0.00
1.13	Helper	4.0	h	235.68	2.38	0.00	560.92	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.10	0.00	12,651.92	0.00	1,294.19
		---	h	12.55	1.95	50.77	24.47	637.15
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.31	0.00	187.16	0.00	57.43
		---	h	2.63	0.07	1.53	0.18	4.02
2.03	Hand-held rock drill, light weight type	2	m.th	0.20	0.00	130.63	0.00	26.72
		---	hr	3.94	0.04	2.03	0.16	8.00
2.04	Hand-held breaker, medium weight type	2	m.th	0.20	0.00	46.95	0.00	9.61
		---	h	14.01	0.03	0.91	0.42	12.75
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	58.92	0.15	24.64	8.84	1,451.79
		s.b	h	11.78	0.00	5.46	0.00	64.34
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	7.36	0.20	40.08	1.47	295.19
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (55 Kw electric + 74 diesel Kw)	1	m.th	0.10	0.00	8,943.66	0.00	914.86
		---	h	9.26	1.30	33.65	12.04	311.66
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 20 t pay l.	Op.	h	32.06	0.63	62.22	20.20	1,994.56
		s.b	h	6.41	0.00	28.86	0.00	185.03
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.10	0.00	747.05	0.00	76.42
		---	h	58.92	0.29	22.25	17.09	1,310.97
2.11	Halogen flood light, 1000 W	1	m.th	0.10	0.00	79.92	0.00	8.18
		---	h	58.92	0.01	0.43	0.59	25.34
2.12	Halogen flood light, 2000 W	1	m.th	0.10	0.00	92.77	0.00	9.49
		---	h	58.92	0.01	0.48	0.59	28.28
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	0.63	0.00	130.82	0.00	82.97
		---	h	365.30	0.01	0.41	3.65	149.77
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	11.05	0.15	18.51	1.66	204.49
		s.b	h	2.21	0.00	7.46	0.00	16.48
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60
		s.b	h	1.23	0.00	12.36	0.00	15.19
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	13.24	0.26	24.87	3.44	329.19
		s.b	h	2.65	0.00	15.28	0.00	40.45
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	1.86	0.63	48.81	1.17	90.87
		s.b	h	0.37	0.00	20.84	0.00	7.76
Total to carry forward ----->>							3,032.46	12,794.92

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 001
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 30-40 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						3,032.46	12,794.92
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.10	0.00	82.94	0.00	8.48
		---	h	0.51	0.01	4.39	0.01	2.25
2.19	Integral drill steel grinder	---	h	0.44	0.01	2.29	0.00	1.00
2.20	Button bits grinder	---	h	1.46	0.04	5.32	0.06	7.74
2.21	Breaker moil point resharpenner	---	h	0.15	0.01	1.57	0.00	0.23
2.22	Steel structure for ventilation fan support	1.0	m.th	0.10	0.14	33.45	0.01	3.42
2.23	Ventilation flexible pipe, 1000 mm dia. (L=100 m)	6.2	do	0.63	1.31	89.04	0.83	56.47
2.24	Compressed air tank, 4 m3 capacity	2	do	0.23	1.07	105.20	0.25	24.10
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	0.63	0.14	13.13	0.09	8.33
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	0.63	0.24	22.33	0.15	14.16
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.10	2.37	278.28	0.24	28.47
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	1.27	0.38	38.10	0.48	48.33
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.20	0.24	27.23	0.05	5.57
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	42.02	2.31	0.00	97.07	0.00
3.02	Explosive, gramonite type	----	kg	378.19	2.06	0.00	779.06	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	326.02	0.00	1.98	0.00	645.52
3.06	Blasting connection wire	----	m	153.61	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.13	0.00	459.99	0.00	59.06
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.13	0.00	808.44	0.00	103.80
3.09	Jumbo drill shank adapter	----	n.	0.22	0.00	302.37	0.00	67.14
3.10	Jumbo drill bit, 48 mm dia.	----	n.	0.71	0.00	150.50	0.00	106.27
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.07	0.00	132.65	0.00	9.29
3.13	Integral drill steel, 1600 mm	----	n.	0.06	0.00	153.97	0.00	9.44
3.14	Integral drill steel, 2400 mm	----	n.	0.04	0.00	174.35	0.00	7.63
3.15	Breaker tool, moil point	----	n.	0.29	0.00	32.37	0.00	9.45
3.16	Pipeline supports including anchors	----	kg	77.50	1.38	3.22	106.95	249.55
3.17	Cable tray including supports and anchors	----	m	31.00	0.35	0.83	10.97	25.61
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	31.00	0.79	7.11	24.49	220.41
	Sub-total						4,053.18	14,549.21
	Missing items and construction contingencies	%		2.00%			81.06	290.98
	Total Direct Costs						4,134.25	14,840.20
	Overheads, risks and profit	%		52.00%			986.67	8,880.04
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m ³	350			14.62	67.74
	AGGREGATE UNIT PRICE		m ³					82.36

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC II - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	15.74	0.00	47.25	0.00	743.90
1.02	Gang foreman	1	h	157.44	6.60	0.00	1,039.10	0.00
1.03	Tunnel specialist	1	h	157.44	0.00	45.38	0.00	7,144.59
1.04	Tunneling jumbo operator	1	h	157.44	5.82	0.00	916.30	0.00
1.05	Loader operator	1	h	157.44	5.82	0.00	916.30	0.00
1.06	Operator of dumper and other units	---	h	235.93	5.82	0.00	1,373.13	0.00
1.07	Miner	3	h	472.32	2.99	0.00	1,412.23	0.00
1.08	Explosive specialist	1	h	157.44	3.69	0.00	580.95	0.00
1.09	Electrician	0.33	h	52.47	3.69	0.00	193.63	0.00
1.10	Mechanic	0.33	h	52.47	3.69	0.00	193.63	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	11.24	3.69	0.00	41.48	0.00
1.12	Pipe fitter	0.33	h	52.47	3.69	0.00	193.63	0.00
1.13	Helper	4.0	h	629.76	2.38	0.00	1,498.82	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.27	0.00	12,651.92	0.00	3,458.18
		---	h	47.04	1.95	50.77	91.72	2,388.00
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.82	0.00	187.16	0.00	153.47
		---	h	13.50	0.07	1.53	0.94	20.65
2.03	Hand-held rock drill, medium weight type	2	m.th	0.55	0.00	130.63	0.00	71.41
		---	hr	202.48	0.04	2.03	8.10	411.04
2.04	Hand-held breaker, medium weight type	2	m.th	0.55	0.00	46.95	0.00	25.67
		---	h	71.99	0.03	0.91	2.16	65.52
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	157.44	0.15	24.64	23.62	3,879.30
		s.b	h	31.49	0.00	5.46	0.00	171.92
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro-powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.27	0.00	12,874.72	0.00	3,519.07
		---	h	24.15	1.95	55.22	47.09	1,333.44
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 30 t pay l.	Op.	h	162.36	0.83	86.77	134.76	14,088.04
		s.b	h	32.47	0.00	37.32	0.00	1,211.86
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.27	0.00	636.14	0.00	173.88
		---	h	157.44	0.20	14.93	31.49	2,350.57
2.11	Halogen flood light, 1000 W	1	m.th	0.27	0.00	79.92	0.00	21.84
		---	h	157.44	0.01	0.43	1.57	67.70
2.12	Halogen flood light, 2000 W	1	m.th	0.27	0.00	92.77	0.00	25.36
		---	h	157.44	0.01	0.48	1.57	75.57
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	1.69	0.00	130.82	0.00	221.70
		---	h	976.12	0.01	0.41	9.76	400.21
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	29.52	0.15	18.51	4.43	546.41
		s.b	h	5.90	0.00	7.46	0.00	44.04
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04
		s.b	h	2.95	0.00	12.36	0.00	36.45
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	55.24	0.26	24.87	14.36	1,373.92
		s.b	h	11.05	0.00	15.28	0.00	168.83
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	7.86	0.63	48.81	4.95	383.52
		s.b	h	1.57	0.00	20.84	0.00	32.75
Total to carry forward ----->>>							8,740	45,040

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC II - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						8,740	45,040
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.27	0.00	82.94	0.00	22.67
		---	h	1.37	0.01	4.39	0.01	6.00
2.19	Integral drill steel grinder	---	h	2.25	0.01	2.29	0.02	5.15
2.20	Button bits grinder	---	h	7.12	0.04	5.32	0.28	37.87
2.21	Breaker moil point resharpen	---	h	0.75	0.01	1.57	0.01	1.18
2.22	Fan supporting steel structure	1	m.th	0.27	0.14	33.45	0.04	9.14
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	6.2	do	1.69	1.51	0.00	2.56	0.00
2.24	Compressed air tank, 4 m3 capacity	2	do	0.61	1.07	105.20	0.66	64.41
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	1.69	0.14	13.13	0.24	22.25
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	1.69	0.24	22.33	0.41	37.84
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.27	2.37	278.28	0.65	76.06
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	3.39	0.38	38.10	1.29	129.13
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.55	0.24	27.23	0.13	14.89
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	244.42	2.31	0.00	564.61	0.00
3.02	Explosive, gramonite type	----	kg	2,199.79	2.06	0.00	4,531.57	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	967.66	0.00	1.98	0.00	1,915.96
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.63	0.00	459.99	0.00	290.45
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.63	0.00	808.44	0.00	510.47
3.09	Jumbo drill shank adapter	----	n.	1.09	0.00	302.37	0.00	330.21
3.10	Jumbo drill bit, 48 mm dia.	----	n.	3.47	0.00	150.50	0.00	522.66
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.36	0.00	132.65	0.00	47.75
3.13	Integral drill steel, 1600 mm	----	n.	0.31	0.00	153.97	0.00	48.50
3.14	Integral drill steel, 2400 mm	----	n.	0.22	0.00	174.35	0.00	39.23
3.15	Breaker tool, moil point	----	n.	1.50	0.00	32.37	0.00	48.55
3.16	Pipeline supports including anchors	----	kg	310.00	1.38	3.22	427.80	998.20
3.17	Cable tray including supports and anchors	----	m	124.00	0.35	0.83	43.90	102.42
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	124.00	0.79	7.11	97.96	881.64
	Sub-total						14,412.58	51,300.89
	Missing items and construction contingencies	%		2.00%			288.25	1,026.02
	Total Direct Costs						14,700.83	52,326.91
	Overheads, risks and profit	%		52.00%			3,485.44	31,368.98
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	1,800			10.10	46.50
	AGGREGATE UNIT PRICE		m³					56.61

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC III - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	42.87	0.00	47.25	0.00	2,025.82
1.02	Gang foreman	1	h	428.75	6.60	0.00	2,829.72	0.00
1.03	Tunnel specialist	1	h	428.75	0.00	45.38	0.00	19,456.47
1.04	Tunneling jumbo operator	1	h	428.75	5.82	0.00	2,495.30	0.00
1.05	Loader operator	1	h	428.75	5.82	0.00	2,495.30	0.00
1.06	Operator of dumper and other units	---	h	391.90	5.82	0.00	2,280.85	0.00
1.07	Miner	3	h	1,286.24	2.99	0.00	3,845.85	0.00
1.08	Explosive specialist	1	h	428.75	3.69	0.00	1,582.07	0.00
1.09	Electrician	0.33	h	142.90	3.69	0.00	527.30	0.00
1.10	Mechanic	0.33	h	142.90	3.69	0.00	527.30	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	24.87	3.69	0.00	91.79	0.00
1.12	Pipe fitter	0.33	h	142.90	3.69	0.00	527.30	0.00
1.13	Helper	4.0	h	1,714.98	2.38	0.00	4,081.66	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.74	0.00	12,651.92	0.00	9,417.45
		---	h	112.68	1.95	50.77	219.73	5,720.93
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	2.23	0.00	187.16	0.00	417.94
		---	h	30.37	0.07	1.53	2.13	46.47
2.03	Hand-held rock drill, medium weight type	2	m.th	1.49	0.00	130.63	0.00	194.47
		---	hr	45.56	0.04	2.03	1.82	92.48
2.04	Hand-held breaker, medium weight type	2	m.th	1.49	0.00	46.95	0.00	69.89
		---	h	161.99	0.03	0.91	4.86	147.41
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	428.75	0.15	24.64	64.31	10,564.29
		s.b	h	85.75	0.00	5.46	0.00	468.19
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.74	0.00	12,874.72	0.00	9,583.29
		---	h	59.00	1.95	55.22	115.05	3,257.84
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 30 t pay l.	Op.	h	218.17	0.83	86.77	181.08	18,930.33
		s.b	h	43.63	0.00	37.32	0.00	1,628.40
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.74	0.00	636.14	0.00	473.51
		---	h	428.75	0.20	14.93	85.75	6,401.17
2.11	Halogen flood light, 1000 W	1	m.th	0.74	0.00	79.92	0.00	59.49
		---	h	428.75	0.01	0.43	4.29	184.36
2.12	Halogen flood light, 2000 W	1	m.th	0.74	0.00	92.77	0.00	69.05
		---	h	428.75	0.01	0.48	4.29	205.80
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	4.61	0.00	130.82	0.00	603.73
		---	h	2,658.22	0.01	0.41	26.58	1,089.87
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	80.39	0.15	18.51	12.06	1,488.01
		s.b	h	16.08	0.00	7.46	0.00	119.94
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	162.23	0.26	24.87	42.18	4,034.60
		s.b	h	32.45	0.00	15.28	0.00	495.77
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	19.00	0.63	48.81	11.97	927.61
		s.b	h	3.80	0.00	20.84	0.00	79.21
Total to carry forward ----->>							22,072.91	99,480.98

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						22,072.91	99,480.98
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.74	0.00	82.94	0.00	61.74
		---	h	3.72	0.01	4.39	0.04	16.34
2.19	Integral drill steel grinder	---	h	5.06	0.01	2.29	0.05	11.59
2.20	Button bits grinder	---	h	15.67	0.04	5.32	0.63	83.35
2.21	Breaker moil point resharpenner	---	h	1.69	0.01	1.57	0.02	2.65
2.22	Steel structure for ventilation fan support	1	m.th	0.74	0.14	33.45	0.10	24.90
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	6.2	do	4.61	1.51	102.31	6.97	472.16
2.24	Compressed air tank, 4 m3 capacity	2	do	1.67	1.07	105.20	1.78	175.40
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	4.61	0.14	13.13	0.65	60.59
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	4.61	0.24	22.33	1.11	103.05
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.74	2.37	278.28	1.76	207.14
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	9.23	0.38	38.10	3.51	351.66
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.49	0.24	27.23	0.36	40.54
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	510.26	2.31	0.00	1,178.70	0.00
3.02	Explosive, gramonite type	----	kg	4592.35	2.06	0.00	9,460.24	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2482.03	0.00	1.98	0.00	4,914.42
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.39	0.00	459.99	0.00	638.94
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.39	0.00	808.44	0.00	1,122.94
3.09	Jumbo drill shank adapter	----	n.	2.40	0.00	302.37	0.00	726.41
3.10	Jumbo drill bit, 48 mm dia.	----	n.	7.64	0.00	150.50	0.00	1,149.77
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	0.81	0.00	132.65	0.00	107.44
3.13	Integral drill steel, 1600 mm	----	n.	0.71	0.00	153.97	0.00	109.12
3.14	Integral drill steel, 2400 mm	----	n.	0.51	0.00	174.35	0.00	88.26
3.15	Breaker tool, moil point	----	n.	3.37	0.00	32.37	0.00	109.24
3.16	Pipeline supports including anchors	----	kg	697.50	1.38	3.22	962.55	2,245.95
3.17	Cable tray including supports and anchors	----	m	279.00	0.35	0.83	98.77	230.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	279.00	0.79	7.11	220.41	1,983.69
	Sub-total						34,011	114,758
	Missing items and construction contingencies	%		2.00%			680	2,295
	Total Direct Costs						34,691	117,053
	Overheads, risks and profit	%		52.00%			7,891	71,016
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	4,050			10.51	46.44
	AGGREGATE UNIT PRICE		m³					56.96

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC IV - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	31.57	0.00	47.25	0.00	1,491.55
1.02	Gang foreman	1	h	315.67	6.60	0.00	2,083.44	0.00
1.03	Tunnel specialist	1	h	315.67	0.00	45.38	0.00	14,325.24
1.04	Tunneling jumbo operator	1	h	315.67	5.82	0.00	1,837.22	0.00
1.05	Loader operator	1	h	315.67	5.82	0.00	1,837.22	0.00
1.06	Operator of dumper and other units	---	h	279.98	5.82	0.00	1,629.48	0.00
1.07	Miner	3	h	947.02	2.99	0.00	2,831.59	0.00
1.08	Explosive specialist	1	h	315.67	3.69	0.00	1,164.83	0.00
1.09	Electrician	0.33	h	105.21	3.69	0.00	388.24	0.00
1.10	Mechanic	0.33	h	105.21	3.69	0.00	388.24	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	16.30	3.69	0.00	60.16	0.00
1.12	Pipe fitter	0.33	h	105.21	3.69	0.00	388.24	0.00
1.13	Helper	4.0	h	1,262.69	2.38	0.00	3,005.21	0.00
2	Equipment							
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.55	0.00	12,651.92	0.00	6,933.80
		---	h	78.77	1.95	50.77	153.61	3,999.30
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	1.64	0.00	187.16	0.00	307.72
		---	h	20.25	0.07	1.53	1.42	30.98
2.03	Hand-held rock drill, medium weight type	2	m.th	1.10	0.00	130.63	0.00	143.18
		---	hr	30.37	0.04	2.03	1.21	61.66
2.04	Hand-held breaker, medium weight type	2	m.th	1.10	0.00	46.95	0.00	51.46
		---	h	107.99	0.03	0.91	3.24	98.27
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	315.67	0.15	24.64	47.35	7,778.18
		s.b	h	63.13	0.00	5.46	0.00	344.71
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.55	0.00	12,874.72	0.00	7,055.90
		---	h	41.72	1.95	55.22	81.35	2,303.77
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 30 t pay l.	Op.	h	152.30	0.83	86.77	126.41	13,214.66
		s.b	h	30.46	0.00	37.32	0.00	1,136.73
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.55	0.00	636.14	0.00	348.63
		---	h	315.67	0.20	14.93	63.13	4,713.00
2.11	Halogen flood light, 1000 W	1	m.th	0.55	0.00	79.92	0.00	43.80
		---	h	315.67	0.01	0.43	3.16	135.74
2.12	Halogen flood light, 2000 W	1	m.th	0.55	0.00	92.77	0.00	50.84
		---	h	315.67	0.01	0.48	3.16	151.52
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	3.40	0.00	130.82	0.00	444.51
		---	h	1,957.17	0.01	0.41	19.57	802.44
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	59.19	0.15	18.51	8.88	1,095.58
		s.b	h	11.84	0.00	7.46	0.00	88.31
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	121.90	0.26	24.87	31.69	3,031.68
		s.b	h	24.38	0.00	15.28	0.00	372.53
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	13.27	0.63	48.81	8.36	647.54
		s.b	h	2.65	0.00	20.84	0.00	55.29
Total to carry forward ----->>							16,175.93	72,202.52

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						16,175.93	72,202.52
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.55	0.00	82.94	0.00	45.45
		---	h	2.74	0.01	4.39	0.03	12.03
2.19	Integral drill steel grinder	---	h	3.37	0.01	2.29	0.03	7.73
2.20	Button bits grinder	---	h	10.21	0.04	5.32	0.41	54.33
2.21	Breaker moil point resharpenner	---	h	1.12	0.01	1.57	0.01	1.77
2.22	Steel structure for ventilation fan support	1	m.th	0.55	0.14	33.45	0.08	18.33
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	6.2	do	3.40	1.51	102.31	5.13	347.64
2.24	Compressed air tank, 4 m3 capacity	2	do	1.23	1.07	105.20	1.31	129.15
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	3.40	0.14	13.13	0.48	44.61
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	3.40	0.24	22.33	0.82	75.87
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0.0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.55	2.37	278.28	1.30	152.51
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	6.80	0.38	38.10	2.58	258.92
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	1.10	0.24	27.23	0.26	29.85
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	321.28	2.31	0.00	742.15	0.00
3.02	Explosive, gramonite type	----	kg	2891.48	2.06	0.00	5,956.45	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1864.59	0.00	1.98	0.00	3,691.89
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.90	0.00	459.99	0.00	416.25
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.90	0.00	808.44	0.00	731.56
3.09	Jumbo drill shank adapter	----	n.	1.57	0.00	302.37	0.00	473.23
3.10	Jumbo drill bit, 48 mm dia.	----	n.	4.98	0.00	150.50	0.00	749.03
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.54	0.00	132.65	0.00	71.63
3.13	Integral drill steel, 1600 mm	----	n.	0.47	0.00	153.97	0.00	72.75
3.14	Integral drill steel, 2400 mm	----	n.	0.34	0.00	174.35	0.00	58.84
3.15	Breaker tool, moil point	----	n.	2.25	0.00	32.37	0.00	72.83
3.16	Pipeline supports including anchors	----	kg	465.00	1.38	3.22	641.70	1,497.30
3.17	Cable tray including supports and anchors	----	m	186.00	0.35	0.83	65.84	153.64
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	186.00	0.79	7.11	146.94	1,322.46
	Sub-total						23,741.45	82,864.60
	Missing items and construction contingencies	%		2.00%			474.83	1,657.29
	Total Direct Costs						24,216.28	84,521.89
	Overheads, risks and profit	%		52.00%			5,654	50,889
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	2,700			11.06	50.16
	AGGREGATE UNIT PRICE		m³					61.22

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC V - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	6.30	0.00	47.25	0.00	297.67	
1.02	Gang foreman	1	h	63.00	6.60	0.00	415.80	0.00	
1.03	Tunnel specialist	1	h	63.00	0.00	45.38	0.00	2,858.91	
1.04	Tunneling jumbo operator	1	h	63.00	5.82	0.00	366.66	0.00	
1.05	Loader operator	1	h	63.00	5.82	0.00	366.66	0.00	
1.06	Operator of dumper and other units	---	h	51.47	5.82	0.00	299.54	0.00	
1.07	Miner	3	h	189.00	2.99	0.00	565.10	0.00	
1.08	Explosive specialist	1	h	63.00	3.69	0.00	232.47	0.00	
1.09	Electrician	0.33	h	21.00	3.69	0.00	77.48	0.00	
1.10	Mechanic	0.33	h	21.00	3.69	0.00	77.48	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	2.67	3.69	0.00	9.86	0.00	
1.12	Pipe fitter	0.33	h	21.00	3.69	0.00	77.48	0.00	
1.13	Helper	4.0	h	252.00	2.38	0.00	599.75	0.00	
2	Equipment								
2.01	One-boom hydraulic tunneling jumbo	1	m.th	0.11	0.00	12,651.92	0.00	1,383.79	
		---	h	13.98	1.95	50.77	27.26	709.80	
2.02	Hand-held rock drill, feed pusher leg type	3	m.th	0.33	0.00	187.16	0.00	61.41	
		---	h	3.37	0.07	1.53	0.24	5.16	
2.03	Hand-held rock drill, light weight type	2	m.th	0.22	0.00	130.63	0.00	28.58	
		---	hr	5.06	0.04	2.03	0.20	10.28	
2.04	Hand-held breaker, medium weight type	2	m.th	0.22	0.00	46.95	0.00	10.27	
		---	h	18.00	0.03	0.91	0.54	16.38	
2.05	Diesel powered a. compressor, 10.0 m3/min.	Op.	h	63.00	0.15	24.64	9.45	1,552.31	
		s.b	h	12.60	0.00	5.46	0.00	68.80	
2.06	Diesel powered a. compressor, 15.0 m3/min	Op.	h	7.87	0.20	40.08	1.57	315.63	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.11	0.00	12,874.72	0.00	1,408.16	
		---	h	7.45	1.95	55.22	14.53	411.48	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 30 t pay l.	Op.	h	26.52	0.83	86.77	22.01	2,301.25	
		s.b	h	5.30	0.00	37.32	0.00	197.95	
2.10	Sound-proof axial tunnel fan, 50 kW	1	m.th	0.11	0.00	636.14	0.00	69.58	
		---	h	63.00	0.20	14.93	12.60	940.58	
2.11	Halogen flood light, 1000 W	1	m.th	0.11	0.00	79.92	0.00	8.74	
		---	h	63.00	0.01	0.43	0.63	27.09	
2.12	Halogen flood light, 2000 W	1	m.th	0.11	0.00	92.77	0.00	10.15	
		---	h	63.00	0.01	0.48	0.63	30.24	
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	0.68	0.00	130.82	0.00	88.71	
		---	h	390.60	0.01	0.41	3.91	160.14	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	11.81	0.15	18.51	1.77	218.65	
		s.b	h	2.36	0.00	7.46	0.00	17.62	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60	
		s.b	h	1.23	0.00	12.36	0.00	15.19	
2.16	Extendable lifter with 1000 kg capacity p. 12 m r.	Op.	h	14.66	0.26	24.87	3.81	364.58	
		s.b	h	2.93	0.00	15.28	0.00	44.80	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	2.31	0.63	48.81	1.46	112.76	
		s.b	h	0.46	0.00	20.84	0.00	9.63	
Total to carry forward ----->>								3,190.86	13,935.89

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 004
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 40-50 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						3,190.86	13,935.89
2.18	Stand-by motorgenerator, 25 KVA (for lighting only)	1	m.th	0.11	0.00	82.94	0.00	9.07
		---	h	0.55	0.01	4.39	0.01	2.40
2.19	Integral drill steel grinder	---	h	0.56	0.01	2.29	0.01	1.29
2.20	Button bits grinder	---	h	1.66	0.04	5.32	0.07	8.85
2.21	Breaker moil point resharpenner	---	h	0.19	0.01	1.57	0.00	0.29
2.22	Steel structure for ventilation fan support	1.0	m.th	0.11	0.14	33.45	0.02	3.66
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	6.2	do	0.68	1.51	102.31	1.02	69.38
2.24	Compressed air tank, 4 m3 capacity	2	do	0.24	1.07	105.20	0.26	25.77
2.25	Compressed air tank, 6 m3 capacity	0	do	0.00	1.36	134.52	0.00	0.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	0.68	0.14	13.13	0.09	8.90
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 100 mm (L=100 m)	6.2	do	0.68	0.24	22.33	0.16	15.14
2.30	Compressed air pipeline, Ø 125 mm (L=100 m)	0	do	0.00	0.37	34.41	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.11	2.37	278.28	0.26	30.44
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	12.4	do	1.36	0.38	38.10	0.52	51.67
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	0.0	do	0.00	0.55	55.77	0.00	0.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	2	do	0.22	0.24	27.23	0.05	5.96
2.38	Control board, 50 KVA	1	do	0.00	0.34	37.60	0.00	0.00
2.39	Control board, 100 KVA	2	do	0.00	0.53	58.60	0.00	0.00
2.40	Transformer cabin, 100 kVA	2	do	0.00	4.61	566.03	0.00	0.00
2.41	Transformer cabin, 150 kVA	0	do	0.00	4.68	574.61	0.00	0.00
2.42	Transformer cabin, 200 kVA	0	do	0.00	4.98	611.06	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	50.40	2.31	0.00	116.42	0.00
3.02	Explosive, gramonite type	----	kg	453.57	2.06	0.00	934.34	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	375.54	0.00	1.98	0.00	743.57
3.06	Blasting connection wire	----	m	153.61	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.15	0.00	459.99	0.00	67.76
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.15	0.00	808.44	0.00	119.08
3.09	Jumbo drill shank adapter	----	n.	0.25	0.00	302.37	0.00	77.03
3.10	Jumbo drill bit, 48 mm dia.	----	n.	0.81	0.00	150.50	0.00	121.93
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.09	0.00	132.65	0.00	11.94
3.13	Integral drill steel, 1600 mm	----	n.	0.08	0.00	153.97	0.00	12.12
3.14	Integral drill steel, 2400 mm	----	n.	0.06	0.00	174.35	0.00	9.81
3.15	Breaker tool, moil point	----	n.	0.37	0.00	32.37	0.00	12.14
3.16	Pipeline supports including anchors	----	kg	77.50	1.38	3.22	106.95	249.55
3.17	Cable tray including supports and anchors	----	m	31.00	0.35	0.83	10.97	25.61
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	31.00	0.79	7.11	24.49	220.41
	Sub-total						4,386.50	15,872.24
	Missing items and construction contingencies	%		2.00%			87.73	317.44
	Total Direct Costs						4,474.23	16,189.69
	Overheads, risks and profit	%		52.00%			1,074.52	9,670.71
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	450			12.33	57.47
	AGGREGATE UNIT PRICE		m³					69.80

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC II - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	14.88	0.00	47.25	0.00	702.93
1.02	Gang foreman	1	h	148.77	6.60	0.00	981.87	0.00
1.03	Tunnel specialist	1	h	148.77	0.00	45.38	0.00	6,751.12
1.04	Tunneling jumbo operator	1	h	148.77	5.82	0.00	865.83	0.00
1.05	Loader operator	---	h	0.31	5.82	0.00	1.80	0.00
1.06	Operator of dumpers and other units	---	h	155.56	5.82	0.00	905.39	0.00
1.07	Miner	4	h	595.07	2.99	0.00	1,779.27	0.00
1.08	Explosive specialist	1	h	148.77	3.69	0.00	548.96	0.00
1.09	Electrician	0.33	h	49.54	3.69	0.00	182.80	0.00
1.10	Mechanic	0.33	h	49.54	3.69	0.00	182.80	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	12.51	3.69	0.00	46.15	0.00
1.12	Pipe fitter	0.33	h	49.54	3.69	0.00	182.80	0.00
1.13	Helper	5	h	743.84	2.38	0.00	1,770.35	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.26	0.00	19,479.66	0.00	5,031.19
		---	h	32.59	3.17	94.80	103.30	3,089.16
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.03	0.00	187.16	0.00	193.36
		---	h	16.50	0.07	1.53	1.16	25.25
2.03	Hand-held rock drill, medium weight type	3	m.th	0.77	0.00	130.63	0.00	101.22
		---	h	247.56	0.04	2.03	9.90	502.54
2.04	Hand-held breaker, medium weight type	4	m.th	1.03	0.00	46.95	0.00	48.50
		---	h	52.81	0.03	0.91	1.58	48.06
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	148.77	0.15	24.64	22.32	3,665.66
		s.b	h	29.75	0.00	5.46	0.00	162.46
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.26	0.00	12,874.72	0.00	3,325.27
		---	h	28.59	1.95	55.22	55.75	1,578.60
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	89.29	1.12	114.78	100.00	10,248.17
		s.b	h	17.86	0.00	50.07	0.00	894.10
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.26	0.00	747.05	0.00	192.95
		---	h	148.77	0.29	22.25	43.14	3,310.10
2.11	Halogen flood light, 1000 W	2	m.th	0.52	0.00	79.92	0.00	41.28
		---	h	297.54	0.01	0.43	2.98	127.94
2.12	Halogen flood light, 2000 W	1	m.th	0.26	0.00	92.77	0.00	23.96
		---	h	148.77	0.01	0.48	1.49	71.41
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	1.34	0.00	130.82	0.00	175.70
		---	h	773.60	0.01	0.41	7.74	317.17
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	27.89	0.15	18.51	4.18	516.32
		s.b	h	5.58	0.00	7.46	0.00	41.62
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04
		s.b	h	2.95	0.00	12.36	0.00	36.45
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	55.66	0.26	24.87	14.47	1,384.31
		s.b	h	11.13	0.00	15.28	0.00	170.10
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	9.50	0.63	48.81	5.98	463.53
		s.b	h	1.90	0.00	20.84	0.00	39.58
Total to carry forward ----->>							7,826.73	43,711.05

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC II - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						7,826.73	43,711.05
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.26	0.00	82.94	0.00	21.42
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.26	0.31	73.58	0.08	19.00
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	1.34	1.51	102.31	2.03	137.41
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.53	1.36	134.52	0.72	70.88
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	1.34	0.14	13.13	0.19	17.63
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	1.34	0.37	34.41	0.50	46.21
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.26	2.37	278.28	0.61	71.87
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	1.34	0.55	55.77	0.74	74.90
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	283.89	2.31	0.00	655.78	0.00
3.02	Explosive, gramonite type	----	kg	2,554.97	2.06	0.00	5,263.24	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,046.68	0.00	1.98	0.00	2,072.42
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.68	0.00	459.99	0.00	313.58
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.68	0.00	808.44	0.00	551.12
3.09	Jumbo drill shank adapter	----	n.	1.18	0.00	302.37	0.00	356.51
3.10	Jumbo drill bit, 51 mm dia.	----	n.	3.75	0.00	164.35	0.00	616.21
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.44	0.00	132.65	0.00	58.38
3.13	Integral drill steel, 1600 mm	----	n.	0.39	0.00	153.97	0.00	59.29
3.14	Integral drill steel, 2400 mm	----	n.	0.28	0.00	174.35	0.00	47.96
3.15	Breaker tool, moiil point	----	n.	1.10	0.00	32.37	0.00	35.61
3.16	Pipeline supports including anchors	----	kg	260.00	1.38	3.22	358.80	837.20
3.17	Cable tray including supports and anchors	----	m	104.00	0.35	0.83	36.82	85.90
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	104.00	0.79	7.11	82.16	739.44
	Sub-total						14,228	50,042
	Missing items and construction contingencies	%		2.00%			284.57	1,000.85
	Total Direct Costs						14,512.95	51,043.27
	Overheads, risks and profit	%		52.00%			3,408.92	30,680.31
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	2,200			8.14	37.14
	AGGREGATE UNIT PRICE		m³					45.28

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC III - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	42.71	0.00	47.25	0.00	2,017.85	
1.02	Gang foreman	1	h	427.06	6.60	0.00	2,818.58	0.00	
1.03	Tunnel specialist	1	h	427.06	0.00	45.38	0.00	19,379.86	
1.04	Tunneling jumbo operator	1	h	427.06	5.82	0.00	2,485.47	0.00	
1.05	Loader operator	---	h	0.89	5.82	0.00	5.18	0.00	
1.06	Operator of dumpers and other units	---	h	352.39	5.82	0.00	2,050.92	0.00	
1.07	Miner	4	h	1,708.23	2.99	0.00	5,107.60	0.00	
1.08	Explosive specialist	1	h	427.06	3.69	0.00	1,575.84	0.00	
1.09	Electrician	0.33	h	142.21	3.69	0.00	524.76	0.00	
1.10	Mechanic	0.33	h	142.21	3.69	0.00	524.76	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	27.68	3.69	0.00	102.16	0.00	
1.12	Pipe fitter	0.33	h	142.21	3.69	0.00	524.76	0.00	
1.13	Helper	5	h	2,135.29	2.38	0.00	5,081.98	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.74	0.00	19,479.66	0.00	14,442.59	
		---	h	78.81	3.17	94.80	249.82	7,471.09	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.97	0.00	187.16	0.00	555.06	
		---	h	37.13	0.07	1.53	2.60	56.81	
2.03	Hand-held rock drill, medium weight type	3	m.th	2.22	0.00	130.63	0.00	290.55	
		---	h	55.70	0.04	2.03	2.23	113.07	
2.04	Hand-held breaker, medium weight type	4	m.th	2.97	0.00	46.95	0.00	139.24	
		---	h	118.83	0.03	0.91	3.56	108.13	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	427.06	0.15	24.64	64.06	10,522.69	
		s.b	h	85.41	0.00	5.46	0.00	466.35	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.74	0.00	12,874.72	0.00	9,545.56	
		---	h	69.35	1.95	55.22	135.23	3,829.31	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	178.75	1.12	114.78	200.20	20,516.58	
		s.b	h	35.75	0.00	50.07	0.00	1,789.97	
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.74	0.00	747.05	0.00	553.88	
		---	h	427.06	0.29	22.25	123.85	9,502.02	
2.11	Halogen flood light, 1000 W	2	m.th	1.48	0.00	79.92	0.00	118.51	
		---	h	854.11	0.01	0.43	8.54	367.27	
2.12	Halogen flood light, 2000 W	1	m.th	0.74	0.00	92.77	0.00	68.78	
		---	h	427.06	0.01	0.48	4.27	204.99	
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	3.86	0.00	130.82	0.00	504.36	
		---	h	2,220.70	0.01	0.41	22.21	910.49	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	80.07	0.15	18.51	12.01	1,482.16	
		s.b	h	16.01	0.00	7.46	0.00	119.47	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48	
		s.b	h	7.74	0.00	12.36	0.00	95.69	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	179.10	0.26	24.87	46.57	4,454.16	
		s.b	h	35.82	0.00	15.28	0.00	547.32	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	22.83	0.63	48.81	14.38	1,114.12	
		s.b	h	4.57	0.00	20.84	0.00	95.14	
Total to carry forward ----->>								21,703.90	112,514.55

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						21,703.90	112,514.55
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.74	0.00	82.94	0.00	61.49
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.74	0.31	73.58	0.23	54.55
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	3.86	1.51	102.31	5.82	394.44
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.51	1.36	134.52	2.06	203.46
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	3.86	0.14	13.13	0.54	50.62
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	3.86	0.37	34.41	1.43	132.66
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.74	2.37	278.28	1.76	206.32
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	3.86	0.55	55.77	2.12	215.01
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	592.65	2.31	0.00	1,369.02	0.00
3.02	Explosive, gramonite type	----	kg	5333.83	2.06	0.00	10,987.68	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2684.62	0.00	1.98	0.00	5,315.55
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.50	0.00	459.99	0.00	689.77
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.50	0.00	808.44	0.00	1,212.28
3.09	Jumbo drill shank adapter	----	n.	2.59	0.00	302.37	0.00	784.20
3.10	Jumbo drill bit, 51 mm dia.	----	n.	8.25	0.00	164.35	0.00	1,355.46
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	0.99	0.00	132.65	0.00	131.35
3.13	Integral drill steel, 1600 mm	----	n.	0.87	0.00	153.97	0.00	133.41
3.14	Integral drill steel, 2400 mm	----	n.	0.62	0.00	174.35	0.00	107.90
3.15	Breaker tool, moiil point	----	n.	2.48	0.00	32.37	0.00	80.13
3.16	Pipeline supports including anchors	----	kg	585.00	1.38	3.22	807.30	1,883.70
3.17	Cable tray including supports and anchors	----	m	234.00	0.35	0.83	82.84	193.28
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	234.00	0.79	7.11	184.86	1,663.74
	Sub-total						35,149.55	127,623.29
	Missing items and construction contingencies	%		2.00%			702.99	2,552.47
	Total Direct Costs						35,852.54	130,175.75
	Overheads, risks and profit	%		52.00%			8,633.47	77,701.24
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	4,951			8.99	41.99
	AGGREGATE UNIT PRICE		m³					50.97

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC IV - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	31.69	0.00	47.25	0.00	1,497.54
1.02	Gang foreman	1	h	316.94	6.60	0.00	2,091.81	0.00
1.03	Tunnel specialist	1	h	316.94	0.00	45.38	0.00	14,382.76
1.04	Tunneling jumbo operator	1	h	316.94	5.82	0.00	1,844.59	0.00
1.05	Loader operator	---	h	0.66	5.82	0.00	3.84	0.00
1.06	Operator of dumpers and other units	---	h	252.30	5.82	0.00	1,468.41	0.00
1.07	Miner	4	h	1,267.76	2.99	0.00	3,790.61	0.00
1.08	Explosive specialist	1	h	316.94	3.69	0.00	1,169.51	0.00
1.09	Electrician	0.33	h	105.54	3.69	0.00	389.45	0.00
1.10	Mechanic	0.33	h	105.54	3.69	0.00	389.45	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	18.15	3.69	0.00	66.99	0.00
1.12	Pipe fitter	0.33	h	105.54	3.69	0.00	389.45	0.00
1.13	Helper	5	h	1,584.70	2.38	0.00	3,771.59	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.55	0.00	19,479.66	0.00	10,718.56
		---	h	55.68	3.17	94.80	176.52	5,278.75
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.20	0.00	187.16	0.00	411.93
		---	h	24.76	0.07	1.53	1.73	37.88
2.03	Hand-held rock drill, medium weight type	3	m.th	1.65	0.00	130.63	0.00	215.64
		---	h	37.13	0.04	2.03	1.49	75.38
2.04	Hand-held breaker, medium weight type	4	m.th	2.20	0.00	46.95	0.00	103.34
		---	h	79.22	0.03	0.91	2.38	72.09
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	316.94	0.15	24.64	47.54	7,809.41
		s.b	h	63.39	0.00	5.46	0.00	346.10
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.55	0.00	12,874.72	0.00	7,084.23
		---	h	48.78	1.95	55.22	95.11	2,693.44
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	124.29	1.12	114.78	139.21	14,266.31
		s.b	h	24.86	0.00	50.07	0.00	1,244.67
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.55	0.00	747.05	0.00	411.06
		---	h	316.94	0.29	22.25	91.91	7,051.92
2.11	Halogen flood light, 1000 W	2	m.th	1.10	0.00	79.92	0.00	87.95
		---	h	633.88	0.01	0.43	6.34	272.57
2.12	Halogen flood light, 2000 W	1	m.th	0.55	0.00	92.77	0.00	51.05
		---	h	316.94	0.01	0.48	3.17	152.13
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	2.86	0.00	130.82	0.00	374.31
		---	h	1,648.09	0.01	0.41	16.48	675.72
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	59.43	0.15	18.51	8.91	1,099.98
		s.b	h	11.89	0.00	7.46	0.00	88.66
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	134.48	0.26	24.87	34.96	3,344.43
		s.b	h	26.90	0.00	15.28	0.00	410.96
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	15.87	0.63	48.81	10.00	774.71
		s.b	h	3.17	0.00	20.84	0.00	66.15
Total to carry forward ----->>							16,020.97	82,043.61

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						16,020.97	82,043.61
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.55	0.00	82.94	0.00	45.64
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.55	0.31	73.58	0.17	40.49
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	2.86	1.51	102.31	4.32	292.74
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.12	1.36	134.52	1.53	151.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	2.86	0.14	13.13	0.40	37.57
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	2.86	0.37	34.41	1.06	98.46
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.55	2.37	278.28	1.30	153.12
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	2.86	0.55	55.77	1.57	159.57
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	373.15	2.31	0.00	861.97	0.00
3.02	Explosive, gramonite type	----	kg	3358.34	2.06	0.00	6,918.17	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2016.70	0.00	1.98	0.00	3,993.08
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.98	0.00	459.99	0.00	449.32
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.98	0.00	808.44	0.00	789.69
3.09	Jumbo drill shank adapter	----	n.	1.69	0.00	302.37	0.00	510.84
3.10	Jumbo drill bit, 51 mm dia.	----	n.	5.37	0.00	164.35	0.00	882.96
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.66	0.00	132.65	0.00	87.57
3.13	Integral drill steel, 1600 mm	----	n.	0.58	0.00	153.97	0.00	88.94
3.14	Integral drill steel, 2400 mm	----	n.	0.41	0.00	174.35	0.00	71.94
3.15	Breaker tool, moiil point	----	n.	1.65	0.00	32.37	0.00	53.42
3.16	Pipeline supports including anchors	----	kg	390.00	1.38	3.22	538.20	1,255.80
3.17	Cable tray including supports and anchors	----	m	156.00	0.35	0.83	55.22	128.86
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	156.00	0.79	7.11	123.24	1,109.16
Sub-total							24,528.14	92,616.26
Missing items and construction contingencies		%		2.00%			490.56	1,852.33
Total Direct Costs							25,018.70	94,468.59
Overheads, risks and profit		%		52.00%			6,213.34	55,920.05
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	3,301			9.46	45.56
AGGREGATE UNIT PRICE			m³					55.02

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC V - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	6.51	0.00	47.25	0.00	307.78
1.02	Gang foreman	1	h	65.14	6.60	0.00	429.91	0.00
1.03	Tunnel specialist	1	h	65.14	0.00	45.38	0.00	2,955.98
1.04	Tunneling jumbo operator	1	h	65.14	5.82	0.00	379.10	0.00
1.05	Loader operator	---	h	0.14	5.82	0.00	0.79	0.00
1.06	Operator of dumpers and other units	---	h	46.95	5.82	0.00	273.22	0.00
1.07	Miner	4	h	260.55	2.99	0.00	779.05	0.00
1.08	Explosive specialist	1	h	65.14	3.69	0.00	240.36	0.00
1.09	Electrician	0.33	h	21.69	3.69	0.00	80.04	0.00
1.10	Mechanic	0.33	h	21.69	3.69	0.00	80.04	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	2.98	3.69	0.00	10.98	0.00
1.12	Pipe fitter	0.33	h	21.69	3.69	0.00	80.04	0.00
1.13	Helper	5	h	325.69	2.38	0.00	775.15	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.11	0.00	19,479.66	0.00	2,202.90
		---	h	10.06	3.17	94.80	31.90	953.99
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	0.45	0.00	187.16	0.00	84.66
		---	h	4.13	0.07	1.53	0.29	6.31
2.03	Hand-held rock drill, light weight type	3	m.th	0.34	0.00	130.63	0.00	44.32
		---	h	6.19	0.04	2.03	0.25	12.56
2.04	Hand-held breaker, medium weight type	4	m.th	0.45	0.00	46.95	0.00	21.24
		---	h	13.20	0.03	0.91	0.40	12.01
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	65.14	0.15	24.64	9.77	1,605.01
		s.b	h	13.03	0.00	5.46	0.00	71.13
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.11	0.00	12,874.72	0.00	1,455.97
		---	h	8.65	1.95	55.22	16.87	477.84
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	21.57	1.12	114.78	24.15	2,475.36
		s.b	h	4.31	0.00	50.07	0.00	215.96
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.11	0.00	747.05	0.00	84.48
		---	h	65.14	0.29	22.25	18.89	1,449.33
2.11	Halogen flood light, 1000 W	2	m.th	0.23	0.00	79.92	0.00	18.08
		---	h	130.28	0.01	0.43	1.30	56.02
2.12	Halogen flood light, 2000 W	1	m.th	0.11	0.00	92.77	0.00	10.49
		---	h	65.14	0.01	0.48	0.65	31.27
2.13	Ligthning line along tunnel, 100 m section	5.2	m.th	0.59	0.00	130.82	0.00	76.93
		---	h	338.72	0.01	0.41	3.39	138.87
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	12.21	0.15	18.51	1.83	226.07
		s.b	h	2.44	0.00	7.46	0.00	18.22
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60
		s.b	h	1.23	0.00	12.36	0.00	15.19
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	15.61	0.26	24.87	4.06	388.32
		s.b	h	3.12	0.00	15.28	0.00	47.72
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	2.75	0.63	48.81	1.73	134.42
		s.b	h	0.55	0.00	20.84	0.00	11.48
Total to carry forward ----->>							3,246.15	15,789.51

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 005
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 50-60 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						3,246.15	15,789.51
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.11	0.00	82.94	0.00	9.38
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.11	0.31	73.58	0.04	8.32
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	0.59	1.51	102.31	0.89	60.16
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.23	1.36	134.52	0.31	31.03
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	0.59	0.14	13.13	0.08	7.72
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	0.59	0.37	34.41	0.22	20.23
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.11	2.37	278.28	0.27	31.47
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	0.59	0.55	55.77	0.32	32.80
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	59	2.31	0.00	135.21	0.00
3.02	Explosive, gramonite type	----	kg	527	2.06	0.00	1,085.20	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	406	0.00	1.98	0.00	804.20
3.06	Blasting connection wire	----	m	154	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.16	0.00	459.99	0.00	73.13
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.16	0.00	808.44	0.00	128.53
3.09	Jumbo drill shank adapter	----	n.	0.27	0.00	302.37	0.00	83.15
3.10	Jumbo drill bit, 51 mm dia.	----	n.	0.87	0.00	164.35	0.00	143.71
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.11	0.00	132.65	0.00	14.59
3.13	Integral drill steel, 1600 mm	----	n.	0.10	0.00	153.97	0.00	14.82
3.14	Integral drill steel, 2400 mm	----	n.	0.07	0.00	174.35	0.00	11.99
3.15	Breaker tool, moiil point	----	n.	0.28	0.00	32.37	0.00	8.90
3.16	Pipeline supports including anchors	----	kg	65.00	1.38	3.22	89.70	209.30
3.17	Cable tray including supports and anchors	----	m	26.00	0.35	0.83	9.20	21.48
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	26.00	0.79	7.11	20.54	184.86
	Sub-total						4,588	17,722
	Missing items and construction contingencies	%		2.00%			92	354
	Total Direct Costs						4,680	18,076
	Overheads, risks and profit	%		52.00%			1,183	10,650
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		550			10.66	52.22
	AGGREGATE UNIT PRICE	m³						62.88

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS II)

SEC 2-10
 ANA 006
 RC II - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	16.09	0.00	47.25	0.00	760.20
1.02	Gang foreman	1	h	160.89	6.60	0.00	1,061.87	0.00
1.03	Tunnel specialist	1	h	160.89	0.00	45.38	0.00	7,301.16
1.04	Tunneling jumbo operator	1	h	160.89	5.82	0.00	936.38	0.00
1.05	Loader operator	---	h	0.34	5.82	0.00	1.95	0.00
1.06	Operator of dumpers and other units	---	h	176.65	5.82	0.00	1,028.09	0.00
1.07	Miner	4	h	643.56	2.99	0.00	1,924.24	0.00
1.08	Explosive specialist	1	h	160.89	3.69	0.00	593.68	0.00
1.09	Electrician	0.33	h	53.58	3.69	0.00	197.70	0.00
1.10	Mechanic	0.33	h	53.58	3.69	0.00	197.70	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	13.85	3.69	0.00	51.12	0.00
1.12	Pipe fitter	0.33	h	53.58	3.69	0.00	197.70	0.00
1.13	Helper	5	h	804.45	2.38	0.00	1,914.58	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.28	0.00	19,479.66	0.00	5,441.10
		---	h	34.57	3.17	94.80	109.58	3,277.04
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.12	0.00	187.16	0.00	209.11
		---	h	19.50	0.07	1.53	1.36	29.83
2.03	Hand-held rock drill, medium weight type	3	m.th	0.84	0.00	130.63	0.00	109.46
		---	h	292.45	0.04	2.03	11.70	593.68
2.04	Hand-held breaker, medium weight type	4	m.th	1.12	0.00	46.95	0.00	52.46
		---	h	62.39	0.03	0.91	1.87	56.77
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	160.89	0.15	24.64	24.13	3,964.32
		s.b	h	32.18	0.00	5.46	0.00	175.69
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.28	0.00	12,874.72	0.00	3,596.19
		---	h	32.99	1.95	55.22	64.32	1,821.48
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	104.55	1.12	114.78	117.10	12,000.76
		s.b	h	20.91	0.00	50.07	0.00	1,047.01
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.28	0.00	747.05	0.00	208.67
		---	h	160.89	0.29	22.25	46.66	3,579.79
2.11	Halogen flood light, 1000 W	2	m.th	0.56	0.00	79.92	0.00	44.65
		---	h	321.78	0.01	0.43	3.22	138.36
2.12	Halogen flood light, 2000 W	1	m.th	0.28	0.00	92.77	0.00	25.91
		---	h	160.89	0.01	0.48	1.61	77.23
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	1.45	0.00	130.82	0.00	190.01
		---	h	836.62	0.01	0.41	8.37	343.02
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	30.17	0.15	18.51	4.53	558.39
		s.b	h	6.03	0.00	7.46	0.00	45.01
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04
		s.b	h	2.95	0.00	12.36	0.00	36.45
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	60.06	0.26	24.87	15.62	1,493.77
		s.b	h	12.01	0.00	15.28	0.00	183.55
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	11.12	0.63	48.81	7.01	542.80
		s.b	h	2.22	0.00	20.84	0.00	46.35
Total to carry forward ----->>							8,526.78	48,381.27

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 006
RC II - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						8,526.8	48,381.3
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.28	0.00	82.94	0.00	23.17
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.28	0.31	73.58	0.09	20.55
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	1.45	1.51	102.31	2.19	148.60
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.57	1.36	134.52	0.77	76.65
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	1.45	0.14	13.13	0.20	19.07
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	1.45	0.37	34.41	0.54	49.98
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.28	2.37	278.28	0.66	77.73
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	1.45	0.55	55.77	0.80	81.00
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	327.81	2.31	0.00	757.23	0.00
3.02	Explosive, gramonite type	----	kg	2,950.26	2.06	0.00	6,077.53	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,135.79	0.00	1.98	0.00	2,248.86
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.74	0.00	459.99	0.00	339.66
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.74	0.00	808.44	0.00	596.96
3.09	Jumbo drill shank adapter	----	n.	1.28	0.00	302.37	0.00	386.17
3.10	Jumbo drill bit, 51 mm dia.	----	n.	4.06	0.00	164.35	0.00	667.47
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.52	0.00	132.65	0.00	68.97
3.13	Integral drill steel, 1600 mm	----	n.	0.45	0.00	153.97	0.00	70.04
3.14	Integral drill steel, 2400 mm	----	n.	0.32	0.00	174.35	0.00	56.65
3.15	Breaker tool, moiil point	----	n.	1.30	0.00	32.37	0.00	42.07
3.16	Pipeline supports including anchors	----	kg	260.00	1.38	3.22	358.80	837.20
3.17	Cable tray including supports and anchors	----	m	104.00	0.35	0.83	36.82	85.90
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	104.00	0.79	7.11	82.16	739.44
	Sub-total						15,844.58	55,115.85
	Missing items and construction contingencies	%		2.00%			316.89	1,102.32
	Total Direct Costs						16,161.47	56,218.16
	Overheads, risks and profit	%		52.00%			3,763.74	33,873.67
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		2,599.58			7.66	34.66
	AGGREGATE UNIT PRICE		m³					42.32

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 006
RC III - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	46.20	0.00	47.25	0.00	2,182.78
1.02	Gang foreman	1	h	461.96	6.60	0.00	3,048.96	0.00
1.03	Tunnel specialist	1	h	461.96	0.00	45.38	0.00	20,963.94
1.04	Tunneling jumbo operator	1	h	461.96	5.82	0.00	2,688.63	0.00
1.05	Loader operator	---	h	0.96	5.82	0.00	5.60	0.00
1.06	Operator of dumpers and other units	---	h	396.26	5.82	0.00	2,306.21	0.00
1.07	Miner	4	h	1,847.86	2.99	0.00	5,525.09	0.00
1.08	Explosive specialist	1	h	461.96	3.69	0.00	1,704.65	0.00
1.09	Electrician	0.33	h	153.83	3.69	0.00	567.65	0.00
1.10	Mechanic	0.33	h	153.83	3.69	0.00	567.65	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	30.67	3.69	0.00	113.19	0.00
1.12	Pipe fitter	0.33	h	153.83	3.69	0.00	567.65	0.00
1.13	Helper	5	h	2,309.82	2.38	0.00	5,497.37	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.80	0.00	19,479.66	0.00	15,623.10
		---	h	83.48	3.17	94.80	264.63	7,913.72
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.21	0.00	187.16	0.00	600.43
		---	h	43.87	0.07	1.53	3.07	67.12
2.03	Hand-held rock drill, medium weight type	3	m.th	2.41	0.00	130.63	0.00	314.30
		---	h	65.80	0.04	2.03	2.63	133.58
2.04	Hand-held breaker, medium weight type	4	m.th	3.21	0.00	46.95	0.00	150.62
		---	h	140.38	0.03	0.91	4.21	127.74
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	461.96	0.15	24.64	69.29	11,382.80
		s.b	h	92.39	0.00	5.46	0.00	504.46
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.80	0.00	12,874.72	0.00	10,325.80
		---	h	79.57	1.95	55.22	155.16	4,393.80
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	208.30	1.12	114.78	233.30	23,909.23
		s.b	h	41.66	0.00	50.07	0.00	2,085.96
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.80	0.00	747.05	0.00	599.15
		---	h	461.96	0.29	22.25	133.97	10,278.70
2.11	Halogen flood light, 1000 W	2	m.th	1.60	0.00	79.92	0.00	128.20
		---	h	923.93	0.01	0.43	9.24	397.29
2.12	Halogen flood light, 2000 W	1	m.th	0.80	0.00	92.77	0.00	74.40
		---	h	461.96	0.01	0.48	4.62	221.74
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	4.17	0.00	130.82	0.00	545.59
		---	h	2,402.21	0.01	0.41	24.02	984.91
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	86.62	0.15	18.51	12.99	1,603.30
		s.b	h	17.32	0.00	7.46	0.00	129.23
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	193.90	0.26	24.87	50.42	4,822.41
		s.b	h	38.78	0.00	15.28	0.00	592.57
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	26.60	0.63	48.81	16.76	1,298.36
		s.b	h	5.32	0.00	20.84	0.00	110.87
Total to carry forward ----->>							23,589.35	123,693.28

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 006
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						23,589.35	123,693.28
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.80	0.00	82.94	0.00	66.52
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.80	0.31	73.58	0.25	59.01
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	4.17	1.51	102.31	6.30	426.68
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.64	1.36	134.52	2.23	220.09
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	4.17	0.14	13.13	0.58	54.76
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	4.17	0.37	34.41	1.54	143.51
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.80	2.37	278.28	1.90	223.19
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	4.17	0.55	55.77	2.29	232.59
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	684.34	2.31	0.00	1,580.82	0.00
3.02	Explosive, gramonite type	----	kg	6159.04	2.06	0.00	12,687.63	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2912.74	0.00	1.98	0.00	5,767.22
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.62	0.00	459.99	0.00	747.00
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.62	0.00	808.44	0.00	1,312.87
3.09	Jumbo drill shank adapter	----	n.	2.81	0.00	302.37	0.00	849.28
3.10	Jumbo drill bit, 51 mm dia.	----	n.	8.93	0.00	164.35	0.00	1,467.93
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	1.17	0.00	132.65	0.00	155.18
3.13	Integral drill steel, 1600 mm	----	n.	1.02	0.00	153.97	0.00	157.60
3.14	Integral drill steel, 2400 mm	----	n.	0.73	0.00	174.35	0.00	127.47
3.15	Breaker tool, moiil point	----	n.	2.92	0.00	32.37	0.00	94.67
3.16	Pipeline supports including anchors	----	kg	585.00	1.38	3.22	807.30	1,883.70
3.17	Cable tray including supports and anchors	----	m	234.00	0.35	0.83	82.84	193.28
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	234.00	0.79	7.11	184.86	1,663.74
	Sub-total						38,947.89	139,778.97
	Missing items and construction contingencies	%		2.00%			778.96	2,795.58
	Total Direct Costs						39,726.85	142,574.55
	Overheads, risks and profit	%		52.00%			9,479.67	85,317.05
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	5,849.04			8.41	38.96
	AGGREGATE UNIT PRICE		m³					47.37

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS IV)

SEC 2-10
 ANA 006
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	34.25	0.00	47.25	0.00	1,618.30
1.02	Gang foreman	1	h	342.50	6.60	0.00	2,260.48	0.00
1.03	Tunnel specialist	1	h	342.50	0.00	45.38	0.00	15,542.53
1.04	Tunneling jumbo operator	1	h	342.50	5.82	0.00	1,993.33	0.00
1.05	Loader operator	---	h	0.71	5.82	0.00	4.15	0.00
1.06	Operator of dumpers and other units	---	h	282.53	5.82	0.00	1,644.33	0.00
1.07	Miner	4	h	1,369.99	2.99	0.00	4,096.27	0.00
1.08	Explosive specialist	1	h	342.50	3.69	0.00	1,263.82	0.00
1.09	Electrician	0.33	h	114.05	3.69	0.00	420.85	0.00
1.10	Mechanic	0.33	h	114.05	3.69	0.00	420.85	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	20.12	3.69	0.00	74.24	0.00
1.12	Pipe fitter	0.33	h	114.05	3.69	0.00	420.85	0.00
1.13	Helper	5	h	1,712.49	2.38	0.00	4,075.72	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.59	0.00	19,479.66	0.00	11,582.87
		---	h	58.89	3.17	94.80	186.67	5,582.30
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.38	0.00	187.16	0.00	445.15
		---	h	29.25	0.07	1.53	2.05	44.75
2.03	Hand-held rock drill, medium weight type	3	m.th	1.78	0.00	130.63	0.00	233.02
		---	h	43.87	0.04	2.03	1.75	89.05
2.04	Hand-held breaker, medium weight type	4	m.th	2.38	0.00	46.95	0.00	111.67
		---	h	93.58	0.03	0.91	2.81	85.16
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	342.50	0.15	24.64	51.37	8,439.13
		s.b	h	68.50	0.00	5.46	0.00	374.01
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.59	0.00	12,874.72	0.00	7,655.48
		---	h	55.73	1.95	55.22	108.68	3,077.63
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	144.41	1.12	114.78	161.74	16,575.37
		s.b	h	28.88	0.00	50.07	0.00	1,446.12
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.59	0.00	747.05	0.00	444.21
		---	h	342.50	0.29	22.25	99.32	7,620.57
2.11	Halogen flood light, 1000 W	2	m.th	1.19	0.00	79.92	0.00	95.04
		---	h	684.99	0.01	0.43	6.85	294.55
2.12	Halogen flood light, 2000 W	1	m.th	0.59	0.00	92.77	0.00	55.16
		---	h	342.50	0.01	0.48	3.42	164.40
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	3.09	0.00	130.82	0.00	404.49
		---	h	1,780.99	0.01	0.41	17.81	730.20
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	64.22	0.15	18.51	9.63	1,188.68
		s.b	h	12.84	0.00	7.46	0.00	95.81
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	145.62	0.26	24.87	37.86	3,621.59
		s.b	h	29.12	0.00	15.28	0.00	445.02
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	18.44	0.63	48.81	11.62	900.10
		s.b	h	3.69	0.00	20.84	0.00	76.86
Total to carry forward ----->>							17,386.01	89,983.22

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 006
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						17,386.01	89,983.22
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.59	0.00	82.94	0.00	49.32
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.59	0.31	73.58	0.18	43.75
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	3.09	1.51	102.31	4.67	316.34
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.21	1.36	134.52	1.65	163.17
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	3.09	0.14	13.13	0.43	40.60
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	3.09	0.37	34.41	1.14	106.40
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.59	2.37	278.28	1.41	165.47
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	3.09	0.55	55.77	1.70	172.44
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	430.88	2.31	0.00	995.33	0.00
3.02	Explosive, gramonite type	----	kg	3877.92	2.06	0.00	7,988.51	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2187.71	0.00	1.98	0.00	4,331.67
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.06	0.00	459.99	0.00	486.51
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.06	0.00	808.44	0.00	855.05
3.09	Jumbo drill shank adapter	----	n.	1.83	0.00	302.37	0.00	553.12
3.10	Jumbo drill bit, 51 mm dia.	----	n.	5.82	0.00	164.35	0.00	956.04
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.78	0.00	132.65	0.00	103.45
3.13	Integral drill steel, 1600 mm	----	n.	0.68	0.00	153.97	0.00	105.07
3.14	Integral drill steel, 2400 mm	----	n.	0.49	0.00	174.35	0.00	84.98
3.15	Breaker tool, moiil point	----	n.	1.95	0.00	32.37	0.00	63.11
3.16	Pipeline supports including anchors	----	kg	390.00	1.38	3.22	538.20	1,255.80
3.17	Cable tray including supports and anchors	----	m	156.00	0.35	0.83	55.22	128.86
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	156.00	0.79	7.11	123.24	1,109.16
	Sub-total						27,097.70	101,246.01
	Missing items and construction contingencies	%		2.00%			541.95	2,024.92
	Total Direct Costs						27,639.66	103,270.93
	Overheads, risks and profit	%		52.00%			6,807.35	61,266.16
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	3,899.36			8.83	42.20
	AGGREGATE UNIT PRICE		m³					51.03

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS V)

SEC 2-10
 ANA 006
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	7.01	0.00	47.25	0.00	331.08
1.02	Gang foreman	1	h	70.07	6.60	0.00	462.46	0.00
1.03	Tunnel specialist	1	h	70.07	0.00	45.38	0.00	3,179.78
1.04	Tunneling jumbo operator	1	h	70.07	5.82	0.00	407.81	0.00
1.05	Loader operator	---	h	0.15	5.82	0.00	0.85	0.00
1.06	Operator of dumpers and other units	---	h	52.21	5.82	0.00	303.83	0.00
1.07	Miner	4	h	280.28	2.99	0.00	838.04	0.00
1.08	Explosive specialist	1	h	70.07	3.69	0.00	258.56	0.00
1.09	Electrician	0.33	h	23.33	3.69	0.00	86.10	0.00
1.10	Mechanic	0.33	h	23.33	3.69	0.00	86.10	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	3.30	3.69	0.00	12.17	0.00
1.12	Pipe fitter	0.33	h	23.33	3.69	0.00	86.10	0.00
1.13	Helper	5	h	350.35	2.38	0.00	833.83	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.12	0.00	19,479.66	0.00	2,369.69
		---	h	10.61	3.17	94.80	33.64	1,006.16
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	0.49	0.00	187.16	0.00	91.07
		---	h	4.87	0.07	1.53	0.34	7.46
2.03	Hand-held rock drill, light weight type	3	m.th	0.36	0.00	130.63	0.00	47.67
		---	h	7.31	0.04	2.03	0.29	14.84
2.04	Hand-held breaker, medium weight type	4	m.th	0.49	0.00	46.95	0.00	22.85
		---	h	15.60	0.03	0.91	0.47	14.19
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	70.07	0.15	24.64	10.51	1,726.53
		s.b	h	14.01	0.00	5.46	0.00	76.52
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Electro powered tunnel loader with steel belt (110 Kw electric + 165 diesel Kw)	1	m.th	0.12	0.00	12,874.72	0.00	1,566.20
		---	h	9.84	1.95	55.22	19.18	543.15
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	24.99	1.12	114.78	27.98	2,867.89
		s.b	h	5.00	0.00	50.07	0.00	250.21
2.10	Sound-proof axial tunnel fan, 75 kW	1	m.th	0.12	0.00	747.05	0.00	90.88
		---	h	70.07	0.29	22.25	20.32	1,559.06
2.11	Halogen flood light, 1000 W	2	m.th	0.24	0.00	79.92	0.00	19.44
		---	h	140.14	0.01	0.43	1.40	60.26
2.12	Halogen flood light, 2000 W	1	m.th	0.12	0.00	92.77	0.00	11.29
		---	h	70.07	0.01	0.48	0.70	33.63
2.13	Ligthing line along tunnel, 100 m section	5.2	m.th	0.63	0.00	130.82	0.00	82.75
		---	h	364.36	0.01	0.41	3.64	149.39
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	13.14	0.15	18.51	1.97	243.19
		s.b	h	2.63	0.00	7.46	0.00	19.60
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60
		s.b	h	1.23	0.00	12.36	0.00	15.19
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	16.68	0.26	24.87	4.34	414.73
		s.b	h	3.34	0.00	15.28	0.00	50.96
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.19	0.63	48.81	2.01	155.74
		s.b	h	0.64	0.00	20.84	0.00	13.30
Total to carry forward ----->>							3,504.63	17,214.32

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 006
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 60-70 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
	Equipment (Cont.d)						3,504.63	17,214.32	
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.12	0.00	82.94	0.00	10.09	
		---	h	0.00	0.01	4.39	0.00	0.00	
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00	
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00	
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00	
2.22	Steel structure for ventilation fan support	1	m.th	0.12	0.31	73.58	0.04	8.95	
2.23	Ventilation flexible pipe, 1200 mm dia. (L=100 m)	5.2	do	0.63	1.51	102.31	0.96	64.72	
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00	
2.25	Compressed air tank, 6 m3 capacity	2	do	0.25	1.36	134.52	0.34	33.38	
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00	
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	5.2	do	0.63	0.14	13.13	0.09	8.31	
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00	
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	5.2	do	0.63	0.37	34.41	0.23	21.77	
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00	
2.31	Steel water tank, 50 m3 capacity	1	do	0.12	2.37	278.28	0.29	33.85	
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00	
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00	
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	5.2	do	0.63	0.55	55.77	0.35	35.28	
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00	
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	5.2	do	0.00	0.14	13.50	0.00	0.00	
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00	
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00	
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00	
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00	
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00	
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00	
3	Materials								
3.01	Explosive, amonite type	----	kg	68	2.31	0.00	156.13	0.00	
3.02	Explosive, gramonite type	----	kg	608	2.06	0.00	1,253.10	0.00	
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00	
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00	
3.05	Electric type detonators	----	n.	441	0.00	1.98	0.00	872.24	
3.06	Blasting connection wire	----	m	154	0.00	0.13	0.00	19.97	
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.17	0.00	459.99	0.00	79.17	
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.17	0.00	808.44	0.00	139.14	
3.09	Jumbo drill shank adapter	----	n.	0.30	0.00	302.37	0.00	90.01	
3.10	Jumbo drill bit, 51 mm dia.	----	n.	0.95	0.00	164.35	0.00	155.58	
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62	
3.12	Integral drill steel, 800 mm	----	n.	0.13	0.00	132.65	0.00	17.24	
3.13	Integral drill steel, 1600 mm	----	n.	0.11	0.00	153.97	0.00	17.51	
3.14	Integral drill steel, 2400 mm	----	n.	0.08	0.00	174.35	0.00	14.16	
3.15	Breaker tool, moi point	----	n.	0.32	0.00	32.37	0.00	10.52	
3.16	Pipeline supports including anchors	----	kg	65.00	1.38	3.22	89.70	209.30	
3.17	Cable tray including supports and anchors	----	m	26.00	0.35	0.83	9.20	21.48	
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	26.00	0.79	7.11	20.54	184.86	
Sub-total								5,035.59	19,274.46
Missing items and construction contingencies		%		2.00%	----->>		100.71	385.49	
Total Direct Costs								5,136.30	19,659.95
Overheads, risks and profit		%		52.00%	----->>		1,289.41	11,604.65	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY			m³	649.89	----->>		9.89	48.11	
AGGREGATE UNIT PRICE			m³	----->>				57.99	

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 007
RC II - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	17.90	0.00	47.25	0.00	845.97
1.02	Gang foreman	1	h	179.04	6.60	0.00	1,181.67	0.00
1.03	Tunnel specialist	1	h	179.04	0.00	45.38	0.00	8,124.85
1.04	Tunneling jumbo operator	1	h	179.04	5.82	0.00	1,042.01	0.00
1.05	Loader operator	---	h	52.68	5.82	0.00	306.62	0.00
1.06	Operator of dumpers and other units	---	h	198.90	5.82	0.00	1,157.62	0.00
1.07	Miner	4	h	716.16	2.99	0.00	2,141.32	0.00
1.08	Explosive specialist	1	h	179.04	3.69	0.00	660.66	0.00
1.09	Electrician	0.33	h	59.62	3.69	0.00	220.00	0.00
1.10	Mechanic	0.33	h	59.62	3.69	0.00	220.00	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	15.09	3.69	0.00	55.68	0.00
1.12	Pipe fitter	0.33	h	59.62	3.69	0.00	220.00	0.00
1.13	Helper	5	h	895.20	2.38	0.00	2,130.58	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.31	0.00	19,479.66	0.00	6,054.94
		---	h	36.25	3.17	94.80	114.92	3,436.84
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.24	0.00	187.16	0.00	232.70
		---	h	22.49	0.07	1.53	1.57	34.41
2.03	Hand-held rock drill, medium weight type	3	m.th	0.93	0.00	130.63	0.00	121.81
		---	h	337.38	0.04	2.03	13.50	684.88
2.04	Hand-held breaker, medium weight type	4	m.th	1.24	0.00	46.95	0.00	58.37
		---	h	71.97	0.03	0.91	2.16	65.50
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	179.04	0.15	24.64	26.86	4,411.55
		s.b	h	35.81	0.00	5.46	0.00	195.51
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	43.90	0.75	70.52	32.93	3,096.07
		s.b	h	8.78	0.00	26.87	0.00	235.94
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	119.77	1.12	114.78	134.14	13,746.73
		s.b	h	23.95	0.00	50.07	0.00	1,199.34
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.31	0.00	918.32	0.00	285.44
		---	h	179.04	0.46	36.86	82.36	6,599.42
2.11	Halogen flood light, 1000 W	2	m.th	0.62	0.00	79.92	0.00	49.68
		---	h	358.08	0.01	0.43	3.58	153.97
2.12	Halogen flood light, 2000 W	1	m.th	0.31	0.00	92.77	0.00	28.84
		---	h	179.04	0.01	0.48	1.79	85.94
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	1.93	0.00	130.82	0.00	252.11
		---	h	1,110.05	0.01	0.41	11.10	455.12
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	33.57	0.15	18.51	5.04	621.38
		s.b	h	6.71	0.00	7.46	0.00	50.09
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04
		s.b	h	2.95	0.00	12.36	0.00	36.45
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	63.16	0.26	24.87	16.42	1,570.77
		s.b	h	12.63	0.00	15.28	0.00	193.01
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	12.74	0.63	48.81	8.03	621.77
		s.b	h	2.55	0.00	20.84	0.00	53.09
Total to carry forward ----->>							9,795.26	54,033.54

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 007
RC II - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						9,795.26	54,033.54
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.31	0.00	82.94	0.00	25.78
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moiil point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.31	0.42	100.34	0.13	31.19
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	1.93	1.73	117.13	3.33	225.73
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.70	1.36	134.52	0.95	93.66
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	1.93	0.14	13.13	0.27	25.30
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	1.93	0.37	34.41	0.71	66.31
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.31	2.37	278.28	0.74	86.50
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	1.93	0.55	55.77	1.06	107.48
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	363.62	2.31	0.00	839.96	0.00
3.02	Explosive, gramonite type	----	kg	3,272.56	2.06	0.00	6,741.48	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,211.58	0.00	1.98	0.00	2,398.93
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.79	0.00	459.99	0.00	361.85
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.79	0.00	808.44	0.00	635.96
3.09	Jumbo drill shank adapter	----	n.	1.36	0.00	302.37	0.00	411.39
3.10	Jumbo drill bit, 51 mm dia.	----	n.	4.33	0.00	164.35	0.00	711.07
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.60	0.00	132.65	0.00	79.56
3.13	Integral drill steel, 1600 mm	----	n.	0.52	0.00	153.97	0.00	80.80
3.14	Integral drill steel, 2400 mm	----	n.	0.37	0.00	174.35	0.00	65.36
3.15	Breaker tool, moiil point	----	n.	1.50	0.00	32.37	0.00	48.54
3.16	Pipeline supports including anchors	----	kg	310.00	1.38	3.22	427.80	998.20
3.17	Cable tray including supports and anchors	----	m	124.00	0.35	0.83	43.90	102.42
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	124.00	0.79	7.11	97.96	881.64
	Sub-total						17,953.54	61,569.62
	Missing items and construction contingencies	%		2.00%			359.07	1,231.39
	Total Direct Costs						18,312.61	62,801.01
	Overheads, risks and profit	%		52.00%			4,217.91	37,961.17
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		2,998.91			7.51	33.60
	AGGREGATE UNIT PRICE		m³					41.11

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 007
RC III - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	51.01	0.00	47.25	0.00	2,410.23
1.02	Gang foreman	1	h	510.10	6.60	0.00	3,366.67	0.00
1.03	Tunnel specialist	1	h	510.10	0.00	45.38	0.00	23,148.43
1.04	Tunneling jumbo operator	1	h	510.10	5.82	0.00	2,968.79	0.00
1.05	Loader operator	---	h	126.36	5.82	0.00	735.41	0.00
1.06	Operator of dumpers and other units	---	h	442.62	5.82	0.00	2,576.06	0.00
1.07	Miner	4	h	2,040.41	2.99	0.00	6,100.82	0.00
1.08	Explosive specialist	1	h	510.10	3.69	0.00	1,882.28	0.00
1.09	Electrician	0.33	h	169.86	3.69	0.00	626.80	0.00
1.10	Mechanic	0.33	h	169.86	3.69	0.00	626.80	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	33.42	3.69	0.00	123.32	0.00
1.12	Pipe fitter	0.33	h	169.86	3.69	0.00	626.80	0.00
1.13	Helper	5	h	2,550.51	2.38	0.00	6,070.21	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.89	0.00	19,479.66	0.00	17,251.06
		---	h	87.45	3.17	94.80	277.22	8,290.36
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.54	0.00	187.16	0.00	662.99
		---	h	50.61	0.07	1.53	3.54	77.43
2.03	Hand-held rock drill, medium weight type	3	m.th	2.66	0.00	130.63	0.00	347.06
		---	h	75.91	0.04	2.03	3.04	154.10
2.04	Hand-held breaker, medium weight type	4	m.th	3.54	0.00	46.95	0.00	166.31
		---	h	161.94	0.03	0.91	4.86	147.37
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	510.10	0.15	24.64	76.52	12,568.91
		s.b	h	102.02	0.00	5.46	0.00	557.03
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	105.30	0.75	70.52	78.97	7,425.75
		s.b	h	21.06	0.00	26.87	0.00	565.88
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	237.68	1.12	114.78	266.20	27,280.82
		s.b	h	47.54	0.00	50.07	0.00	2,380.12
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.89	0.00	918.32	0.00	813.26
		---	h	510.10	0.46	36.86	234.65	18,802.36
2.11	Halogen flood light, 1000 W	2	m.th	1.77	0.00	79.92	0.00	141.55
		---	h	1,020.20	0.01	0.43	10.20	438.69
2.12	Halogen flood light, 2000 W	1	m.th	0.89	0.00	92.77	0.00	82.16
		---	h	510.10	0.01	0.48	5.10	244.85
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	5.49	0.00	130.82	0.00	718.29
		---	h	3,162.63	0.01	0.41	31.63	1,296.68
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	95.64	0.15	18.51	14.35	1,770.37
		s.b	h	19.13	0.00	7.46	0.00	142.70
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	204.66	0.26	24.87	53.21	5,089.97
		s.b	h	40.93	0.00	15.28	0.00	625.45
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	30.35	0.63	48.81	19.12	1,481.44
		s.b	h	6.07	0.00	20.84	0.00	126.50
Total to carry forward ----->>							26,794.96	136,435.30

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 007
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						26,794.96	136,435.30
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.89	0.00	82.94	0.00	73.45
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpen	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.89	0.42	100.34	0.37	88.86
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	5.49	1.73	117.13	9.50	643.12
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.98	1.36	134.52	2.70	266.85
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	5.49	0.14	13.13	0.77	72.09
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	5.49	0.37	34.41	2.03	188.93
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.89	2.37	278.28	2.10	246.44
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	5.49	0.55	55.77	3.02	306.22
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	759.10	2.31	0.00	1,753.52	0.00
3.02	Explosive, gramonite type	----	kg	6831.90	2.06	0.00	14,073.71	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3106.85	0.00	1.98	0.00	6,151.56
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.73	0.00	459.99	0.00	795.71
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.73	0.00	808.44	0.00	1,398.47
3.09	Jumbo drill shank adapter	----	n.	2.99	0.00	302.37	0.00	904.65
3.10	Jumbo drill bit, 51 mm dia.	----	n.	9.51	0.00	164.35	0.00	1,563.64
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	1.35	0.00	132.65	0.00	179.01
3.13	Integral drill steel, 1600 mm	----	n.	1.18	0.00	153.97	0.00	181.81
3.14	Integral drill steel, 2400 mm	----	n.	0.84	0.00	174.35	0.00	147.05
3.15	Breaker tool, moi point	----	n.	3.37	0.00	32.37	0.00	109.21
3.16	Pipeline supports including anchors	----	kg	697.50	1.38	3.22	962.55	2,245.95
3.17	Cable tray including supports and anchors	----	m	279.00	0.35	0.83	98.77	230.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	279.00	0.79	7.11	220.41	1,983.69
	Sub-total						43,924	154,452
	Missing items and construction contingencies	%		2.00%			878.49	3,089.04
	Total Direct Costs						44,802.89	157,540.90
	Overheads, risks and profit	%		52.00%			10,521.88	94,696.89
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		6,747.55			8.20	37.38
	AGGREGATE UNIT PRICE		m³					45.58

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS IV)

SEC 2-10
 ANA 007
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	37.66	0.00	47.25	0.00	1,779.28
1.02	Gang foreman	1	h	376.57	6.60	0.00	2,485.35	0.00
1.03	Tunnel specialist	1	h	376.57	0.00	45.38	0.00	17,088.66
1.04	Tunneling jumbo operator	1	h	376.57	5.82	0.00	2,191.63	0.00
1.05	Loader operator	---	h	88.09	5.82	0.00	512.67	0.00
1.06	Operator of dumpers and other units	---	h	314.32	5.82	0.00	1,829.34	0.00
1.07	Miner	4	h	1,506.27	2.99	0.00	4,503.75	0.00
1.08	Explosive specialist	1	h	376.57	3.69	0.00	1,389.54	0.00
1.09	Electrician	0.33	h	125.40	3.69	0.00	462.72	0.00
1.10	Mechanic	0.33	h	125.40	3.69	0.00	462.72	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	21.93	3.69	0.00	80.91	0.00
1.12	Pipe fitter	0.33	h	125.40	3.69	0.00	462.72	0.00
1.13	Helper	5	h	1,882.84	2.38	0.00	4,481.16	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.65	0.00	19,479.66	0.00	12,735.10
		---	h	61.61	3.17	94.80	195.31	5,840.74
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.62	0.00	187.16	0.00	489.43
		---	h	33.74	0.07	1.53	2.36	51.62
2.03	Hand-held rock drill, medium weight type	3	m.th	1.96	0.00	130.63	0.00	256.20
		---	h	50.61	0.04	2.03	2.02	102.73
2.04	Hand-held breaker, medium weight type	4	m.th	2.62	0.00	46.95	0.00	122.78
		---	h	107.96	0.03	0.91	3.24	98.24
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	376.57	0.15	24.64	56.49	9,278.64
		s.b	h	75.31	0.00	5.46	0.00	411.21
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	73.41	0.75	70.52	55.06	5,176.65
		s.b	h	14.68	0.00	26.87	0.00	394.49
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	164.37	1.12	114.78	184.10	18,866.62
		s.b	h	32.87	0.00	50.07	0.00	1,646.02
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.65	0.00	918.32	0.00	600.36
		---	h	376.57	0.46	36.86	173.22	13,880.30
2.11	Halogen flood light, 1000 W	2	m.th	1.31	0.00	79.92	0.00	104.50
		---	h	753.14	0.01	0.43	7.53	323.85
2.12	Halogen flood light, 2000 W	1	m.th	0.65	0.00	92.77	0.00	60.65
		---	h	376.57	0.01	0.48	3.77	180.75
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	4.05	0.00	130.82	0.00	530.26
		---	h	2,334.72	0.01	0.41	23.35	957.24
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	70.61	0.15	18.51	10.59	1,306.93
		s.b	h	14.12	0.00	7.46	0.00	105.34
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	153.39	0.26	24.87	39.88	3,814.70
		s.b	h	30.68	0.00	15.28	0.00	468.75
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	20.99	0.63	48.81	13.22	1,024.52
		s.b	h	4.20	0.00	20.84	0.00	87.49
Total to carry forward ----->>							19,642.15	98,728.02

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 007
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						19,642.15	98,728.02
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.65	0.00	82.94	0.00	54.22
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.65	0.42	100.34	0.27	65.60
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	4.05	1.73	117.13	7.01	474.77
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.46	1.36	134.52	1.99	197.00
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	4.05	0.14	13.13	0.57	53.22
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	4.05	0.37	34.41	1.50	139.48
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.65	2.37	278.28	1.55	181.93
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	4.05	0.55	55.77	2.23	226.05
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	477.95	2.31	0.00	1,104.07	0.00
3.02	Explosive, gramonite type	----	kg	4301.56	2.06	0.00	8,861.22	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2333.31	0.00	1.98	0.00	4,619.95
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.13	0.00	459.99	0.00	518.17
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.13	0.00	808.44	0.00	910.69
3.09	Jumbo drill shank adapter	----	n.	1.95	0.00	302.37	0.00	589.11
3.10	Jumbo drill bit, 51 mm dia.	----	n.	6.20	0.00	164.35	0.00	1,018.25
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.90	0.00	132.65	0.00	119.34
3.13	Integral drill steel, 1600 mm	----	n.	0.79	0.00	153.97	0.00	121.21
3.14	Integral drill steel, 2400 mm	----	n.	0.56	0.00	174.35	0.00	98.04
3.15	Breaker tool, moi point	----	n.	2.25	0.00	32.37	0.00	72.81
3.16	Pipeline supports including anchors	----	kg	465.00	1.38	3.22	641.70	1,497.30
3.17	Cable tray including supports and anchors	----	m	186.00	0.35	0.83	65.84	153.64
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	186.00	0.79	7.11	146.94	1,322.46
	Sub-total						30,477	111,334
	Missing items and construction contingencies	%		2.00%			609.54	2,226.67
	Total Direct Costs						31,086.59	113,560.41
	Overheads, risks and profit	%		52.00%			7,521.64	67,694.80
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY		m³	4,498.37			8.58	40.29
	AGGREGATE UNIT PRICE		m³					48.88

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS V)

SEC 2-10
 ANA 007
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Labor								
1.01	General foreman	---	h	7.82	0.00	47.25	0.00	369.65	
1.02	Gang foreman	1	h	78.23	6.60	0.00	516.34	0.00	
1.03	Tunnel specialist	1	h	78.23	0.00	45.38	0.00	3,550.22	
1.04	Tunneling jumbo operator	1	h	78.23	5.82	0.00	455.32	0.00	
1.05	Loader operator	---	h	15.44	5.82	0.00	89.86	0.00	
1.06	Operator of dumpers and other units	---	h	58.09	5.82	0.00	338.10	0.00	
1.07	Miner	4	h	312.93	2.99	0.00	935.67	0.00	
1.08	Explosive specialist	1	h	78.23	3.69	0.00	288.68	0.00	
1.09	Electrician	0.33	h	26.05	3.69	0.00	96.13	0.00	
1.10	Mechanic	0.33	h	26.05	3.69	0.00	96.13	0.00	
1.11	Bit and intergral drill steel grinder specialist	---	h	3.60	3.69	0.00	13.27	0.00	
1.12	Pipe fitter	0.33	h	26.05	3.69	0.00	96.13	0.00	
1.13	Helper	5	h	391.17	2.38	0.00	930.97	0.00	
2	Equipment								
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.14	0.00	19,479.66	0.00	2,645.75	
		---	h	11.08	3.17	94.80	35.13	1,050.60	
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	0.54	0.00	187.16	0.00	101.68	
		---	h	5.62	0.07	1.53	0.39	8.60	
2.03	Hand-held rock drill, light weight type	3	m.th	0.41	0.00	130.63	0.00	53.23	
		---	h	8.43	0.04	2.03	0.34	17.12	
2.04	Hand-held breaker, medium weight type	4	m.th	0.54	0.00	46.95	0.00	25.51	
		---	h	17.99	0.03	0.91	0.54	16.37	
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	78.23	0.15	24.64	11.73	1,927.66	
		s.b	h	15.65	0.00	5.46	0.00	85.43	
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00	
		s.b	h	0.00	0.00	7.50	0.00	0.00	
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	12.87	0.75	70.52	9.65	907.39	
		s.b	h	2.57	0.00	26.87	0.00	69.15	
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00	
		s.b	h	0.00	0.00	40.23	0.00	0.00	
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	28.37	1.12	114.78	31.78	3,256.84	
		s.b	h	5.67	0.00	50.07	0.00	284.14	
2.10	Sound-proof axial tunnel fan, 125 kW	1	m.th	0.14	0.00	918.32	0.00	124.73	
		---	h	78.23	0.46	36.86	35.99	2,883.67	
2.11	Halogen flood light, 1000 W	2	m.th	0.27	0.00	79.92	0.00	21.71	
		---	h	156.47	0.01	0.43	1.56	67.28	
2.12	Halogen flood light, 2000 W	1	m.th	0.14	0.00	92.77	0.00	12.60	
		---	h	78.23	0.01	0.48	0.78	37.55	
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	0.84	0.00	130.82	0.00	110.16	
		---	h	485.05	0.01	0.41	4.85	198.87	
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	14.67	0.15	18.51	2.20	271.52	
		s.b	h	2.93	0.00	7.46	0.00	21.89	
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60	
		s.b	h	1.23	0.00	12.36	0.00	15.19	
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	17.62	0.26	24.87	4.58	438.24	
		s.b	h	3.52	0.00	15.28	0.00	53.85	
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.62	0.63	48.81	2.28	176.86	
		s.b	h	0.72	0.00	20.84	0.00	15.10	
Total to carry forward ----->>								4,000	18,998

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 007
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 70-80 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						4,000	18,998
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.14	0.00	82.94	0.00	11.27
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.14	0.42	100.34	0.06	13.63
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	0.84	1.73	117.13	1.46	98.63
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.30	1.36	134.52	0.41	40.93
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	0.84	0.14	13.13	0.12	11.06
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	0.84	0.37	34.41	0.31	28.98
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.14	2.37	278.28	0.32	37.80
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	0.84	0.55	55.77	0.46	46.96
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	75	2.31	0.00	173.19	0.00
3.02	Explosive, gramonite type	----	kg	675	2.06	0.00	1,390.00	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	470	0.00	1.98	0.00	930.21
3.06	Blasting connection wire	----	m	154	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.18	0.00	459.99	0.00	84.31
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.18	0.00	808.44	0.00	148.18
3.09	Jumbo drill shank adapter	----	n.	0.32	0.00	302.37	0.00	95.85
3.10	Jumbo drill bit, 51 mm dia.	----	n.	1.01	0.00	164.35	0.00	165.68
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.15	0.00	132.65	0.00	19.89
3.13	Integral drill steel, 1600 mm	----	n.	0.13	0.00	153.97	0.00	20.20
3.14	Integral drill steel, 2400 mm	----	n.	0.09	0.00	174.35	0.00	16.34
3.15	Breaker tool, moi point	----	n.	0.37	0.00	32.37	0.00	12.13
3.16	Pipeline supports including anchors	----	kg	77.50	1.38	3.22	106.95	249.55
3.17	Cable tray including supports and anchors	----	m	31.00	0.35	0.83	10.97	25.61
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	31.00	0.79	7.11	24.49	220.41
	Sub-total						5,709.12	21,308.36
	Missing items and construction contingencies	%		2.00%			114.18	426.17
	Total Direct Costs						5,823.30	21,734.53
	Overheads, risks and profit	%		52.00%			1,433.01	12,897.06
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		749.73			9.68	46.19
	AGGREGATE UNIT PRICE	m³						55.87

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 008
RC II - T. A

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	18.05	0.00	47.25	0.00	852.83
1.02	Gang foreman	1	h	180.49	6.60	0.00	1,191.26	0.00
1.03	Tunnel specialist	1	h	180.49	0.00	45.38	0.00	8,190.78
1.04	Tunneling jumbo operator	1	h	180.49	5.82	0.00	1,050.47	0.00
1.05	Loader operator	---	h	52.68	5.82	0.00	306.62	0.00
1.06	Operator of dumpers and other units	---	h	199.20	5.82	0.00	1,159.36	0.00
1.07	Miner	4	h	721.97	2.99	0.00	2,158.70	0.00
1.08	Explosive specialist	1	h	180.49	3.69	0.00	666.02	0.00
1.09	Electrician	0.33	h	60.10	3.69	0.00	221.78	0.00
1.10	Mechanic	0.33	h	60.10	3.69	0.00	221.78	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	15.39	3.69	0.00	56.79	0.00
1.12	Pipe fitter	0.33	h	60.10	3.69	0.00	221.78	0.00
1.13	Helper	5	h	902.47	2.38	0.00	2,147.87	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.31	0.00	19,479.66	0.00	6,104.07
		---	h	37.05	3.17	94.80	117.44	3,512.23
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	1.25	0.00	187.16	0.00	234.59
		---	h	22.49	0.07	1.53	1.57	34.41
2.03	Hand-held rock drill, medium weight type	3	m.th	0.94	0.00	130.63	0.00	122.80
		---	h	337.38	0.04	2.03	13.50	684.88
2.04	Hand-held breaker, medium weight type	4	m.th	1.25	0.00	46.95	0.00	58.85
		---	h	71.97	0.03	0.91	2.16	65.50
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	180.49	0.15	24.64	27.07	4,447.35
		s.b	h	36.10	0.00	5.46	0.00	197.10
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	43.90	0.75	70.52	32.93	3,096.07
		s.b	h	8.78	0.00	26.87	0.00	235.94
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	119.77	1.12	114.78	134.14	13,746.73
		s.b	h	23.95	0.00	50.07	0.00	1,199.34
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.31	0.00	856.34	0.00	268.34
		---	h	180.49	0.38	29.58	68.59	5,338.99
2.11	Halogen flood light, 1000 W	2	m.th	0.63	0.00	79.92	0.00	50.09
		---	h	360.99	0.01	0.43	3.61	155.22
2.12	Halogen flood light, 2000 W	1	m.th	0.31	0.00	92.77	0.00	29.07
		---	h	180.49	0.01	0.48	1.80	86.64
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	1.94	0.00	130.82	0.00	254.16
		---	h	1,119.06	0.01	0.41	11.19	458.81
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	33.84	0.15	18.51	5.08	626.42
		s.b	h	6.77	0.00	7.46	0.00	50.49
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	14.75	0.32	29.23	4.72	431.04
		s.b	h	2.95	0.00	12.36	0.00	36.45
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	63.68	0.26	24.87	16.56	1,583.81
		s.b	h	12.74	0.00	15.28	0.00	194.62
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	12.74	0.63	48.81	8.03	621.77
		s.b	h	2.55	0.00	20.84	0.00	53.09
Total to carry forward ----->>							9,850.82	53,022.49

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 008
RC II - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS II)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						9,850.82	53,022.49
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.31	0.00	82.94	0.00	25.99
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.31	0.42	100.34	0.13	31.44
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	1.94	1.73	117.13	3.36	227.56
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.70	1.36	134.52	0.95	94.42
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	1.94	0.14	13.13	0.27	25.51
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	1.94	0.37	34.41	0.72	66.85
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.31	2.37	278.28	0.74	87.20
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	1.94	0.55	55.77	1.07	108.35
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	349.07	2.31	0.00	806.36	0.00
3.02	Explosive, gramonite type	----	kg	3,141.66	2.06	0.00	6,471.82	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	n.	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	1,247.34	0.00	1.98	0.00	2,469.73
3.06	Blasting connection wire	----	m	368.66	0.00	0.13	0.00	47.93
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.81	0.00	459.99	0.00	372.32
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.81	0.00	808.44	0.00	654.35
3.09	Jumbo drill shank adapter	----	n.	1.40	0.00	302.37	0.00	423.29
3.10	Jumbo drill bit, 51 mm dia.	----	n.	4.45	0.00	164.35	0.00	731.64
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.09	0.00	586.85	0.00	50.48
3.12	Integral drill steel, 800 mm	----	n.	0.60	0.00	132.65	0.00	79.56
3.13	Integral drill steel, 1600 mm	----	n.	0.52	0.00	153.97	0.00	80.80
3.14	Integral drill steel, 2400 mm	----	n.	0.37	0.00	174.35	0.00	65.36
3.15	Breaker tool, moi point	----	n.	1.50	0.00	32.37	0.00	48.54
3.16	Pipeline supports including anchors	----	kg	310.00	1.38	3.22	427.80	998.20
3.17	Cable tray including supports and anchors	----	m	124.00	0.35	0.83	43.90	102.42
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	124.00	0.79	7.11	97.96	881.64
	Sub-total						17,705.90	60,696.08
	Missing items and construction contingencies	%		2.00%			354.12	1,213.92
	Total Direct Costs						18,060.02	61,910.00
	Overheads, risks and profit	%		52.00%			4,158.44	37,425.97
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		2,999			7.41	33.12
	AGGREGATE UNIT PRICE	m³						40.53

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS III)

SEC 2-10
 ANA 008
 RC III - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	51.35	0.00	47.25	0.00	2,426.23
1.02	Gang foreman	1	h	513.49	6.60	0.00	3,389.03	0.00
1.03	Tunnel specialist	1	h	513.49	0.00	45.38	0.00	23,302.12
1.04	Tunneling jumbo operator	1	h	513.49	5.82	0.00	2,988.50	0.00
1.05	Loader operator	---	h	126.36	5.82	0.00	735.41	0.00
1.06	Operator of dumpers and other units	---	h	443.32	5.82	0.00	2,580.13	0.00
1.07	Miner	4	h	2,053.95	2.99	0.00	6,141.32	0.00
1.08	Explosive specialist	1	h	513.49	3.69	0.00	1,894.77	0.00
1.09	Electrician	0.33	h	170.99	3.69	0.00	630.96	0.00
1.10	Mechanic	0.33	h	170.99	3.69	0.00	630.96	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	34.07	3.69	0.00	125.74	0.00
1.12	Pipe fitter	0.33	h	170.99	3.69	0.00	630.96	0.00
1.13	Helper	5	h	2,567.44	2.38	0.00	6,110.52	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.89	0.00	19,479.66	0.00	17,365.60
		---	h	89.31	3.17	94.80	283.12	8,466.87
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	3.57	0.00	187.16	0.00	667.39
		---	h	50.61	0.07	1.53	3.54	77.43
2.03	Hand-held rock drill, medium weight type	3	m.th	2.67	0.00	130.63	0.00	349.36
		---	h	75.91	0.04	2.03	3.04	154.10
2.04	Hand-held breaker, medium weight type	4	m.th	3.57	0.00	46.95	0.00	167.42
		---	h	161.94	0.03	0.91	4.86	147.37
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	513.49	0.15	24.64	77.02	12,652.36
		s.b	h	102.70	0.00	5.46	0.00	560.73
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	105.30	0.75	70.52	78.97	7,425.75
		s.b	h	21.06	0.00	26.87	0.00	565.88
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	237.68	1.12	114.78	266.20	27,280.82
		s.b	h	47.54	0.00	50.07	0.00	2,380.12
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.89	0.00	856.34	0.00	763.40
		---	h	513.49	0.38	29.58	195.13	15,189.00
2.11	Halogen flood light, 1000 W	2	m.th	1.78	0.00	79.92	0.00	142.49
		---	h	1,026.98	0.01	0.43	10.27	441.60
2.12	Halogen flood light, 2000 W	1	m.th	0.89	0.00	92.77	0.00	82.70
		---	h	513.49	0.01	0.48	5.13	246.47
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	5.53	0.00	130.82	0.00	723.06
		---	h	3,183.63	0.01	0.41	31.84	1,305.29
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	96.28	0.15	18.51	14.44	1,782.13
		s.b	h	19.26	0.00	7.46	0.00	143.65
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	38.71	0.32	29.23	12.39	1,131.48
		s.b	h	7.74	0.00	12.36	0.00	95.69
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	205.88	0.26	24.87	53.53	5,120.14
		s.b	h	41.18	0.00	15.28	0.00	629.16
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	30.35	0.63	48.81	19.12	1,481.44
		s.b	h	6.07	0.00	20.84	0.00	126.50
Total to carry forward ----->>							26,916.90	133,393.75

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 008
RC III - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS III)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						26,916.90	133,393.75
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.89	0.00	82.94	0.00	73.94
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.89	0.42	100.34	0.37	89.45
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	5.53	1.73	117.13	9.56	647.39
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	2.00	1.36	134.52	2.72	268.62
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	5.53	0.14	13.13	0.77	72.57
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	5.53	0.37	34.41	2.05	190.19
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.89	2.37	278.28	2.11	248.08
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	5.53	0.55	55.77	3.04	308.25
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	728.74	2.31	0.00	1,683.38	0.00
3.02	Explosive, gramonite type	----	kg	6558.62	2.06	0.00	13,510.76	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	3197.81	0.00	1.98	0.00	6,331.67
3.06	Blasting connection wire	----	m	967.74	0.00	0.13	0.00	125.81
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.78	0.00	459.99	0.00	818.53
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.78	0.00	808.44	0.00	1,438.58
3.09	Jumbo drill shank adapter	----	n.	3.08	0.00	302.37	0.00	930.60
3.10	Jumbo drill bit, 51 mm dia.	----	n.	9.79	0.00	164.35	0.00	1,608.49
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.19	0.00	586.85	0.00	113.58
3.12	Integral drill steel, 800 mm	----	n.	1.35	0.00	132.65	0.00	179.01
3.13	Integral drill steel, 1600 mm	----	n.	1.18	0.00	153.97	0.00	181.81
3.14	Integral drill steel, 2400 mm	----	n.	0.84	0.00	174.35	0.00	147.05
3.15	Breaker tool, moi point	----	n.	3.37	0.00	32.37	0.00	109.21
3.16	Pipeline supports including anchors	----	kg	697.50	1.38	3.22	962.55	2,245.95
3.17	Cable tray including supports and anchors	----	m	279.00	0.35	0.83	98.77	230.45
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	279.00	0.79	7.11	220.41	1,983.69
	Sub-total						43,413.39	151,736.69
	Missing items and construction contingencies	%		2.00%			868.27	3,034.73
	Total Direct Costs						44,281.66	154,771.42
	Overheads, risks and profit	%		52.00%			10,350.76	93,156.84
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		6,748			8.10	36.74
	AGGREGATE UNIT PRICE		m³					44.84

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS IV)

SEC 2-10
 ANA 008
 RC IV - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	37.89	0.00	47.25	0.00	1,790.21
1.02	Gang foreman	1	h	378.88	6.60	0.00	2,500.61	0.00
1.03	Tunnel specialist	1	h	378.88	0.00	45.38	0.00	17,193.56
1.04	Tunneling jumbo operator	1	h	378.88	5.82	0.00	2,205.08	0.00
1.05	Loader operator	---	h	88.09	5.82	0.00	512.67	0.00
1.06	Operator of dumpers and other units	---	h	314.80	5.82	0.00	1,832.12	0.00
1.07	Miner	4	h	1,515.52	2.99	0.00	4,531.40	0.00
1.08	Explosive specialist	1	h	378.88	3.69	0.00	1,398.07	0.00
1.09	Electrician	0.33	h	126.17	3.69	0.00	465.56	0.00
1.10	Mechanic	0.33	h	126.17	3.69	0.00	465.56	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	22.35	3.69	0.00	82.47	0.00
1.12	Pipe fitter	0.33	h	126.17	3.69	0.00	465.56	0.00
1.13	Helper	5	h	1,894.40	2.38	0.00	4,508.67	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.66	0.00	19,479.66	0.00	12,813.28
		---	h	62.88	3.17	94.80	199.33	5,960.98
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	2.63	0.00	187.16	0.00	492.44
		---	h	33.74	0.07	1.53	2.36	51.62
2.03	Hand-held rock drill, medium weight type	3	m.th	1.97	0.00	130.63	0.00	257.78
		---	h	50.61	0.04	2.03	2.02	102.73
2.04	Hand-held breaker, medium weight type	4	m.th	2.63	0.00	46.95	0.00	123.53
		---	h	107.96	0.03	0.91	3.24	98.24
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	378.88	0.15	24.64	56.83	9,335.60
		s.b	h	75.78	0.00	5.46	0.00	413.74
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	73.41	0.75	70.52	55.06	5,176.65
		s.b	h	14.68	0.00	26.87	0.00	394.49
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	164.37	1.12	114.78	184.10	18,866.62
		s.b	h	32.87	0.00	50.07	0.00	1,646.02
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.66	0.00	856.34	0.00	563.28
		---	h	378.88	0.38	29.58	143.97	11,207.26
2.11	Halogen flood light, 1000 W	2	m.th	1.32	0.00	79.92	0.00	105.14
		---	h	757.76	0.01	0.43	7.58	325.84
2.12	Halogen flood light, 2000 W	1	m.th	0.66	0.00	92.77	0.00	61.02
		---	h	378.88	0.01	0.48	3.79	181.86
2.13	Ligthning line along tunnel, 100 m section	6.2	m.th	4.08	0.00	130.82	0.00	533.51
		---	h	2,349.05	0.01	0.41	23.49	963.11
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	71.04	0.15	18.51	10.66	1,314.95
		s.b	h	14.21	0.00	7.46	0.00	105.99
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	29.78	0.32	29.23	9.53	870.37
		s.b	h	5.96	0.00	12.36	0.00	73.61
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	154.22	0.26	24.87	40.10	3,835.37
		s.b	h	30.84	0.00	15.28	0.00	471.29
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	20.99	0.63	48.81	13.22	1,024.52
		s.b	h	4.20	0.00	20.84	0.00	87.49
Total to carry forward ----->>							19,723.02	96,442.11

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 008
RC IV - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS IV)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						19,723.02	96,442.11
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.66	0.00	82.94	0.00	54.56
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.66	0.42	100.34	0.28	66.00
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	4.08	1.73	117.13	7.06	477.68
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	1.47	1.36	134.52	2.00	198.20
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	4.08	0.14	13.13	0.57	53.55
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	4.08	0.37	34.41	1.51	140.33
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.66	2.37	278.28	1.56	183.05
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	4.08	0.55	55.77	2.24	227.44
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	458.83	2.31	0.00	1,059.91	0.00
3.02	Explosive, gramonite type	----	kg	4129.50	2.06	0.00	8,506.77	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	2401.05	0.00	1.98	0.00	4,754.07
3.06	Blasting connection wire	----	m	744.42	0.00	0.13	0.00	96.77
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	1.16	0.00	459.99	0.00	532.90
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	1.16	0.00	808.44	0.00	936.58
3.09	Jumbo drill shank adapter	----	n.	2.00	0.00	302.37	0.00	605.86
3.10	Jumbo drill bit, 51 mm dia.	----	n.	6.37	0.00	164.35	0.00	1,047.20
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.13	0.00	586.85	0.00	75.72
3.12	Integral drill steel, 800 mm	----	n.	0.90	0.00	132.65	0.00	119.34
3.13	Integral drill steel, 1600 mm	----	n.	0.79	0.00	153.97	0.00	121.21
3.14	Integral drill steel, 2400 mm	----	n.	0.56	0.00	174.35	0.00	98.04
3.15	Breaker tool, moi point	----	n.	2.25	0.00	32.37	0.00	72.81
3.16	Pipeline supports including anchors	----	kg	465.00	1.38	3.22	641.70	1,497.30
3.17	Cable tray including supports and anchors	----	m	186.00	0.35	0.83	65.84	153.64
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	186.00	0.79	7.11	146.94	1,322.46
	Sub-total						30,159.40	109,276.81
	Missing items and construction contingencies	%		2.00%			603.19	2,185.54
	Total Direct Costs						30,762.59	111,462.35
	Overheads, risks and profit	%		52.00%			7,395.70	66,561.27
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		4,498			8.48	39.58
	AGGREGATE UNIT PRICE	m³						48.06

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS V)

SEC 2-10
 ANA 008
 RC V - T. A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Labor							
1.01	General foreman	---	h	7.86	0.00	47.25	0.00	371.54
1.02	Gang foreman	1	h	78.63	6.60	0.00	518.98	0.00
1.03	Tunnel specialist	1	h	78.63	0.00	45.38	0.00	3,568.39
1.04	Tunneling jumbo operator	1	h	78.63	5.82	0.00	457.65	0.00
1.05	Loader operator	---	h	15.44	5.82	0.00	89.86	0.00
1.06	Operator of dumpers and other units	---	h	58.17	5.82	0.00	338.58	0.00
1.07	Miner	4	h	314.53	2.99	0.00	940.46	0.00
1.08	Explosive specialist	1	h	78.63	3.69	0.00	290.16	0.00
1.09	Electrician	0.33	h	26.18	3.69	0.00	96.62	0.00
1.10	Mechanic	0.33	h	26.18	3.69	0.00	96.62	0.00
1.11	Bit and intergral drill steel grinder specialist	---	h	3.66	3.69	0.00	13.52	0.00
1.12	Pipe fitter	0.33	h	26.18	3.69	0.00	96.62	0.00
1.13	Helper	5	h	393.17	2.38	0.00	935.74	0.00
2	Equipment							
2.01	Two-boom hydraulic tunneling jumbo	1	m.th	0.14	0.00	19,479.66	0.00	2,659.29
		---	h	11.30	3.17	94.80	35.82	1,071.12
2.02	Hand-held rock drill, feed pusher leg type	4	m.th	0.55	0.00	187.16	0.00	102.20
		---	h	5.62	0.07	1.53	0.39	8.60
2.03	Hand-held rock drill, light weight type	3	m.th	0.41	0.00	130.63	0.00	53.50
		---	h	8.43	0.04	2.03	0.34	17.12
2.04	Hand-held breaker, medium weight type	4	m.th	0.55	0.00	46.95	0.00	25.64
		---	h	17.99	0.03	0.91	0.54	16.37
2.05	Diesel powered a. compressor, 15.0 m3/min.	Op.	h	78.63	0.15	24.64	11.80	1,937.53
		s.b	h	15.73	0.00	5.46	0.00	85.87
2.06	Diesel powered a. compressor, 20.0 m3/min.	Op.	h	0.00	0.20	40.08	0.00	0.00
		s.b	h	0.00	0.00	7.50	0.00	0.00
2.07	Wheel loader, 157 kw, 3.10 heaped rock bucket	Op.	h	12.87	0.75	70.52	9.65	907.39
		s.b	h	2.57	0.00	26.87	0.00	69.15
2.08	Mechanized pick scaler, 120 kW, 10.0 m reach	Op.	h	0.00	0.70	64.44	0.00	0.00
		s.b	h	0.00	0.00	40.23	0.00	0.00
2.09	Articulated tunnel type dump truck, 42 t pay l.	Op.	h	28.37	1.12	114.78	31.78	3,256.84
		s.b	h	5.67	0.00	50.07	0.00	284.14
2.10	Sound-proof axial tunnel fan, 100 kW	1	m.th	0.14	0.00	856.34	0.00	116.90
		---	h	78.63	0.38	29.58	29.88	2,325.98
2.11	Halogen flood light, 1000 W	2	m.th	0.27	0.00	79.92	0.00	21.82
		---	h	157.27	0.01	0.43	1.57	67.62
2.12	Halogen flood light, 2000 W	1	m.th	0.14	0.00	92.77	0.00	12.66
		---	h	78.63	0.01	0.48	0.79	37.74
2.13	Ligthing line along tunnel, 100 m section	6.2	m.th	0.85	0.00	130.82	0.00	110.73
		---	h	487.53	0.01	0.41	4.88	199.89
2.14	Personnel transportation vehicle, 14+1 seats	Op.	h	14.74	0.15	18.51	2.21	272.91
		s.b	h	2.95	0.00	7.46	0.00	22.00
2.15	Flat bed truck with crane, 10 t pay load	Op.	h	6.14	0.32	29.23	1.97	179.60
		s.b	h	1.23	0.00	12.36	0.00	15.19
2.16	Extendable lifter with 1000 kg cap. platform, 12 m r.	Op.	h	17.77	0.26	24.87	4.62	441.92
		s.b	h	3.55	0.00	15.28	0.00	54.30
2.17	Bulldozer in disposal area, Kw 72 f.w. power	Op.	h	3.62	0.63	48.81	2.28	176.86
		s.b	h	0.72	0.00	20.84	0.00	15.10
Total to carry forward ----->>							4,013.32	18,505.92

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 2-10
ANA 008
RC V - T. B

UNDERGROUND EXCAV. - TUNNELS COMBINED IN GROUPS - CROSS SECTION 80-90 M2 (ROCK CLASS V)

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Equipment (Cont.d)						4,013.32	18,505.92
2.18	Stand-by motorgenerator, 25 KVA	1	m.th	0.14	0.00	82.94	0.00	11.32
		---	h	0.00	0.01	4.39	0.00	0.00
2.19	Integral drill steel grinder	---	h	0.00	0.01	2.29	0.00	0.00
2.20	Button bits grinder	---	h	0.00	0.04	5.32	0.00	0.00
2.21	Breaker moi point resharpenner	---	h	0.00	0.01	1.57	0.00	0.00
2.22	Steel structure for ventilation fan support	1	m.th	0.14	0.42	100.34	0.06	13.70
2.23	Ventilation flexible pipe, 1400 mm dia. (L=100 m)	6.2	do	0.85	1.73	117.13	1.46	99.14
2.24	Compressed air tank, 4 m3 capacity	0	do	0.00	1.07	105.20	0.00	0.00
2.25	Compressed air tank, 6 m3 capacity	2	do	0.31	1.36	134.52	0.42	41.14
2.26	Compressed air tank, 8 m3 capacity	0	do	0.00	2.01	198.33	0.00	0.00
2.27	Water steel pipeline, Ø 50 mm (L=100 m)	6.2	do	0.85	0.14	13.13	0.12	11.11
2.28	Water steel pipeline, Ø 75 mm (L=100 m)	0.0	do	0.00	0.20	18.98	0.00	0.00
2.29	Compressed air pipeline, Ø 125 mm (L=100 m)	6.2	do	0.85	0.37	34.41	0.31	29.12
2.30	Compressed air pipeline, Ø 150 mm (L=100 m)	0.0	do	0.00	0.44	41.32	0.00	0.00
2.31	Steel water tank, 50 m3 capacity	1	do	0.14	2.37	278.28	0.32	37.99
2.32	Steel water tank, 100 m3 capacity	0	do	0.00	3.15	370.12	0.00	0.00
2.33	MV transmission cable, 3x10 mm2 (L=100 m)	0	do	0.00	0.38	38.10	0.00	0.00
2.34	MV transmission cable, 3x16 mm2 (L=100 m)	6.2	do	0.85	0.55	55.77	0.47	47.20
2.35	MV transmission cable, 3x25 mm2 (L=100 m)	0.0	do	0.00	0.83	84.05	0.00	0.00
2.36	LV transmission cable, 3x6 mm2 (L=100 m)	6.2	do	0.00	0.14	13.50	0.00	0.00
2.37	Control board, 10 KVA	1	do	0.00	0.24	27.23	0.00	0.00
2.38	Control board, 100 KVA	1	do	0.00	0.53	58.60	0.00	0.00
2.39	Control board, 200 KVA	1	do	0.00	0.79	88.17	0.00	0.00
2.40	Transformer cabin, 200 kVA	2	do	0.00	4.98	611.06	0.00	0.00
2.41	Transformer cabin, 300 kVA	1	do	0.00	5.68	696.82	0.00	0.00
2.42	Transformer cabin, 500 kVA	0	do	0.00	7.96	976.74	0.00	0.00
3	Materials							
3.01	Explosive, amonite type	----	kg	72	2.31	0.00	166.26	0.00
3.02	Explosive, gramonite type	----	kg	648	2.06	0.00	1,334.40	0.00
3.03	Explosive, ammonium nitrate type	----	kg	0.00	0.74	0.00	0.00	0.00
3.04	NONEL type detonators	----	kg	0.00	0.00	0.00	0.00	0.00
3.05	Electric type detonators	----	n.	483	0.00	1.98	0.00	956.97
3.06	Blasting connection wire	----	m	154	0.00	0.13	0.00	19.97
3.07	Jumbo drill rod R32, length 3090 mm	----	n.	0.19	0.00	459.99	0.00	86.69
3.08	Jumbo drill rod R32, length 5530 mm	----	n.	0.19	0.00	808.44	0.00	152.35
3.09	Jumbo drill shank adapter	----	n.	0.33	0.00	302.37	0.00	98.55
3.10	Jumbo drill bit, 51 mm dia.	----	n.	1.04	0.00	164.35	0.00	170.34
3.11	Jumbo drill bit reamer, 102 mm dia.	----	n.	0.02	0.00	586.85	0.00	12.62
3.12	Integral drill steel, 800 mm	----	n.	0.15	0.00	132.65	0.00	19.89
3.13	Integral drill steel, 1600 mm	----	n.	0.13	0.00	153.97	0.00	20.20
3.14	Integral drill steel, 2400 mm	----	n.	0.09	0.00	174.35	0.00	16.34
3.15	Breaker tool, moi point	----	n.	0.37	0.00	32.37	0.00	12.13
3.16	Pipeline supports including anchors	----	kg	77.50	1.38	3.22	106.95	249.55
3.17	Cable tray including supports and anchors	----	m	31.00	0.35	0.83	10.97	25.61
3.18	Steel cable & rock bolts for ventilation pipeline	----	m	31.00	0.79	7.11	24.49	220.41
	Sub-total						5,659.54	20,858.28
	Missing items and construction contingencies	%		2.00%			113.19	417.17
	Total Direct Costs						5,772.74	21,275.44
	Overheads, risks and profit	%		52.00%			1,406.51	12,658.55
	UNIT PRICE IN LOCAL & FOREIGN CURRENCY	m³		750			9.58	45.26
	AGGREGATE UNIT PRICE	m³						54.84

SECTION – 3

SURFACE CONCRETE

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 CONCRETE AT THE BATCHING & MIXING PLANT EXCLUDING CEMENT & ADMIXTURES (LOT 1)

SEC 3-01
 ANA 005
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)	
1	CONCRETE BATCHING AND MIXING								
1.1	Labour								
1.1.01	General foreman	---	h	540.00	0.00	43.75	0.00	23,625.00	
1.1.02	Gang foreman	1	h	5,400.00	6.11	0.00	32,994.00	0.00	
1.1.03	Specialist	2	h	10,800.00	3.42	0.00	36,936.00	0.00	
1.1.03	Skilled	1	h	5,400.00	2.77	0.00	14,958.00	0.00	
1.1.04	Semiskilled	2	h	10,800.00	2.20	0.00	23,760.00	0.00	
1.2	Equipment								
1.2.01	Transfer of aggregates with wheel loader	Op.	h	1,785	0.49	44.61	874.64	79,628.21	
	to hoppers (115 kW, 2.40 m3 heaped)	s.b.	h	357.00	0.00	18.74	0.00	6,690.13	
1.2.02	Batching and mixing plant, 55 m3/hr capacity	1	m.th	27.00	0.00	3,953.27	0.00	106,738.29	
		---	hr	3,600.00	0.87	42.50	3,132.00	153,000.00	
1.2.03	Cement silos 460 m3 capacity with 2 cemen	1	m.th	27.00	0.00	1,374.59	0.00	37,113.93	
		---	hr	3,600.00	0.19	7.71	684.00	27,756.00	
1.2.05	Transformer cabin, 200 KVA	1	m.th	27.00	4.98	611.06	134.46	16,498.62	
1.2.06	Control board, 200 KVA	1	m.th	27.00	0.79	88.17	21.33	2,380.59	
1.2.07	Steel water tank, 50 m ³ capacity	1	m.th	27.00	2.37	278.28	63.99	7,513.56	
1.2.08	Alogen floodligh, 1000 W	3	m.th	81.00	0.00	79.92	0.00	6,473.52	
		---	hr	10,800.00	0.01	0.43	108.00	4,644.00	
1.2.09	Alogen floodligh, 2000 W	3	m.th	81.00	0.00	92.77	0.00	7,514.37	
		---	hr	10,800.00	0.01	0.48	108.00	5,184.00	
1.3	Aggregates and Water								
1.3.01	Alluvial material transported to processing p	---	t	346,500	0.12	1.05	40,194.00	364,864.50	
1.3.02	Aggregate processing	---	t	346,500	0.57	3.63	195,772.50	1,258,834.50	
1.3.03	Water supply up to water tank	---	m ³	25,500	0.10	0.31	2,550.00	7,905.00	
2	PLANT INSTALLATION AND REMOVAL								
2.1	Civil Works								
2.1.01	Excavation	---	m3	190.00	0.15	2.60	28.50	494.00	
2.1.02	Concrete, foundation	---	m3	167.00	13.50	27.50	2,254.50	4,592.50	
2.1.03	Concrete, structures	---	m3	28.00	16.80	34.30	470.40	960.40	
2.1.04	Portland cement	---	t	53.77	0.00	206.20	0.00	11,087.37	
2.1.05	Reinforcing steel	---	t	23.38	280.00	990.00	6,546.40	23,146.20	
2.1.06	Formworks	---	m ²	283.00	5.80	11.85	1,641.40	3,353.55	
2.1.07	Random fills and backfills	---	m ³	2,500	0.20	1.50	500.00	3,750.00	
2.1.08	Concrete demolition	---	m3	28.00	10.00	60.00	280.00	1,680.00	
2.2	Installation and removal								
2.2.01	Installation	---	l.s.	----	----	----	7,183.80	64,654.20	
2.2.02	Removal	---	l.s.	----	----	----	1,657.80	14,920.20	
Sub-total				----->>			372,854	2,245,003	
Missing items and construction contingencies			%	1.50%	----->>			5,593	33,675
Total direct costs				----->>			378,447	2,278,678	
UNIT COST IN LOCAL & FOREIGN CURRENCY			m3	150,000	----->>			2.523	15.191
AGGREGATE UNIT COST			m3	----->>			17.71		

ROGUN HYDROELECTRIC POWER PLANT

SEC 3-01

CIVIL WORKS COST ESTIMATE - PHASE I

ANA 006

CONCRETE AT THE BATCHING & MIXING PLANT EXCLUDING CEMENT & ADMIXTURES (LOT 2)

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	CONCRETE BATCHING AND MIXING							
1.1	Labour							
1.1.01	General foreman	---	h	2,400.00	0.00	43.75	0.00	105,000.00
1.1.02	Gang foreman	1	h	24,000.00	6.11	0.00	146,640.00	0.00
1.1.03	Specialist	2	h	48,000.00	3.42	0.00	164,160.00	0.00
1.1.03	Skilled	1	h	24,000.00	2.77	0.00	66,480.00	0.00
1.1.04	Semiskilled	2	h	48,000.00	2.20	0.00	105,600.00	0.00
1.2	Equipment							
1.2.01	Aggregate reclaiming system under stockpile	1	m.th	60.00	0.00	1,291.52	0.00	77,491.20
		---	hr	24,000.00	0.16	6.75	3,840.00	162,000.00
1.2.02	Batching and mixing plant, 65 m3/hr capacity	1	m.th	60.00	0.00	8,280.96	0.00	496,857.60
		---	hr	24,000.00	1.03	50.67	24,720.00	1,216,080.00
1.2.03	Cement silos 1310 m3 capacity with 4 ceme	1	m.th	60.00	0.00	7,214.38	0.00	432,862.80
		---	hr	24,000.00	0.47	15.75	11,280.00	378,000.00
1.2.05	Transformer cabin, 250 KVA	1	m.th	60.00	5.27	646.44	316.20	38,786.40
1.2.06	Control board, 250 KVA	1	m.th	60.00	0.87	97.24	52.20	5,834.40
1.2.07	Steel water tank, 100 m ³ capacity	1	m.th	60.00	3.15	370.12	189.00	22,207.20
1.2.09	Alogen floodligh, 1000 W	3	m.th	180.00	0.00	79.92	0.00	14,385.60
		---	hr	72,000.00	0.01	0.43	720.00	30,960.00
1.2.09	Alogen floodligh, 2000 W	3	m.th	180.00	0.00	92.77	0.00	16,698.60
		---	hr	72,000.00	0.01	0.48	720.00	34,560.00
1.3	Aggregates and Water							
1.3.01	Alluvial material loaded & transported to plant	---	t	1,735,965	0.08	1.10	137,141.24	1,916,505.36
1.3.02	Aggregate processing	---	t	1,735,965	0.16	1.35	279,490.37	2,334,872.93
1.3.03	Water supply up to water tank	---	m ³	127,755	0.10	0.31	12,775.50	39,604.05
2	PLANT INSTALLATION AND REMOVAL							
2.1	Civil Works							
2.1.01	Excavation, general	---	m3	200.00	0.15	2.60	30.00	520.00
2.1.02	Excavation, trench	---	m3	500.00	0.30	5.20	150.00	2,600.00
2.1.03	Concrete, foundation	---	m3	180.00	13.50	27.50	2,430.00	4,950.00
2.1.04	Concrete, structures	---	m3	30.00	16.80	34.30	504.00	1,029.00
2.1.05	Portland cement	---	t	57.90	0.00	206.20	0.00	11,938.98
2.1.06	Reinforcing steel	---	t	13.20	280.00	990.00	3,696.00	13,068.00
2.1.07	Formworks	---	m ²	300.00	5.80	11.85	1,740.00	3,555.00
2.1.08	Random fills and backfills	---	m3	3,000.00	0.20	1.50	600.00	4,500.00
2.1.09	Galvanized corrugated metal pipe	---	kg	27,680.00	0.30	2.80	8,304.00	77,504.00
2.1.10	Concrete demolition	---	m3	30.00	10.00	60.00	300.00	1,800.00
2.2	Installation and removal							
2.2.01	Installation	---	l.s.		---	---	11,298.30	101,684.70
2.2.02	Removal	---	l.s.		---	---	2,607.30	23,465.70
Sub-total							985,784	7,569,322
Missing items and construction contingencies			%	1.50%			14,787	113,540
Total direct costs							1,000,571	7,682,861
UNIT COST IN LOCAL & FOREIGN CURRENCY			m3	751,500			1.331	10.223
AGGREGATE UNIT COST			m3					11.55

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - LOT 1 - LEAN AND BACKFILL CONCRETE

SEC 3-03
 ANA 001
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class C1-16/19							
1.01	Concrete at the batching and mixing plant	---	m ³	3,700.00	2.52	15.19	9,335.10	56,206.70
1.02	Portland cement, normal type	1	t	1,110.00	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	0	kg	0.00	0.00	1.44	0.00	0.00
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Transport							
2.01	Truck-mixer, 8.0 m3 nominal capacity	Op.	hr	483.54	0.33	41.12	159.57	19,883.37
		s.b.	hr	96.71	0.00	13.62	0.00	1,317.18
2.02	Truck.mixer, 10.0 m3 nominal capacity	Op.	hr	0.00	0.40	47.95	0.00	0.00
		s.b.	hr	0.00	0.00	14.53	0.00	0.00
2.03	General foreman	---	hr	5.32	0.00	43.75	0.00	232.71
2.04	Gang foreman	---	hr	53.19	6.11	0.00	324.99	0.00
2.05	Truck-mixer, operator	---	hr	531.90	5.39	0.00	2,866.94	0.00
2.06	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 28 m3/h	Op.	hr	0.00	0.28	21.17	0.00	0.00
		s.b.	hr	0.00	0.00	11.10	0.00	0.00
3.02	Diesel powered concrete pump, max. 54 m3/h	Op.	hr	0.00	0.35	29.66	0.00	0.00
		s.b.	hr	0.00	0.00	13.76	0.00	0.00
3.03	Truck mounted concrete pump, 21.0 m boom (max. 110 m3/h)	Op.	hr	0.00	0.82	53.49	0.00	0.00
		s.b.	hr	0.00	0.00	36.46	0.00	0.00
3.04	Truck mounted concrete pump, 36.0 m boom (max. 140 m3/h)	Op.	hr	0.00	1.11	71.37	0.00	0.00
		s.b.	hr	0.00	0.00	49.06	0.00	0.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	hr	407.00	0.01	1.46	4.07	594.22
		s.b.	hr	101.75	0.00	0.42	0.00	42.74
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	hr	0.00	0.02	1.63	0.00	0.00
		s.b.	hr	0.00	0.00	0.53	0.00	0.00
3.07	Motorcompressor, 10.0 m3/min.	Op.	hr	0.00	0.15	24.64	0.00	0.00
		s.b.	hr	0.00	0.00	5.46	0.00	0.00
3.08	General foreman	---	hr	18.82	0.00	43.75	0.00	823.40
3.09	Gang foreman	---	hr	188.21	6.11	0.00	1,149.94	0.00
3.10	Equipment operator	---	hr	0.00	5.39	0.00	0.00	0.00
3.11	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3.12	Vibrator-man	---	hr	895.40	2.20	0.00	1,969.88	0.00
3.13	Other, semiskilled	---	hr	986.67	2.20	0.00	2,170.67	0.00
4	Finishing and curing							
4.01	General foreman	---	hr	0.00	0.00	43.75	0.00	0.00
4.02	Gang foreman	---	hr	0.00	6.11	0.00	0.00	0.00
4.03	Skilled	---	hr	0.00	0.00	2.77	0.00	0.00
4.04	Semiskilled	---	hr	0.00	0.00	2.20	0.00	0.00
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						17,981.16	79,100.31
6	Additional volume of concrete							
6.01	Overbreak	---	%	0.00%	----	----	0.00	0.00
6.02	Overtickness and losses	---	%	0.50%	----	----	89.91	395.50
	Sub-total						18,071.06	79,495.81
	Missing items and construction contingencies	%		1.50%	----->>	----->>	271.07	1,192.44
	Total Direct Costs						18,342.13	80,688.25
	Overheads, risks and profit on cement and admixtrures	%		25.00%	----->>	----->>	-	-
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	5,149.58	46,346.22
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	3,700	----->>	----->>	6.35	34.33
	AGGREGATE UNIT PRICE		m3		----->>	----->>		40.68

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
SURFACE CONCRETE - LOT 1 - FOUNDATIONS AND MATS

SEC 3-03
ANA 002
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	11,700.00	2.52	15.19	29,519.10	177,734.70
1.02	Portland cement, normal type	1	t	3,627.00	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	10,881.00	0.00	1.44	0.00	15,668.64
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Transport							
2.01	Truck-mixer, 8.0 m3 nominal capacity	Op.	hr	0.00	0.33	41.12	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
2.02	Truck.mixer, 10.0 m3 nominal capacity	Op.	hr	1,223.24	0.40	47.95	489.30	58,654.27
		s.b.	hr	244.65	0.00	14.53	0.00	3,554.73
2.03	General foreman	---	hr	0.00	0.00	43.75	0.00	0.00
2.04	Gang foreman	---	hr	0.00	6.11	0.00	0.00	0.00
2.05	Truck-mixer, operator	---	hr	0.00	5.39	0.00	0.00	0.00
2.06	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 28 m3/h	Op.	hr	139.29	0.28	21.17	39.00	2,948.68
		s.b.	hr	27.86	0.00	11.10	0.00	309.21
3.02	Diesel powered concrete pump, max. 54 m3/h	Op.	hr	180.56	0.35	29.66	63.19	5,355.28
		s.b.	hr	36.11	0.00	13.76	0.00	496.89
3.03	Truck mounted concrete pump, 21.0 m boom (max. 110 m3/h)	Op.	hr	53.18	0.82	53.49	43.61	2,844.70
		s.b.	hr	10.64	0.00	36.46	0.00	387.80
3.04	Truck mounted concrete pump, 36.0 m boom (max. 140 m3/h)	Op.	hr	0.00	1.11	71.37	0.00	0.00
		s.b.	hr	0.00	0.00	49.06	0.00	0.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	hr	0.00	0.01	1.46	0.00	0.00
		s.b.	hr	0.00	0.00	0.42	0.00	0.00
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	hr	1,228.50	0.02	1.63	24.57	2,002.46
		s.b.	hr	245.70	0.00	0.53	0.00	130.22
3.07	Motorcompressor, 10.0 m3/min.	Op.	hr	204.75	0.15	24.64	30.71	5,045.04
		s.b.	hr	40.95	0.00	5.46	0.00	223.59
3.08	General foreman	---	hr	43.44	0.00	43.75	0.00	1,900.50
3.09	Gang foreman	---	hr	434.40	6.11	0.00	2,654.18	0.00
3.10	Equipment operator	---	hr	410.33	5.39	0.00	2,211.65	0.00
3.11	Operator's helper	---	hr	410.33	2.20	0.00	902.72	0.00
3.12	Vibrator-man	---	hr	2,702.70	2.20	0.00	5,945.94	0.00
3.13	Other, semiskilled	---	hr	820.65	2.20	0.00	1,805.43	0.00
4	Finishing and curing							
4.01	General foreman	---	hr	21.06	0.00	43.75	0.00	921.38
4.02	Gang foreman	---	hr	210.60	6.11	0.00	1,286.77	0.00
4.03	Skilled	---	hr	702.00	0.00	2.77	0.00	1,944.54
4.04	Semiskilled	---	hr	1,404.00	0.00	2.20	0.00	3,088.80
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						45,016.17	283,211.41
6	Additional volume of concrete							
6.01	Overbreak	---	%	8.00%	----	----	3,601.29	22,656.91
6.02	Overtickness and losses	---	%	0.50%	----	----	225.08	1,416.06
	Sub-total						48,842.55	307,284.38
	Missing items and construction contingencies	%		1.50%	----->>		732.64	4,609.27
	Total Direct Costs						49,575.19	311,893.65
	Overheads, risks and profit on cement and admixtrures	%		25.00%	----->>		391.72	3,525.44
	Overhead, risks & profit on other costs	%		52.00%	----->>		17,981.61	161,834.49
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	11,700			5.81	40.79
	AGGREGATE UNIT PRICE		m3					46.60

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - LOT 1 - CULVERTS AND SMALL BRIDGES

SEC 3-03
 ANA 003
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	5,400.00	2.52	15.19	13,624.20	82,031.40
1.02	Portland cement, normal type	1	t	1,674.00	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	5,022.00	0.00	1.44	0.00	7,231.68
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Transport							
2.01	Truck-mixer, 8.0 m3 nominal capacity	Op.	hr	705.71	0.33	41.12	232.89	29,018.97
		s.b.	hr	141.14	0.00	13.62	0.00	1,922.37
2.02	Truck.mixer, 10.0 m3 nominal capacity	Op.	hr	0.00	0.40	47.95	0.00	0.00
		s.b.	hr	0.00	0.00	14.53	0.00	0.00
2.03	General foreman	---	hr	7.76	0.00	43.75	0.00	339.63
2.04	Gang foreman	---	hr	77.63	6.11	0.00	474.31	0.00
2.05	Truck-mixer, operator	---	hr	776.29	5.39	0.00	4,184.18	0.00
2.06	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 28 m3/h	Op.	hr	91.84	0.28	21.17	25.71	1,944.18
		s.b.	hr	18.37	0.00	11.10	0.00	203.88
3.02	Diesel powered concrete pump, max. 54 m3/h	Op.	hr	0.00	0.35	29.66	0.00	0.00
		s.b.	hr	0.00	0.00	13.76	0.00	0.00
3.03	Truck mounted concrete pump, 21.0 m boom (max. 110 m3/h)	Op.	hr	121.56	0.82	53.49	99.68	6,502.16
		s.b.	hr	24.31	0.00	36.46	0.00	886.40
3.04	Truck mounted concrete pump, 36.0 m boom (max. 140 m3/h)	Op.	hr	0.00	1.11	71.37	0.00	0.00
		s.b.	hr	0.00	0.00	49.06	0.00	0.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	hr	594.00	0.01	1.46	5.94	867.24
		s.b.	hr	148.50	0.00	0.42	0.00	62.37
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	hr	567.00	0.02	1.63	11.34	924.21
		s.b.	hr	113.40	0.00	0.53	0.00	60.10
3.07	Motorcompressor, 10.0 m3/min.	Op.	hr	185.88	0.15	24.64	27.88	4,580.20
		s.b.	hr	37.18	0.00	5.46	0.00	202.99
3.08	General foreman	---	hr	39.63	0.00	43.75	0.00	1,733.64
3.09	Gang foreman	---	hr	396.26	6.11	0.00	2,421.15	0.00
3.10	Equipment operator	---	hr	234.73	5.39	0.00	1,265.22	0.00
3.11	Operator's helper	---	hr	234.73	2.20	0.00	516.42	0.00
3.12	Vibrator-man	---	hr	2,554.20	2.20	0.00	5,619.24	0.00
3.13	Other, semiskilled	---	hr	938.94	2.20	0.00	2,065.67	0.00
4	Finishing and curing							
4.01	General foreman	---	hr	56.70	0.00	43.75	0.00	2,480.63
4.02	Gang foreman	---	hr	567.00	6.11	0.00	3,464.37	0.00
4.03	Skilled	---	hr	1,890.00	0.00	2.77	0.00	5,235.30
4.04	Semiskilled	---	hr	3,780.00	0.00	2.20	0.00	8,316.00
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						34,038.20	154,543.34
6	Additional volume of concrete							
6.01	Overbreak	---	%	5.00%	---	---	1,701.91	7,727.17
6.02	Overtickness and losses	---	%	0.50%	---	---	170.19	772.72
	Sub-total						35,910.30	163,043.22
	Missing items and construction contingencies	%		1.50%			538.65	2,445.65
	Total Direct Costs						36,448.95	165,488.87
	Overheads, risks and profit on cement and admixtures	%		25.00%			180.79	1,627.13
	Overhead, risks & profit on other costs	%		52.00%			10,124.72	91,122.48
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	5,400			8.66	47.82
	AGGREGATE UNIT PRICE		m3					56.48

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
SURFACE CONCRETE - LOT 1 - RETAINING WALLS

SEC 3-03
ANA 004
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	11,400.00	2.52	15.19	28,762.20	173,177.40
1.02	Portland cement, normal type	1	t	3,534.00	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	10,602.00	0.00	1.44	0.00	15,266.88
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Transport							
2.01	Truck-mixer, 8.0 m3 nominal capacity	Op.	hr	0.00	0.33	41.12	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
2.02	Truck.mixer, 10.0 m3 nominal capacity	Op.	hr	1,191.87	0.40	47.95	476.75	57,150.31
		s.b.	hr	238.37	0.00	14.53	0.00	3,463.58
2.03	General foreman	---	hr	0.00	0.00	43.75	0.00	0.00
2.04	Gang foreman	---	hr	0.00	6.11	0.00	0.00	0.00
2.05	Truck-mixer, operator	---	hr	0.00	5.39	0.00	0.00	0.00
2.06	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 28 m3/h	Op.	hr	254.46	0.28	21.17	71.25	5,387.01
		s.b.	hr	50.89	0.00	11.10	0.00	564.91
3.02	Diesel powered concrete pump, max. 54 m3/h	Op.	hr	131.94	0.35	29.66	46.18	3,913.47
		s.b.	hr	26.39	0.00	13.76	0.00	363.11
3.03	Truck mounted concrete pump, 21.0 m boom	Op.	hr	43.18	0.82	53.49	35.41	2,309.80
	(max. 110 m3/h)	s.b.	hr	8.64	0.00	36.46	0.00	314.88
3.04	Truck mounted concrete pump, 36.0 m boom	Op.	hr	0.00	1.11	71.37	0.00	0.00
	(max. 140 m3/h)	s.b.	hr	0.00	0.00	49.06	0.00	0.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	hr	1,254.00	0.01	1.46	12.54	1,830.84
		s.b.	hr	313.50	0.00	0.42	0.00	131.67
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	hr	1,197.00	0.02	1.63	23.94	1,951.11
		s.b.	hr	239.40	0.00	0.53	0.00	126.88
3.07	Motorcompressor, 10.0 m3/min.	Op.	hr	392.42	0.15	24.64	58.86	9,669.30
		s.b.	hr	78.48	0.00	5.46	0.00	428.53
3.08	General foreman	---	hr	72.82	0.00	43.75	0.00	3,186.05
3.09	Gang foreman	---	hr	728.24	6.11	0.00	4,449.55	0.00
3.10	Equipment operator	---	hr	472.55	5.39	0.00	2,547.04	0.00
3.11	Operator's helper	---	hr	472.55	2.20	0.00	1,039.61	0.00
3.12	Vibrator-man	---	hr	5,392.20	2.20	0.00	11,862.84	0.00
3.13	Other, semiskilled	---	hr	945.10	2.20	0.00	2,079.22	0.00
4	Finishing and curing							
4.01	General foreman	---	hr	51.30	0.00	43.75	0.00	2,244.38
4.02	Gang foreman	---	hr	513.00	6.11	0.00	3,134.43	0.00
4.03	Skilled	---	hr	1,710.00	0.00	2.77	0.00	4,736.70
4.04	Semiskilled	---	hr	3,420.00	0.00	2.20	0.00	7,524.00
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	5,700.00	2.12	2.68	12,084.00	15,276.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						66,683.82	309,016.81
6	Additional volume of concrete							
6.01	Overbreak	---	%	2.00%	---	---	1,333.68	6,180.34
6.02	Overtickness and losses	---	%	0.50%	---	---	333.42	1,545.08
	Sub-total						68,350.91	316,742.23
	Missing items and construction contingencies	%		1.50%			1,025.26	4,751.13
	Total Direct Costs						69,376.18	321,493.37
	Overheads, risks and profit on cement and admixtures	%		25.00%			381.67	3,435.05
	Overhead, risks & profit on other costs	%		52.00%			19,531.34	175,782.05
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	11,400			7.83	43.92
	AGGREGATE UNIT PRICE		m3					51.75

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - LOT 1 - BEAMS AND SLABS OF BRIDGES

SEC 3-03
 ANA 005
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class A2-30/37							
1.01	Concrete at the batching and mixing plant	---	m ³	3,900.00	2.52	15.19	9,839.70	59,244.90
1.02	Portland cement, normal type	1	t	1,404.00	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	0	kg	0.00	0.00	1.44	0.00	0.00
1.05	Concrete admixture, superplasticizer	1	kg	8,424.00	0.00	1.97	0.00	16,595.28
2	Transport							
2.01	Truck-mixer, 8.0 m3 nominal capacity	Op.	hr	0.00	0.33	41.12	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
2.02	Truck.mixer, 10.0 m3 nominal capacity	Op.	hr	407.75	0.40	47.95	163.10	19,551.42
		s.b.	hr	81.55	0.00	14.53	0.00	1,184.91
2.03	General foreman	---	hr	0.00	0.00	43.75	0.00	0.00
2.04	Gang foreman	---	hr	0.00	6.11	0.00	0.00	0.00
2.05	Truck-mixer, operator	---	hr	0.00	5.39	0.00	0.00	0.00
2.06	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 28 m3/h	Op.	hr	127.68	0.28	21.17	35.75	2,702.96
		s.b.	hr	25.54	0.00	11.10	0.00	283.45
3.02	Diesel powered concrete pump, max. 54 m3/h	Op.	hr	0.00	0.35	29.66	0.00	0.00
		s.b.	hr	0.00	0.00	13.76	0.00	0.00
3.03	Truck mounted concrete pump, 21.0 m boom	Op.	hr	41.36	0.82	53.49	33.92	2,212.54
	(max. 110 m3/h)	s.b.	hr	8.27	0.00	36.46	0.00	301.62
3.04	Truck mounted concrete pump, 36.0 m boom	Op.	hr	18.24	1.11	71.37	20.25	1,301.99
	(max. 140 m3/h)	s.b.	hr	3.65	0.00	49.06	0.00	179.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	hr	429.00	0.01	1.46	4.29	626.34
		s.b.	hr	107.25	0.00	0.42	0.00	45.05
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	hr	409.50	0.02	1.63	8.19	667.49
		s.b.	hr	81.90	0.00	0.53	0.00	43.41
3.07	Motorcompressor, 10.0 m3/min.	Op.	hr	134.25	0.15	24.64	20.14	3,307.92
		s.b.	hr	26.85	0.00	5.46	0.00	146.60
3.08	General foreman	---	hr	32.87	0.00	43.75	0.00	1,437.97
3.09	Gang foreman	---	hr	328.68	6.11	0.00	2,008.23	0.00
3.10	Equipment operator	---	hr	206.01	5.39	0.00	1,110.41	0.00
3.11	Operator's helper	---	hr	206.01	2.20	0.00	453.23	0.00
3.12	Vibrator-man	---	hr	1,844.70	2.20	0.00	4,058.34	0.00
3.13	Other, semiskilled	---	hr	1,030.07	2.20	0.00	2,266.15	0.00
4	Finishing and curing							
4.01	General foreman	---	hr	117.00	0.00	43.75	0.00	5,118.75
4.02	Gang foreman	---	hr	1,170.00	6.11	0.00	7,148.70	0.00
4.03	Skilled	---	hr	3,900.00	0.00	2.77	0.00	10,803.00
4.04	Semiskilled	---	hr	7,800.00	0.00	2.20	0.00	17,160.00
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						27,170.40	142,914.59
6	Additional volume of concrete							
6.01	Overbreak	---	%	0.00%	---	---	0.00	0.00
6.02	Overtickness and losses	---	%	0.50%	---	---	135.85	714.57
	Sub-total						27,306.25	143,629.16
	Missing items and construction contingencies	%		1.50%			409.59	2,154.44
	Total Direct Costs						27,715.84	145,783.60
	Overheads, risks and profit on cement and admixtures	%		25.00%			414.88	3,733.94
	Overhead, risks & profit on other costs	%		52.00%			8,159.02	73,431.15
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	3,900			9.31	57.17
	AGGREGATE UNIT PRICE		m3					66.47

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
SURFACE CONCRETE - LOT 1 - ROAD PAVING

SEC 3-03
ANA 006
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class A2-30/37							
1.01	Concrete at the batching and mixing plant	---	m ³	4,400.00	2.52	15.19	11,101.20	66,840.40
1.02	Portland cement, normal type	1	t	1,584.00	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	4,752.00	0.00	1.44	0.00	6,842.88
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Transport							
2.01	Truck-mixer, 8.0 m3 nominal capacity	Op.	hr	575.03	0.33	41.12	189.76	23,645.09
		s.b.	hr	115.01	0.00	13.62	0.00	1,566.37
2.02	Truck.mixer, 10.0 m3 nominal capacity	Op.	hr	0.00	0.40	47.95	0.00	0.00
		s.b.	hr	0.00	0.00	14.53	0.00	0.00
2.03	General foreman	---	hr	6.33	0.00	43.75	0.00	276.73
2.04	Gang foreman	---	hr	63.25	6.11	0.00	386.48	0.00
2.05	Truck-mixer, operator	---	hr	632.53	5.39	0.00	3,409.33	0.00
2.06	Operator's helper	---	hr	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 28 m3/h	Op.	hr	0.00	0.28	21.17	0.00	0.00
		s.b.	hr	0.00	0.00	11.10	0.00	0.00
3.02	Diesel powered concrete pump, max. 54 m3/h	Op.	hr	0.00	0.35	29.66	0.00	0.00
		s.b.	hr	0.00	0.00	13.76	0.00	0.00
3.03	Truck mounted concrete pump, 21.0 m boom (max. 110 m3/h)	Op.	hr	66.67	0.82	53.49	54.67	3,566.00
		s.b.	hr	13.33	0.00	36.46	0.00	486.13
3.04	Truck mounted concrete pump, 36.0 m boom (max. 140 m3/h)	Op.	hr	0.00	1.11	71.37	0.00	0.00
		s.b.	hr	0.00	0.00	49.06	0.00	0.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	hr	677.60	0.01	1.46	6.78	989.30
		s.b.	hr	169.40	0.00	0.42	0.00	71.15
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	hr	0.00	0.02	1.63	0.00	0.00
		s.b.	hr	0.00	0.00	0.53	0.00	0.00
3.07	Motorcompressor, 10.0 m3/min.	Op.	hr	104.25	0.15	24.64	15.64	2,568.63
		s.b.	hr	20.85	0.00	5.46	0.00	113.84
3.08	General foreman	---	hr	18.57	0.00	43.75	0.00	812.61
3.09	Gang foreman	---	hr	185.74	6.11	0.00	1,134.86	0.00
3.10	Equipment operator	---	hr	73.33	5.39	0.00	395.27	0.00
3.11	Operator's helper	---	hr	73.33	2.20	0.00	161.33	0.00
3.12	Vibrator-man	---	hr	1,490.72	2.20	0.00	3,279.58	0.00
3.13	Other, semiskilled	---	hr	220.00	2.20	0.00	484.00	0.00
4	Finishing and curing							
4.01	General foreman	---	hr	132.00	0.00	43.75	0.00	5,775.00
4.02	Gang foreman	---	hr	1,320.00	6.11	0.00	8,065.20	0.00
4.03	Skilled	---	hr	4,400.00	0.00	2.77	0.00	12,188.00
4.04	Semiskilled	---	hr	8,800.00	0.00	2.20	0.00	19,360.00
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						28,684.09	145,102.12
6	Additional volume of concrete							
6.01	Overbreak	---	%	1.00%	---	---	286.84	1,451.02
6.02	Overtickness and losses	---	%	0.50%	---	---	143.42	725.51
	Sub-total						29,114.35	147,278.65
	Missing items and construction contingencies	%		1.50%			436.72	2,209.18
	Total Direct Costs						29,551.07	149,487.83
	Overheads, risks and profit on cement and admixtures	%		25.00%			171.07	1,539.65
	Overhead, risks & profit on other costs	%		52.00%			8,954.19	80,587.74
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	4,400			8.79	52.64
	AGGREGATE UNIT PRICE		m3					61.43

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - DIVERSION TUNNEL INLETS, FOUNDATION AND MAT

SEC 3-03
 ANA 007
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	3,626.00	1.33	10.22	4,826.21	37,068.60
1.02	Portland cement, normal type	1	t	1,305.36	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	3,916.08	0.00	1.44	-	5,639.16
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	421.46	0.40	47.95	168.58	20,209.01
		s.b.	h	84.29	0.00	14.53	-	1,224.76
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	4.64	0.00	43.75	-	202.83
2.04	Gang foreman	---	h	46.36	6.11	0.00	283.26	-
2.05	Truck-mixer, operator	---	h	463.61	5.39	0.00	2,498.84	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	118.63	0.35	29.66	41.52	3,518.52
		s.b.	h	23.73	0.00	13.76	-	326.47
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	0.00	0.82	53.49	-	-
		s.b.	h	0.00	0.00	36.46	-	-
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	-	-
		s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	398.86	0.01	1.46	3.99	582.34
		s.b.	h	99.72	0.00	0.42	-	41.88
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	380.73	0.02	1.63	7.61	620.59
		s.b.	h	76.15	0.00	0.53	-	40.36
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	124.82	0.15	24.64	18.72	3,075.52
		s.b.	h	24.96	0.00	5.46	-	136.30
3.08	General foreman	---	h	22.37	0.00	43.75	-	978.72
3.09	Gang foreman	---	h	223.71	6.11	0.00	1,366.85	-
3.10	Equipment operator	---	h	130.49	5.39	0.00	703.35	-
3.11	Operator's helper	---	h	130.49	2.20	0.00	287.08	-
3.12	Vibrator-man	---	h	1,715.10	2.20	0.00	3,773.22	-
3.13	Other, semiskilled	---	h	260.98	2.20	0.00	574.16	-
4	Finishing and curing							
4.01	General foreman	---	h	6.25	0.00	43.75	-	273.65
4.02	Gang foreman	---	h	62.55	6.11	0.00	382.17	-
4.03	Skilled	---	h	208.50	2.77	0.00	577.53	-
4.04	Semiskilled	---	h	416.99	2.20	0.00	917.38	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						16,430.47	73,938.69
6	Additional volume of concrete							
6.01	Overbreak	---	%	5.00%	---	---	728	3,683
6.02	Overtickness and losses	---	%	1.00%	---	---	146	737
	Sub-total						17,303.67	78,358.59
	Missing items and construction contingencies		%	1.50%			259.56	1,175.38
	Total Direct Costs						17,563.23	79,533.97
	Overheads, risks and profit on cement and admixtures		%	25.00%			140.98	1,268.81
	Overhead, risks & profit on other costs		%	52.00%			4,755.82	42,802.36
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	3,626			6.19	34.09
	AGGREGATE UNIT PRICE		m3					40.28

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - DIVERSION TUNNEL OUTLETS, FOUNDATION AND MAT

SEC 3-03
 ANA 008
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	5,631.60	1.33	10.22	7,495.66	57,571.85
1.02	Portland cement, normal type	1	t	2,027.38	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	6,082.13	0.00	1.44	-	8,758.26
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	624.83	0.40	47.95	249.93	29,960.48
		s.b.	h	124.97	0.00	14.53	-	1,815.75
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	6.87	0.00	43.75	-	300.70
2.04	Gang foreman	---	h	68.73	6.11	0.00	419.95	-
2.05	Truck-mixer, operator	---	h	687.31	5.39	0.00	3,704.60	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	184.24	0.35	29.66	64.49	5,464.67
		s.b.	h	36.85	0.00	13.76	-	507.04
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom	Op.	h	0.00	0.82	53.49	-	-
	(max. 110 m3/h)	s.b.	h	0.00	0.00	36.46	-	-
3.04	Truck mounted concrete pump, 36 m boom	Op.	h	0.00	1.11	71.37	-	-
	(max. 140 m3/h)	s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	619.48	0.01	1.46	6.19	904.43
		s.b.	h	154.87	0.00	0.42	-	65.04
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	591.32	0.02	1.63	11.83	963.85
		s.b.	h	118.26	0.00	0.53	-	62.68
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	193.86	0.15	24.64	29.08	4,776.64
		s.b.	h	38.77	0.00	5.46	-	211.69
3.08	General foreman	---	h	34.74	0.00	43.75	-	1,520.06
3.09	Gang foreman	---	h	347.44	6.11	0.00	2,122.87	-
3.10	Equipment operator	---	h	202.67	5.39	0.00	1,092.38	-
3.11	Operator's helper	---	h	202.67	2.20	0.00	445.87	-
3.12	Vibrator-man	---	h	2,663.75	2.20	0.00	5,860.24	-
3.13	Other, semiskilled	---	h	405.34	2.20	0.00	891.74	-
4	Finishing and curing							
4.01	General foreman	---	h	9.71	0.00	43.75	-	425.01
4.02	Gang foreman	---	h	97.15	6.11	0.00	593.56	-
4.03	Skilled	---	h	323.82	2.77	0.00	896.97	-
4.04	Semiskilled	---	h	647.63	2.20	0.00	1,424.79	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						25,310.15	113,308.15
6	Additional volume of concrete							
6.01	Overbreak	---	%	5.00%	---	---	1,120	5,644
6.02	Overtickness and losses	---	%	1.00%	---	---	224	1,129
	Sub-total						26,653.84	120,081.14
	Missing items and construction contingencies		%	1.50%			399.81	1,801.22
	Total Direct Costs						27,053.65	121,882.35
	Overheads, risks and profit on cement and admixtures		%	25.00%			218.96	1,970.61
	Overhead, risks & profit on other costs		%	52.00%			7,289.24	65,603.18
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	5,631.60			6.14	33.64
	AGGREGATE UNIT PRICE		m3					39.78

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - STAGE 1 POWER TUNNEL INTAKE, FOUNDATION AND MAT

SEC 3-03
 ANA 009
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	43.50	1.33	10.22	57.90	444.70
1.02	Portland cement, normal type	1	t	15.66	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	46.98	0.00	1.44	-	67.65
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	5.00	0.40	47.95	2.00	239.90
		s.b.	h	1.00	0.00	14.53	-	14.54
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	0.06	0.00	43.75	-	2.41
2.04	Gang foreman	---	h	0.55	6.11	0.00	3.36	-
2.05	Truck-mixer, operator	---	h	5.50	5.39	0.00	29.66	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	1.42	0.35	29.66	0.50	42.21
		s.b.	h	0.28	0.00	13.76	-	3.92
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	0.00	0.82	53.49	-	-
		s.b.	h	0.00	0.00	36.46	-	-
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	-	-
		s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	4.79	0.01	1.46	0.05	6.99
		s.b.	h	1.20	0.00	0.42	-	0.50
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	4.57	0.02	1.63	0.09	7.45
		s.b.	h	0.91	0.00	0.53	-	0.48
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	1.50	0.15	24.64	0.22	36.90
		s.b.	h	0.30	0.00	5.46	-	1.64
3.08	General foreman	---	h	0.27	0.00	43.75	-	11.74
3.09	Gang foreman	---	h	2.68	6.11	0.00	16.40	-
3.10	Equipment operator	---	h	1.57	5.39	0.00	8.44	-
3.11	Operator's helper	---	h	1.57	2.20	0.00	3.44	-
3.12	Vibrator-man	---	h	20.58	2.20	0.00	45.27	-
3.13	Other, semiskilled	---	h	3.13	2.20	0.00	6.89	-
4	Finishing and curing							
4.01	General foreman	---	h	0.04	0.00	43.75	-	1.57
4.02	Gang foreman	---	h	0.36	6.11	0.00	2.19	-
4.03	Skilled	---	h	1.20	2.77	0.00	3.31	-
4.04	Semiskilled	---	h	2.39	2.20	0.00	5.26	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						184.99	882.58
6	Additional volume of concrete							
6.01	Overbreak	---	%	5.00%	---	---	9	44
6.02	Overtickness and losses	---	%	1.00%	---	---	2	9
	Sub-total						195.44	935.45
	Missing items and construction contingencies		%	1.50%			2.93	14.03
	Total Direct Costs						198.38	949.48
	Overheads, risks and profit on cement and admixtures		%	25.00%			1.69	15.22
	Overhead, risks & profit on other costs		%	52.00%			56.17	505.53
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	43.50			5.89	33.80
	AGGREGATE UNIT PRICE		m3					39.69

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - TRANSPORTATION TUNNEL T3 PORTAL , FOUNDATION AND MAT

SEC 3-03
 ANA 010
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	215.40	1.33	10.22	286.70	2,202.03
1.02	Portland cement, normal type	1	t	77.54	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	232.63	0.00	1.44	-	334.99
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	19.24	0.40	47.95	7.70	922.45
		s.b.	h	3.85	0.00	14.53	-	55.91
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	0.21	0.00	43.75	-	9.26
2.04	Gang foreman	---	h	2.12	6.11	0.00	12.93	-
2.05	Truck-mixer, operator	---	h	21.16	5.39	0.00	114.06	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	7.05	0.35	29.66	2.47	209.02
		s.b.	h	1.41	0.00	13.76	-	19.39
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	0.00	0.82	53.49	-	-
		s.b.	h	0.00	0.00	36.46	-	-
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	-	-
		s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	23.69	0.01	1.46	0.24	34.59
		s.b.	h	5.92	0.00	0.42	-	2.49
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	22.62	0.02	1.63	0.45	36.87
		s.b.	h	4.52	0.00	0.53	-	2.40
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	7.41	0.15	24.64	1.11	182.70
		s.b.	h	1.48	0.00	5.46	-	8.10
3.08	General foreman	---	h	1.33	0.00	43.75	-	58.14
3.09	Gang foreman	---	h	13.29	6.11	0.00	81.20	-
3.10	Equipment operator	---	h	7.75	5.39	0.00	41.78	-
3.11	Operator's helper	---	h	7.75	2.20	0.00	17.05	-
3.12	Vibrator-man	---	h	101.88	2.20	0.00	224.15	-
3.13	Other, semiskilled	---	h	15.50	2.20	0.00	34.11	-
4	Finishing and curing							
4.01	General foreman	---	h	0.18	0.00	43.75	-	7.77
4.02	Gang foreman	---	h	1.78	6.11	0.00	10.86	-
4.03	Skilled	---	h	5.92	2.77	0.00	16.41	-
4.04	Semiskilled	---	h	11.85	2.20	0.00	26.06	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						877.27	4,086.11
6	Additional volume of concrete							
6.01	Overbreak	---	%	5.00%	----	----	41	204
6.02	Overtickness and losses	---	%	1.00%	----	----	8	41
	Sub-total						926.70	4,330.81
	Missing items and construction contingencies	%		1.50%	----->>	----->>	13.90	64.96
	Total Direct Costs						940.60	4,395.77
	Overheads, risks and profit on cement and admixtrures	%		25.00%	----->>	----->>	8.37	75.37
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	260.07	2,340.65
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	215.40	----->>	----->>	5.61	31.62
	AGGREGATE UNIT PRICE		m3		----->>	----->>		37.24

SURFACE CONCRETE - TRANSPORTATION TUNNEL T4 & CABLE TUNNEL PORTALS , FOUNDATION AND I Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	421.00	1.33	10.22	560.35	4,303.88
1.02	Portland cement, normal type	1	t	151.56	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	454.68	0.00	1.44	-	654.74
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	51.67	0.40	47.95	20.67	2,477.63
		s.b.	h	10.33	0.00	14.53	-	150.16
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	0.57	0.00	43.75	-	24.87
2.04	Gang foreman	---	h	5.68	6.11	0.00	34.73	-
2.05	Truck-mixer, operator	---	h	56.84	5.39	0.00	306.36	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	13.77	0.35	29.66	4.82	408.52
		s.b.	h	2.75	0.00	13.76	-	37.90
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	0.00	0.82	53.49	-	-
		s.b.	h	0.00	0.00	36.46	-	-
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	-	-
		s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	46.31	0.01	1.46	0.46	67.61
		s.b.	h	11.58	0.00	0.42	-	4.86
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	44.21	0.02	1.63	0.88	72.05
		s.b.	h	8.84	0.00	0.53	-	4.69
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	14.49	0.15	24.64	2.17	357.09
		s.b.	h	2.90	0.00	5.46	-	15.83
3.08	General foreman	---	h	2.60	0.00	43.75	-	113.63
3.09	Gang foreman	---	h	25.97	6.11	0.00	158.70	-
3.10	Equipment operator	---	h	15.15	5.39	0.00	81.66	-
3.11	Operator's helper	---	h	15.15	2.20	0.00	33.33	-
3.12	Vibrator-man	---	h	199.13	2.20	0.00	438.09	-
3.13	Other, semiskilled	---	h	30.30	2.20	0.00	66.66	-
4	Finishing and curing							
4.01	General foreman	---	h	0.35	0.00	43.75	-	15.20
4.02	Gang foreman	---	h	3.47	6.11	0.00	21.22	-
4.03	Skilled	---	h	11.58	2.77	0.00	32.07	-
4.04	Semiskilled	---	h	23.16	2.20	0.00	50.94	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						1,813.13	8,708.66
6	Additional volume of concrete							
6.01	Overbreak	---	%	5.00%	----	----	85	435
6.02	Overtickness and losses	---	%	1.00%	----	----	17	87
	Sub-total						1,915.66	9,230.27
	Missing items and construction contingencies	%		1.50%	----->>	----->>	28.73	138.45
	Total Direct Costs						1,944.40	9,368.72
	Overheads, risks and profit on cement and admixtrures	%		25.00%	----->>	----->>	16.37	147.32
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	554.24	4,988.12
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	421.00			5.97	34.45
	AGGREGATE UNIT PRICE		m3					40.43

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - DIVERSION TUNNEL INLETS, ABOVE FOUNDATION

SEC 3-03
 ANA 012
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	30,868.00	1.33	10.22	41,085.31	315,563.56
1.02	Portland cement, normal type	1	t	11,112.48	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	33,337.44	0.00	1.44	-	48,005.91
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	3,587.87	0.40	47.95	1,435.15	172,038.57
		s.b.	h	717.57	0.00	14.53	-	10,426.36
2.02	Truck-mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	39.47	0.00	43.75	-	1,726.66
2.04	Gang foreman	---	h	394.67	6.11	0.00	2,411.41	-
2.05	Truck-mixer, operator	---	h	3,946.66	5.39	0.00	21,272.51	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	345.45	0.82	53.49	283.27	18,478.16
		s.b.	h	69.09	0.00	36.46	-	2,519.03
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	110.24	1.11	71.37	122.37	7,868.03
		s.b.	h	22.05	0.00	49.06	-	1,081.70
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	3,395.48	0.01	1.46	33.95	4,957.40
		s.b.	h	848.87	0.00	0.42	-	356.53
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	3,241.14	0.02	1.63	64.82	5,283.06
		s.b.	h	648.23	0.00	0.53	-	343.56
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	1,062.57	0.15	24.64	159.39	26,181.76
		s.b.	h	212.51	0.00	5.46	-	1,160.33
3.08	General foreman	---	h	171.07	0.00	43.75	-	7,484.26
3.09	Gang foreman	---	h	1,710.69	6.11	0.00	10,452.30	-
3.10	Equipment operator	---	h	501.26	5.39	0.00	2,701.81	-
3.11	Operator's helper	---	h	501.26	2.20	0.00	1,102.78	-
3.12	Vibrator-man	---	h	14,600.56	2.20	0.00	32,121.24	-
3.13	Other, semiskilled	---	h	1,503.79	2.20	0.00	3,308.33	-
4	Finishing and curing							
4.01	General foreman	---	h	81.49	0.00	43.75	-	3,565.25
4.02	Gang foreman	---	h	814.92	6.11	0.00	4,979.13	-
4.03	Skilled	---	h	2,716.38	2.77	0.00	7,524.38	-
4.04	Semiskilled	---	h	5,432.77	2.20	0.00	11,952.09	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m ²	15,434.00	2.12	2.68	32,720.08	41,363.12
	Sub total (No. 1, 2, 3, 4 & 5) ----->>			----->	----->	----->	173,730.33	668,403.26
6	Additional volume of concrete							
6.01	Overbreak	---	%	10.0%	----	----	11,655	62,347
6.02	Overtickness and losses	---	%	1.0%	----	----	1,166	6,235
	Sub-total						186,551.34	736,985.50
	Missing items and construction contingencies	%		1.50%	----->>	----->>	2,798.27	11,054.78
	Total Direct Costs						189,349.61	748,040.28
	Overheads, risks and profit on cement and admixtures	%		25.00%	----->>	----->>	1,200.15	10,801.33
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	46,247.97	416,231.70
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	30,868			7.67	38.07
	AGGREGATE UNIT PRICE		m3					45.74

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - DIVERSION TUNNEL INLETS, ABUTMENT STABILIZATION

SEC 3-03
 ANA 013
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	8,000.00	1.33	10.22	10,648.00	81,784.00
1.02	Portland cement, normal type	1	t	2,880.00	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	8,640.00	0.00	1.44	-	12,441.60
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	845.33	0.40	47.95	338.13	40,533.55
		s.b.	h	169.07	0.00	14.53	-	2,456.53
2.02	Truck-mixer, 12 m3 capacity	Op.	h	845.33	0.46	52.69	388.85	44,540.41
		s.b.	h	169.07	0.00	16.74	-	2,830.16
2.03	General foreman	---	h	9.30	0.00	43.75	-	406.81
2.04	Gang foreman	---	h	92.99	6.11	0.00	568.15	-
2.05	Truck-mixer, operator	---	h	929.86	5.39	0.00	5,011.96	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump, max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	38.37	0.82	53.49	31.46	2,052.41
		s.b.	h	7.67	0.00	36.46	-	279.79
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	66.67	1.11	71.37	74.00	4,758.00
		s.b.	h	13.33	0.00	49.06	-	654.13
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	880.00	0.01	1.46	8.80	1,284.80
		s.b.	h	220.00	0.00	0.42	-	92.40
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	840.00	0.02	1.63	16.80	1,369.20
		s.b.	h	168.00	0.00	0.53	-	89.04
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	275.38	0.15	24.64	41.31	6,785.48
		s.b.	h	55.08	0.00	5.46	-	300.72
3.08	General foreman	---	h	43.62	0.00	43.75	-	1,908.24
3.09	Gang foreman	---	h	436.17	6.11	0.00	2,665.00	-
3.10	Equipment operator	---	h	115.54	5.39	0.00	622.76	-
3.11	Operator's helper	---	h	115.54	2.20	0.00	254.19	-
3.12	Vibrator-man	---	h	3,784.00	2.20	0.00	8,324.80	-
3.13	Other, semiskilled	---	h	346.62	2.20	0.00	762.57	-
4	Finishing and curing							
4.01	General foreman	---	h	24.00	0.00	43.75	-	1,050.00
4.02	Gang foreman	---	h	240.00	6.11	0.00	1,466.40	-
4.03	Skilled	---	h	800.00	2.77	0.00	2,216.00	-
4.04	Semiskilled	---	h	1,600.00	2.20	0.00	3,520.00	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	4,000.00	2.12	2.68	8,480.00	10,720.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						45,439.17	216,337.28
6	Additional volume of concrete							
6.01	Overbreak	---	%	15.0%	----	----	4,464	30,685
6.02	Overtickness and losses	---	%	1.0%	----	----	298	2,046
	Sub-total						50,200.26	249,068.04
	Missing items and construction contingencies	%		1.50%	----->>	----->>	753.00	3,736.02
	Total Direct Costs						50,953.26	252,804.06
	Overheads, risks and profit on cement and admixtures	%		25.00%	----->>	----->>	311.04	2,799.36
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	15,148.42	136,335.76
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	8,000	----->>	----->>	8.30	48.99
	AGGREGATE UNIT PRICE		m3		----->>	----->>		57.29

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - DIVERSION TUNNEL OUTLETS, ABOVE FOUNDATION

SEC 3-03
 ANA 014
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	18,772.00	1.33	10.22	24,985.53	191,906.16
1.02	Portland cement, normal type	1	t	6,757.92	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	20,273.76	0.00	1.44	-	29,194.21
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	2,082.76	0.40	47.95	833.10	99,868.26
		s.b.	h	416.55	0.00	14.53	-	6,052.50
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	22.91	0.00	43.75	-	1,002.33
2.04	Gang foreman	---	h	229.10	6.11	0.00	1,399.82	-
2.05	Truck-mixer, operator	---	h	2,291.03	5.39	0.00	12,348.67	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	210.08	0.82	53.49	172.27	11,237.27
		s.b.	h	42.02	0.00	36.46	-	1,531.92
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	67.04	1.11	71.37	74.42	4,784.85
		s.b.	h	13.41	0.00	49.06	-	657.82
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	2,064.92	0.01	1.46	20.65	3,014.78
		s.b.	h	516.23	0.00	0.42	-	216.82
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	1,971.06	0.02	1.63	39.42	3,212.83
		s.b.	h	394.21	0.00	0.53	-	208.93
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	646.19	0.15	24.64	96.93	15,922.12
		s.b.	h	129.24	0.00	5.46	-	705.64
3.08	General foreman	---	h	104.03	0.00	43.75	-	4,551.46
3.09	Gang foreman	---	h	1,040.33	6.11	0.00	6,356.44	-
3.10	Equipment operator	---	h	304.84	5.39	0.00	1,643.07	-
3.11	Operator's helper	---	h	304.84	2.20	0.00	670.64	-
3.12	Vibrator-man	---	h	8,879.16	2.20	0.00	19,534.14	-
3.13	Other, semiskilled	---	h	914.51	2.20	0.00	2,011.92	-
4	Finishing and curing							
4.01	General foreman	---	h	56.32	0.00	43.75	-	2,463.83
4.02	Gang foreman	---	h	563.16	6.11	0.00	3,440.91	-
4.03	Skilled	---	h	1,877.20	2.77	0.00	5,199.84	-
4.04	Semiskilled	---	h	3,754.40	2.20	0.00	8,259.68	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	9,386.00	2.12	2.68	19,898.32	25,154.48
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						106,985.79	401,686.20
6	Additional volume of concrete							
6.01	Overbreak	---	%	10.00%	----	----	7,019	37,407
6.02	Overtickness and losses	---	%	1.00%	----	----	702	3,741
	Sub-total						114,706.36	442,833.67
	Missing items and construction contingencies	%		1.50%	----->>	----->>	1,720.60	6,642.51
	Total Direct Costs						116,426.96	449,476.17
	Overheads, risks and profit on cement and admixtrures	%		25.00%	----->>	----->>	729.86	6,568.70
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	27,908.86	251,179.77
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	18,772.00			7.73	37.67
	AGGREGATE UNIT PRICE		m3					45.40

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - STAGE 1 POWER TUNNEL INTAKE, ABOVE FOUNDATION

SEC 3-03
 ANA 015
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	2,282.00	1.33	10.22	3,037.34	23,328.89
1.02	Portland cement, normal type	1	t	821.52	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	2,464.56	0.00	1.44	-	3,548.97
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	262.46	0.40	47.95	104.98	12,585.02
		s.b.	h	52.49	0.00	14.53	-	762.71
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	2.89	0.00	43.75	-	126.31
2.04	Gang foreman	---	h	28.87	6.11	0.00	176.40	-
2.05	Truck-mixer, operator	---	h	288.71	5.39	0.00	1,556.13	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	18.24	0.82	53.49	14.96	975.75
		s.b.	h	3.65	0.00	36.46	-	133.02
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	13.58	1.11	71.37	15.08	969.44
		s.b.	h	2.72	0.00	49.06	-	133.28
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	251.02	0.01	1.46	2.51	366.49
		s.b.	h	62.76	0.00	0.42	-	26.36
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	239.61	0.02	1.63	4.79	390.56
		s.b.	h	47.92	0.00	0.53	-	25.40
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	78.55	0.15	24.64	11.78	1,935.56
		s.b.	h	15.71	0.00	5.46	-	85.78
3.08	General foreman	---	h	12.54	0.00	43.75	-	548.81
3.09	Gang foreman	---	h	125.44	6.11	0.00	766.45	-
3.10	Equipment operator	---	h	35.01	5.39	0.00	188.69	-
3.11	Operator's helper	---	h	35.01	2.20	0.00	77.02	-
3.12	Vibrator-man	---	h	1,079.39	2.20	0.00	2,374.65	-
3.13	Other, semiskilled	---	h	105.02	2.20	0.00	231.05	-
4	Finishing and curing							
4.01	General foreman	---	h	7.87	0.00	43.75	-	344.44
4.02	Gang foreman	---	h	78.73	6.11	0.00	481.03	-
4.03	Skilled	---	h	262.43	2.77	0.00	726.93	-
4.04	Semiskilled	---	h	524.86	2.20	0.00	1,154.69	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	456.40	2.12	2.68	967.57	1,223.15
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						11,892.07	47,509.94
6	Additional volume of concrete							
6.01	Overbreak	---	%	8.00%	----	----	685	3,675
6.02	Overtickness and losses	---	%	1.00%	----	----	86	459
	Sub-total						12,662.63	51,644.75
	Missing items and construction contingencies		%	1.50%	----->>	----->>	189.94	774.67
	Total Direct Costs						12,852.57	52,419.42
	Overheads, risks and profit on cement and admixtrures		%	25.00%	----->>	----->>	88.72	798.52
	Overhead, risks & profit on other costs		%	52.00%	----->>	----->>	3,209.60	28,886.37
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	2,282.00			7.08	35.98
	AGGREGATE UNIT PRICE		m3					43.06

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - TRANSPORTATION TUNNEL T3 PORTAL , ABOVE FOUNDATION

SEC 3-03
 ANA 016
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	718.00	1.33	10.22	955.66	7,340.11
1.02	Portland cement, normal type	1	t	258.48	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	775.44	0.00	1.44	-	1,116.63
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	64.13	0.40	47.95	25.65	3,074.85
		s.b.	h	12.83	0.00	14.53	-	186.35
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	0.71	0.00	43.75	-	30.86
2.04	Gang foreman	---	h	7.05	6.11	0.00	43.10	-
2.05	Truck-mixer, operator	---	h	70.54	5.39	0.00	380.20	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	11.48	0.82	53.49	9.41	614.01
		s.b.	h	2.30	0.00	36.46	-	83.70
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	-	-
		s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	78.98	0.01	1.46	0.79	115.31
		s.b.	h	19.75	0.00	0.42	-	8.29
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	75.39	0.02	1.63	1.51	122.89
		s.b.	h	15.08	0.00	0.53	-	7.99
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	24.72	0.15	24.64	3.71	609.00
		s.b.	h	4.94	0.00	5.46	-	26.99
3.08	General foreman	---	h	4.03	0.00	43.75	-	176.20
3.09	Gang foreman	---	h	40.27	6.11	0.00	246.08	-
3.10	Equipment operator	---	h	12.63	5.39	0.00	68.06	-
3.11	Operator's helper	---	h	12.63	2.20	0.00	27.78	-
3.12	Vibrator-man	---	h	339.61	2.20	0.00	747.15	-
3.13	Other, semiskilled	---	h	37.88	2.20	0.00	83.34	-
4	Finishing and curing							
4.01	General foreman	---	h	1.81	0.00	43.75	-	79.16
4.02	Gang foreman	---	h	18.09	6.11	0.00	110.55	-
4.03	Skilled	---	h	60.31	2.77	0.00	167.06	-
4.04	Semiskilled	---	h	120.62	2.20	0.00	265.37	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
Sub total (No. 1, 2, 3, 4 & 5) ----->>							3,135.42	13,592.35
6	Additional volume of concrete							
6.01	Overbreak	---	%	10.00%	----	----	259	1,351
6.02	Overtickness and losses	---	%	1.00%	----	----	26	135
Sub-total							3,420.59	15,078.80
Missing items and construction contingencies							51.31	226.18
Total Direct Costs							3,471.90	15,304.99
Overheads, risks and profit on cement and admixtrures							27.92	251.24
Overhead, risks & profit on other costs							918.33	8,265.00
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	718.00	----->>	6.15	33.18
AGGREGATE UNIT PRICE				m3	----->>	----->>	39.33	

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 3-03
ANA 017

SURFACE CONCRETE - TRANSPORTATION TUNNEL T4 & CABLE TUNNEL PORTALS , ABOVE FOUNDATIC Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	1,050.00	1.33	10.22	1,397.55	10,734.15
1.02	Portland cement, normal type	1	t	378.00	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	1,134.00	0.00	1.44	-	1,632.96
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	128.87	0.40	47.95	51.55	6,179.37
		s.b.	h	25.77	0.00	14.53	-	374.50
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	1.42	0.00	43.75	-	62.02
2.04	Gang foreman	---	h	14.18	6.11	0.00	86.61	-
2.05	Truck-mixer, operator	---	h	141.76	5.39	0.00	764.08	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	11.75	0.82	53.49	9.64	628.55
		s.b.	h	2.35	0.00	36.46	-	85.69
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	3.75	1.11	71.37	4.16	267.64
		s.b.	h	0.75	0.00	49.06	-	36.80
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	115.50	0.01	1.46	1.16	168.63
		s.b.	h	28.88	0.00	0.42	-	12.13
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	110.25	0.02	1.63	2.21	179.71
		s.b.	h	22.05	0.00	0.53	-	11.69
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	36.14	0.15	24.64	5.42	890.59
		s.b.	h	7.23	0.00	5.46	-	39.47
3.08	General foreman	---	h	5.82	0.00	43.75	-	254.58
3.09	Gang foreman	---	h	58.19	6.11	0.00	355.54	-
3.10	Equipment operator	---	h	17.05	5.39	0.00	91.90	-
3.11	Operator's helper	---	h	17.05	2.20	0.00	37.51	-
3.12	Vibrator-man	---	h	496.65	2.20	0.00	1,092.63	-
3.13	Other, semiskilled	---	h	51.15	2.20	0.00	112.54	-
4	Finishing and curing							
4.01	General foreman	---	h	3.87	0.00	43.75	-	169.51
4.02	Gang foreman	---	h	38.75	6.11	0.00	236.73	-
4.03	Skilled	---	h	129.15	2.77	0.00	357.75	-
4.04	Semiskilled	---	h	258.30	2.20	0.00	568.26	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	-	-
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						5,175.23	21,727.97
6	Additional volume of concrete							
6.01	Overbreak	---	%	10.00%	----	----	401	2,156
6.02	Overtickness and losses	---	%	1.00%	----	----	40	216
	Sub-total						5,616.61	24,099.41
	Missing items and construction contingencies		%	1.50%			84.25	361.49
	Total Direct Costs						5,700.86	24,460.90
	Overheads, risks and profit on cement and admixtrures		%	25.00%			40.82	367.42
	Overhead, risks & profit on other costs		%	52.00%			1,483.50	13,351.47
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	1,050.00			6.88	36.36
	AGGREGATE UNIT PRICE		m3					43.24

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 SURFACE CONCRETE - TRANSPORTATION TUNNEL T22, PORTALS

SEC 3-03
 ANA 018
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	185.00	1.33	10.22	246.24	1,891.26
1.02	Portland cement, normal type	1	t	66.60	0.00	0.00	-	-
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	-	-
1.04	Concrete admixture, water reducing	1	kg	199.80	0.00	1.44	-	287.71
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	-	-
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	22.39	0.40	47.95	8.95	1,073.43
		s.b.	h	4.48	0.00	14.53	-	65.05
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	-	-
		s.b.	h	0.00	0.00	16.74	-	-
2.03	General foreman	---	h	0.25	0.00	43.75	-	10.77
2.04	Gang foreman	---	h	2.46	6.11	0.00	15.05	-
2.05	Truck-mixer, operator	---	h	24.63	5.39	0.00	132.73	-
2.06	Operator's helper	---	h	0.00	2.20	0.00	-	-
3	Pouring and vibration							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	0.00	0.35	29.66	-	-
		s.b.	h	0.00	0.00	13.76	-	-
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	-	-
		s.b.	h	0.00	0.00	14.10	-	-
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	2.96	0.82	53.49	2.43	158.21
		s.b.	h	0.59	0.00	36.46	-	21.57
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	-	-
		s.b.	h	0.00	0.00	49.06	-	-
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	20.35	0.01	1.46	0.20	29.71
		s.b.	h	5.09	0.00	0.42	-	2.14
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	19.43	0.02	1.63	0.39	31.66
		s.b.	h	3.89	0.00	0.53	-	2.06
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	6.37	0.15	24.64	0.96	156.91
		s.b.	h	1.27	0.00	5.46	-	6.95
3.08	General foreman	---	h	1.04	0.00	43.75	-	45.40
3.09	Gang foreman	---	h	10.38	6.11	0.00	63.40	-
3.10	Equipment operator	---	h	3.25	5.39	0.00	17.54	-
3.11	Operator's helper	---	h	3.25	2.20	0.00	7.16	-
3.12	Vibrator-man	---	h	87.51	2.20	0.00	192.51	-
3.13	Other, semiskilled	---	h	9.76	2.20	0.00	21.47	-
4	Finishing and curing							
4.01	General foreman	---	h	0.58	0.00	43.75	-	25.50
4.02	Gang foreman	---	h	5.83	6.11	0.00	35.61	-
4.03	Skilled	---	h	19.43	2.77	0.00	53.81	-
4.04	Semiskilled	---	h	38.85	2.20	0.00	85.47	-
5	Scaffolding							
5.01	Wall type scaffolding	---	m2	46.25	2.12	2.68	98.05	123.95
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						981.95	3,932.28
6	Additional volume of concrete							
6.01	Overbreak	---	%	15.00%	----	----	106	567
6.02	Overtickness and losses	---	%	1.00%	----	----	7	38
	Sub-total						1,095.40	4,537.53
	Missing items and construction contingencies	%		1.50%	----->>	----->>	16.43	68.06
	Total Direct Costs						1,111.83	4,605.60
	Overheads, risks and profit on cement and admixtrures	%		25.00%	----->>	----->>	7.19	64.74
	Overhead, risks & profit on other costs	%		52.00%	----->>	----->>	282.34	2,541.10
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	185.00	----->>	----->>	7.57	38.98
	AGGREGATE UNIT PRICE		m3		----->>	----->>		46.56

SECTION – 4

UNDERGROUND CONCRETE

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T2 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 001
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	204.25	2.57	18.60	523.93	3,799.27
1.02	Formworks and concrete placing:							
	a) Formwork	---	m2	1,276.56	0.00	1.34	0.00	1,708.04
	b) Grouted anchor bars	---	kg	1,595.70	0.00	0.84	0.00	1,340.39
	c) Formwork bond breaking compound	---	kg	25.53	0.00	3.23	0.00	82.47
	d) Motorcompressor, 5 m3/min.	Op.	h	10.21	0.08	11.32	0.82	115.61
		s.b.	h	2.04	0.00	2.99	0.00	6.11
	e) Immersion type vibrator, 77 mm dia.	Op.	h	30.64	0.01	1.46	0.31	44.73
		s.b.	h	6.13	0.00	0.42	0.00	2.57
	f) General foreman	---	h	1.90	0.00	47.25	0.00	89.57
	g) Gang foreman	---	h	18.96	6.60	0.00	125.12	0.00
	h) Skilled	---	h	189.57	2.77	0.00	525.11	0.00
	i) Semiskilled	---	h	409.78	2.77	0.00	1,135.08	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	8,887.75	1.33	10.22	11,829.60	90,859.47
	b) Portland cement, normal type	50%	t	1,599.80	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,599.80	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	6,399.18	0.00	1.44	0.00	9,214.82
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	1,470.75	0.33	41.12	485.35	60,477.22
		s.b.	h	294.15	0.00	13.62	0.00	4,006.32
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
	c) General foreman	----	h	16.18	0.00	47.25	0.00	764.42
	d) Gang foreman	----	h	161.78	6.60	0.00	1,067.76	0.00
	e) Transit mixer, operator	1	h	1,617.82	5.82	0.00	9,415.74	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	39.2%	----	----	8,926.47	64,730.02
3	Formworks							
3.01	Steel formworks excluding side closure	---	m3	8,887.75	0.00	13.20	0.00	117,318.31
3.02	Side closure of formworks	0	m3	0.00	0.00	0.71	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	12,296.68	0.00	0.24	0.00	2,951.20
		s.b.	h	2,459.34	0.00	0.17	0.00	418.09
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	325.05	0.09	7.91	29.25	2,571.15
		s.b.	h	65.01	0.00	5.13	0.00	333.50
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	5.60	0.00	350.00	0.00	1,958.28
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	1,119.02	0.00	3.58	0.00	4,006.08
3.07	Formwork bond breaking compound	---	kg	554.03	0.00	3.23	0.00	1,789.51
3.08	General foreman	---	h	55.68	0.00	47.25	0.00	2,630.76
3.09	Gang foreman	1	h	556.78	6.60	0.00	3,674.72	0.00
3.10	Specialist	3	h	1,670.33	3.69	0.00	6,163.50	0.00
03:11	Skilled	2	h	1,113.55	2.99	0.00	3,329.52	0.00
03:12	Semiskilled	1	h	556.78	2.38	0.00	1,325.12	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	306.90	0.61	44.83	187.21	13,758.46
		s.b.	h	61.38	0.00	13.85	0.00	850.12
4.02	Motorcompressors, 30 m3/min (28.6 m3/min. consumption)	Op.	h	306.90	0.31	94.77	96.55	29,085.46
		s.b.	h	61.38	0.00	11.42	0.00	701.02
4.03	General foreman	---	h	33.76	0.00	47.25	0.00	1,595.13
4.04	Gang foreman	1	h	337.59	6.60	0.00	2,228.12	0.00
4.05	Concrete pump, operator	1	h	337.59	5.82	0.00	1,964.79	0.00
4.06	Concrete pump, helper	1	h	337.59	2.38	0.00	803.47	0.00
4.07	Skilled	1	h	337.59	2.99	0.00	1,009.40	0.00
4.08	Semiskilled	2	h	675.19	2.38	0.00	1,606.94	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	716.89	60,093.02
Sub-total							57,170.76	477,301.10
Missing items and construction contingencies							% 1.50%	857.56 7,159.52
Total Direct Costs							58,028.32	484,460.62
Overheads, risks and profit on cement and admixtures							% 25.00%	235.66 2,120.98
Overhead, risks & profit on other costs							% 52.00%	27,719.24 249,473.18
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m3 9.092	9.46 80.96
AGGREGATE UNIT PRICE							m3	90.41

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T2 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 002
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	227.08	2.39	18.51	543.49	4,203.27
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,419.26	0.00	1.34	0.00	1,898.97
	b) Grouted anchor bars	---	kg	1,774.08	0.00	0.84	0.00	1,490.22
	c) Formwork bond breaking compound	---	kg	28.39	0.00	3.23	0.00	91.68
	d) Motorcompressor, 5 m3/min.	Op.	h	11.35	0.08	11.32	0.91	128.53
		s.b.	h	2.27	0.00	2.99	0.00	6.79
	e) Immersion type vibrator, 77 mm dia.	Op.	h	34.06	0.01	1.46	0.34	49.73
		s.b.	h	6.81	0.00	0.42	0.00	2.86
	f) General foreman	---	h	2.11	0.00	47.25	0.00	99.58
	g) Gang foreman	---	h	21.08	6.60	0.00	139.10	0.00
	h) Skilled	---	h	210.76	2.77	0.00	583.81	0.00
	i) Semiskilled	---	h	455.58	2.77	0.00	1,261.96	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	10,355.93	1.33	10.22	13,783.74	105,868.66
	b) Portland cement, normal type	50%	t	1,864.07	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,864.07	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	7,456.27	0.00	1.44	0.00	10,737.03
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	1,461.43	0.40	47.95	584.57	70,075.42
		s.b.	h	292.29	0.00	14.53	0.00	4,246.91
	c) General foreman	----	h	16.08	0.00	47.25	0.00	759.58
	d) Gang foreman	----	h	160.76	6.60	0.00	1,061.00	0.00
	e) Transit mixer, operator	1	h	1,607.57	5.82	0.00	9,356.05	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	36.9%	----	----	9,149.03	70,757.72
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	184.14	0.00	790.40	0.00	145,544.26
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	31,067.99	0.00	0.24	0.00	7,456.32
		s.b.	h	6,213.60	0.00	0.17	0.00	1,056.31
3.04	Truck for shifting the forms, 30 t pay load	Op.	h	262.83	0.20	18.17	52.57	4,775.55
		s.b.	h	52.57	0.00	12.41	0.00	652.33
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	6.41	0.00	350.00	0.00	2,242.71
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	1,281.55	0.00	3.58	0.00	4,587.95
3.07	Formwork bond breaking compound	---	kg	725.95	0.00	3.23	0.00	2,344.82
3.08	General foreman	---	h	90.55	0.00	47.25	0.00	4,278.59
3.09	Gang foreman	1	h	905.52	6.60	0.00	5,976.45	0.00
3.10	Specialist	3	h	2,716.57	3.69	0.00	10,024.13	0.00
03:11	Skilled	2	h	1,811.04	2.99	0.00	5,415.02	0.00
03:12	Semiskilled	1	h	905.52	2.38	0.00	2,155.14	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	357.23	0.61	44.83	217.91	16,014.73
		s.b.	h	71.45	0.00	13.85	0.00	989.53
4.02	Motorcompressors, 30 m3/min (33.8 m3/min. consumption)	Op.	h	357.23	0.37	112.00	132.82	40,010.72
		s.b.	h	71.45	0.00	13.50	0.00	964.35
4.03	General foreman	---	h	39.30	0.00	47.25	0.00	1,856.72
4.04	Gang foreman	1	h	392.96	6.60	0.00	2,593.51	0.00
4.05	Concrete pump, operator	1	h	392.96	5.82	0.00	2,287.00	0.00
4.06	Concrete pump, helper	1	h	392.96	2.38	0.00	935.23	0.00
4.07	Skilled	1	h	392.96	2.99	0.00	1,174.94	0.00
4.08	Semiskilled	2	h	785.91	2.38	0.00	1,870.47	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	1,647.26	110,394.18
Sub-total							70,946.44	613,586.01
Missing items and construction contingencies							1,064.20	9,203.79
Total Direct Costs							72,010.64	622,789.80
Overheads, risks and profit on cement and admixtures							274.31	2,468.80
Overhead, risks & profit on other costs							35,559.05	320,031.49
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							10.19	89.32
AGGREGATE UNIT PRICE								99.51

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T3 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 003
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	489.47	2.24	17.46	1,096.44	8,548.01
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	3,059.20	0.00	1.34	0.00	4,093.21
	b) Grouted anchor bars	---	kg	3,824.00	0.00	0.84	0.00	3,212.16
	c) Formwork bond breaking compound	---	kg	61.18	0.00	3.23	0.00	197.62
	d) Motorcompressor, 5 m3/min.	Op.	h	24.47	0.08	11.32	1.96	277.04
		s.b.	h	4.89	0.00	2.99	0.00	14.64
	e) Immersion type vibrator, 77 mm dia.	Op.	h	73.42	0.01	1.46	0.73	107.19
		s.b.	h	14.68	0.00	0.42	0.00	6.17
	f) General foreman	---	h	4.54	0.00	47.25	0.00	214.65
	g) Gang foreman	---	h	45.43	6.60	0.00	299.83	0.00
	h) Skilled	---	h	454.29	2.77	0.00	1,258.39	0.00
	i) Semiskilled	---	h	982.00	2.77	0.00	2,720.15	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	24,224.51	1.33	10.22	32,242.82	247,647.15
	b) Portland cement, normal type	50%	t	4,360.41	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	4,360.41	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	17,441.65	0.00	1.44	0.00	25,115.97
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	2,925.25	0.40	47.95	1,170.10	140,265.91
		s.b.	h	585.05	0.00	14.53	0.00	8,500.79
	c) General foreman	----	h	32.18	0.00	47.25	0.00	1,520.40
	d) Gang foreman	----	h	321.78	6.60	0.00	2,123.73	0.00
	e) Transit mixer, operator	1	h	3,217.78	5.82	0.00	18,727.47	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	35.4%	----	----	19,207.24	149,742.15
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	318.60	0.00	790.40	0.00	251,821.44
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	63,689.48	0.00	0.24	0.00	15,285.47
		s.b.	h	12,737.90	0.00	0.17	0.00	2,165.44
3.04	Truck for shifting the forms, 30 t pay load	Op.	h	519.31	0.20	18.17	103.86	9,435.84
		s.b.	h	103.86	0.00	12.41	0.00	1,288.92
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	9.87	0.00	350.00	0.00	3,452.84
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	1,973.05	0.00	3.58	0.00	7,063.52
3.07	Formwork bond breaking compound	---	kg	1,804.93	0.00	3.23	0.00	5,829.92
3.08	General foreman	---	h	157.84	0.00	47.25	0.00	7,457.97
3.09	Gang foreman	1	h	1,578.41	6.60	0.00	10,417.48	0.00
3.10	Specialist	3	h	4,735.22	3.69	0.00	17,472.96	0.00
03:11	Skilled	2	h	3,156.81	2.99	0.00	9,438.87	0.00
03:12	Semiskilled	1	h	1,578.41	2.38	0.00	3,756.61	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	834.23	0.61	44.83	508.88	37,398.40
		s.b.	h	166.85	0.00	13.85	0.00	2,310.81
4.02	Motorcompressors, 30 m3/min (58.4 m3/min. consumption)	Op.	h	834.23	0.64	193.52	535.91	161,438.09
		s.b.	h	166.85	0.00	23.32	0.00	3,891.01
4.03	General foreman	---	h	91.76	0.00	47.25	0.00	4,335.90
4.04	Gang foreman	1	h	917.65	6.60	0.00	6,056.49	0.00
4.05	Concrete pump, operator	1	h	917.65	5.82	0.00	5,340.72	0.00
4.06	Concrete pump, helper	1	h	917.65	2.38	0.00	2,184.01	0.00
4.07	Skilled	1	h	917.65	2.99	0.00	2,743.77	0.00
4.08	Semiskilled	2	h	1,835.30	2.38	0.00	4,368.01	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	2,825.13	237,211.59
Sub-total							144,601.57	1,339,850.21
Missing items and construction contingencies			%	1.50%			2,169.02	20,097.75
Total Direct Costs							146,770.60	1,359,947.97
Overheads, risks and profit on cement and admixtures			%	25.00%			640.59	5,765.28
Overhead, risks & profit on other costs			%	52.00%			77,016.95	693,152.51
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	24,714			9.08	83.31
AGGREGATE UNIT PRICE			m ³					92.39

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T3' (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 004
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	215.68	2.45	18.87	527.57	4,069.81
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,348.00	0.00	1.34	0.00	1,803.62
	b) Grouted anchor bars	---	kg	1,685.00	0.00	0.84	0.00	1,415.40
	c) Formwork bond breaking compound	---	kg	26.96	0.00	3.23	0.00	87.08
	d) Motorcompressor, 5 m3/min.	Op.	h	10.78	0.08	11.32	0.86	122.07
		s.b.	h	2.16	0.00	2.99	0.00	6.45
	e) Immersion type vibrator, 77 mm dia.	Op.	h	32.35	0.01	1.46	0.32	47.23
		s.b.	h	6.47	0.00	0.42	0.00	2.72
	f) General foreman	---	h	2.00	0.00	47.25	0.00	94.58
	g) Gang foreman	---	h	20.02	6.60	0.00	132.12	0.00
	h) Skilled	---	h	200.18	2.77	0.00	554.49	0.00
	i) Semiskilled	---	h	432.71	2.77	0.00	1,198.60	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	5,118.15	1.33	10.22	6,812.26	52,322.85
	b) Portland cement, normal type	50%	t	921.27	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	921.27	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	3,685.07	0.00	1.44	0.00	5,306.50
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	758.11	0.40	47.95	303.24	36,351.30
		s.b.	h	151.62	0.00	14.53	0.00	2,203.06
	c) General foreman	----	h	8.34	0.00	47.25	0.00	394.03
	d) Gang foreman	----	h	83.39	6.60	0.00	550.39	0.00
	e) Transit mixer, operator	1	h	833.92	5.82	0.00	4,853.41	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	35.4%	----	----	4,431.31	34,184.49
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	5,118.15	0.00	13.72	0.00	70,232.39
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.57	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	8,972.02	0.00	0.24	0.00	2,153.28
		s.b.	h	1,794.40	0.00	0.17	0.00	305.05
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	249.63	0.17	15.78	42.44	3,939.16
		s.b.	h	49.93	0.00	10.59	0.00	528.72
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	3.19	0.00	350.00	0.00	1,117.80
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	638.74	0.00	3.58	0.00	2,286.70
3.07	Formwork bond breaking compound	---	kg	689.17	0.00	3.23	0.00	2,226.00
3.08	General foreman	---	h	63.11	0.00	47.25	0.00	2,982.11
3.09	Gang foreman	1	h	631.13	6.60	0.00	4,165.48	0.00
3.10	Specialist	3	h	1,893.40	3.69	0.00	6,986.65	0.00
03:11	Skilled	2	h	1,262.27	2.99	0.00	3,774.18	0.00
03:12	Semiskilled	1	h	631.13	2.38	0.00	1,502.10	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	180.04	0.61	44.83	109.83	8,071.41
		s.b.	h	36.01	0.00	13.85	0.00	498.72
4.02	Motorcompressors, 30 m3/min (33.7 m3/min. consumption)	Op.	h	180.04	0.37	111.67	66.74	20,105.72
		s.b.	h	36.01	0.00	13.46	0.00	484.59
4.03	General foreman	---	h	19.80	0.00	47.25	0.00	935.78
4.04	Gang foreman	1	h	198.05	6.60	0.00	1,307.13	0.00
4.05	Concrete pump, operator	1	h	198.05	5.82	0.00	1,152.65	0.00
4.06	Concrete pump, helper	1	h	198.05	2.38	0.00	471.36	0.00
4.07	Skilled	1	h	198.05	2.99	0.00	592.17	0.00
4.08	Semiskilled	2	h	396.10	2.38	0.00	942.72	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	820.78	55,313.51
Sub-total							41,298.79	309,592.14
Missing items and construction contingencies							619.48	4,643.88
Total Direct Costs							41,918.27	314,236.03
Overheads, risks and profit on cement and admixtures							138.25	1,244.28
Overhead, risks & profit on other costs							18,232.46	164,092.12
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	5,334		11.30	89.91
AGGREGATE UNIT PRICE				m3				101.21

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T4 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 005
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	306.56	2.77	19.79	847.74	6,067.40	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	1,916.00	0.00	1.34	0.00	2,563.61	
	b) Grouted anchor bars	---	kg	2,395.00	0.00	0.84	0.00	2,011.80	
	c) Formwork bond breaking compound	---	kg	38.32	0.00	3.23	0.00	123.77	
	d) Motorcompressor, 5 m3/min.	Op.	h	15.33	0.08	11.32	1.23	173.51	
		s.b.	h	3.07	0.00	2.99	0.00	9.17	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	45.98	0.01	1.46	0.46	67.14	
		s.b.	h	9.20	0.00	0.42	0.00	3.86	
	f) General foreman	---	h	2.85	0.00	47.25	0.00	134.44	
	g) Gang foreman	---	h	28.45	6.60	0.00	187.79	0.00	
	h) Skilled	---	h	284.53	2.77	0.00	788.14	0.00	
	i) Semiskilled	---	h	615.04	2.77	0.00	1,703.65	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	18,462.42	1.33	10.22	24,573.48	188,741.32	
	b) Portland cement, normal type	50%	t	3,323.24	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	3,323.24	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	13,292.94	0.00	1.44	0.00	19,141.84	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	3,550.72	0.33	41.12	1,171.74	146,005.46	
		s.b.	h	710.14	0.00	13.62	0.00	9,672.15	
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00	
		s.b.	h	0.00	0.00	14.53	0.00	0.00	
	c) General foreman	----	h	39.06	0.00	47.25	0.00	1,845.48	
	d) Gang foreman	----	h	390.58	6.60	0.00	2,577.82	0.00	
	e) Transit mixer, operator	1	h	3,905.79	5.82	0.00	22,731.69	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	40.4%	----	----	20,616.38	147,554.53	
3	Formworks								
3.01	Steel formworks excluding side closure	---	m ³	18,462.42	0.00	13.62	0.00	251,440.58	
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.57	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	24,806.24	0.00	0.24	0.00	5,953.50	
		s.b.	h	4,961.25	0.00	0.17	0.00	843.41	
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	354.81	0.15	13.48	53.22	4,782.90	
		s.b.	h	70.96	0.00	8.88	0.00	630.15	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	11.65	0.00	350.00	0.00	4,078.20	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	2,330.40	0.00	3.58	0.00	8,342.83	
3.07	Formwork bond breaking compound	---	kg	828.67	0.00	3.23	0.00	2,676.60	
3.08	General foreman	---	h	136.75	0.00	47.25	0.00	6,461.37	
3.09	Gang foreman	1	h	1,367.49	6.60	0.00	9,025.40	0.00	
3.10	Specialist	3	h	4,102.46	3.69	0.00	15,138.06	0.00	
03:11	Skilled	2	h	2,734.97	2.99	0.00	8,177.56	0.00	
03:12	Semiskilled	1	h	1,367.49	2.38	0.00	3,254.61	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	633.55	0.61	44.83	386.47	28,402.14	
		s.b.	h	126.71	0.00	13.85	0.00	1,754.94	
4.02	Motorcompressors, 30 m3/min (28.5 m3/min. consumption)	Op.	h	633.55	0.31	94.44	198.62	59,832.34	
		s.b.	h	126.71	0.00	11.38	0.00	1,442.09	
4.03	General foreman	---	h	69.69	0.00	47.25	0.00	3,292.89	
4.04	Gang foreman	1	h	696.91	6.60	0.00	4,599.59	0.00	
4.05	Concrete pump, operator	1	h	696.91	5.82	0.00	4,056.00	0.00	
4.06	Concrete pump, helper	1	h	696.91	2.38	0.00	1,658.64	0.00	
4.07	Skilled	1	h	696.91	2.99	0.00	2,083.75	0.00	
4.08	Semiskilled	2	h	1,393.81	2.38	0.00	3,317.28	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	2,161.90	202,048.71	
Sub-total							129,311.21	1,106,098.13	
Missing items and construction contingencies		%	1.50%				1,939.67	16,591.47	
Total Direct Costs							131,250.87	1,122,689.60	
Overheads, risks and profit on cement and admixtures		%	25.00%				486.49	4,378.43	
Overhead, risks & profit on other costs		%	52.00%				64,193.00	577,737.01	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m ³	18,768.98			10.44	90.83
AGGREGATE UNIT PRICE				m ³				101.27	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T5A (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 006
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	62.08	2.52	18.35	156.63	1,139.22
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	388.00	0.00	1.34	0.00	519.14
	b) Grouted anchor bars	---	kg	485.00	0.00	0.84	0.00	407.40
	c) Formwork bond breaking compound	---	kg	7.76	0.00	3.23	0.00	25.06
	d) Motorcompressor, 5 m3/min.	Op.	h	3.10	0.08	11.32	0.25	35.14
		s.b.	h	0.62	0.00	2.99	0.00	1.86
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.31	0.01	1.46	0.09	13.60
		s.b.	h	1.86	0.00	0.42	0.00	0.78
	f) General foreman	---	h	0.58	0.00	47.25	0.00	27.22
	g) Gang foreman	---	h	5.76	6.60	0.00	38.03	0.00
	h) Skilled	---	h	57.62	2.77	0.00	159.60	0.00
	i) Semiskilled	---	h	124.55	2.77	0.00	345.00	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,097.54	1.33	10.22	2,791.83	21,443.15
	b) Portland cement, normal type	50%	t	377.56	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	377.56	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,510.23	0.00	1.44	0.00	2,174.73
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	335.27	0.33	41.12	110.64	13,786.11
		s.b.	h	67.05	0.00	13.62	0.00	913.26
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
	c) General foreman	----	h	3.69	0.00	47.25	0.00	174.25
	d) Gang foreman	----	h	36.88	6.60	0.00	243.40	0.00
	e) Transit mixer, operator	1	h	368.79	5.82	0.00	2,146.37	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	39.2%	----	----	2,072.11	15,070.90
3	Formworks		m3					
3.01	Steel formworks excluding side closure	---	m3	2,097.54	0.00	13.20	0.00	27,687.53
3.02	Side closure of formworks	0	m3	0.00	0.00	0.71	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	3,026.80	0.00	0.24	0.00	726.43
		s.b.	h	605.36	0.00	0.17	0.00	102.91
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	71.85	0.15	13.48	10.78	968.56
		s.b.	h	14.37	0.00	8.88	0.00	127.61
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	1.33	0.00	350.00	0.00	465.15
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	265.80	0.00	3.58	0.00	951.56
3.07	Formwork bond breaking compound	---	kg	169.75	0.00	3.23	0.00	548.29
3.08	General foreman	---	h	21.33	0.00	47.25	0.00	1,007.74
3.09	Gang foreman	1	h	213.28	6.60	0.00	1,407.63	0.00
3.10	Specialist	3	h	639.83	3.69	0.00	2,360.99	0.00
03:11	Skilled	2	h	426.56	2.99	0.00	1,275.40	0.00
03:12	Semiskilled	1	h	213.28	2.38	0.00	507.60	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	72.90	0.61	44.83	44.47	3,268.04
		s.b.	h	14.58	0.00	13.85	0.00	201.93
4.02	Motorcompressors, 30 m3/min (28.9 m3/min. consumption)	Op.	h	72.90	0.32	95.76	23.17	6,981.13
		s.b.	h	14.58	0.00	11.54	0.00	168.26
4.03	General foreman	---	h	8.02	0.00	47.25	0.00	378.89
4.04	Gang foreman	1	h	80.19	6.60	0.00	529.24	0.00
4.05	Concrete pump, operator	1	h	80.19	5.82	0.00	466.70	0.00
4.06	Concrete pump, helper	1	h	80.19	2.38	0.00	190.85	0.00
4.07	Skilled	1	h	80.19	2.99	0.00	239.76	0.00
4.08	Semiskilled	2	h	160.38	2.38	0.00	381.70	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	229.45	19,186.28
Sub-total							15,731.69	118,502.15
Missing items and construction contingencies							235.98	1,777.53
Total Direct Costs							15,967.66	120,279.68
Overheads, risks and profit on cement and admixtures							55.98	503.80
Overhead, risks & profit on other costs							6,968.43	62,715.86
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							10.65	84.97
AGGREGATE UNIT PRICE								95.61

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T6 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 007
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	35.20	2.72	19.49	95.57	686.15
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	220.00	0.00	1.34	0.00	294.36
	b) Grouted anchor bars	---	kg	275.00	0.00	0.84	0.00	231.00
	c) Formwork bond breaking compound	---	kg	4.40	0.00	3.23	0.00	14.21
	d) Motorcompressor, 5 m ³ /min.	Op.	h	1.76	0.08	11.32	0.14	19.92
		s.b.	h	0.35	0.00	2.99	0.00	1.05
	e) Immersion type vibrator, 77 mm dia.	Op.	h	5.28	0.01	1.46	0.05	7.71
		s.b.	h	1.06	0.00	0.42	0.00	0.44
	f) General foreman	---	h	0.33	0.00	47.25	0.00	15.44
	g) Gang foreman	---	h	3.27	6.60	0.00	21.56	0.00
	h) Skilled	---	h	32.67	2.77	0.00	90.50	0.00
	i) Semiskilled	---	h	70.62	2.77	0.00	195.62	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,214.92	1.33	10.22	1,617.06	12,420.13
	b) Portland cement, normal type	50%	t	218.69	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	218.69	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	874.74	0.00	1.44	0.00	1,259.63
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	225.47	0.33	41.12	74.41	9,271.32
		s.b.	h	45.09	0.00	13.62	0.00	614.18
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
	c) General foreman	----	h	2.48	0.00	47.25	0.00	117.19
	d) Gang foreman	----	h	24.80	6.60	0.00	163.69	0.00
	e) Transit mixer, operator	1	h	248.02	5.82	0.00	1,443.46	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	37.4%	----	----	1,235.28	8,868.73
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	1,214.92	0.00	12.62	0.00	15,329.43
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.68	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,311.70	0.00	0.24	0.00	554.81
		s.b.	h	462.34	0.00	0.17	0.00	78.60
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	40.74	0.17	15.78	6.93	642.89
		s.b.	h	8.15	0.00	10.59	0.00	86.29
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.76	0.00	350.00	0.00	265.96
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	151.98	0.00	3.58	0.00	544.07
3.07	Formwork bond breaking compound	---	kg	128.70	0.00	3.23	0.00	415.70
3.08	General foreman	---	h	13.03	0.00	47.25	0.00	615.70
3.09	Gang foreman	1	h	130.31	6.60	0.00	860.02	0.00
3.10	Specialist	3	h	390.92	3.69	0.00	1,442.49	0.00
03:11	Skilled	2	h	260.61	2.99	0.00	779.23	0.00
03:12	Semiskilled	1	h	130.31	2.38	0.00	310.13	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	42.20	0.61	44.83	25.74	1,891.74
		s.b.	h	8.44	0.00	13.85	0.00	116.89
4.02	Motorcompressors, 30 m ³ /min (38.6 m ³ /min. consumption)	Op.	h	42.20	0.42	127.91	17.92	5,397.46
		s.b.	h	8.44	0.00	15.41	0.00	130.09
4.03	General foreman	---	h	4.64	0.00	47.25	0.00	219.32
4.04	Gang foreman	1	h	46.42	6.60	0.00	306.36	0.00
4.05	Concrete pump, operator	1	h	46.42	5.82	0.00	270.15	0.00
4.06	Concrete pump, helper	1	h	46.42	2.38	0.00	110.47	0.00
4.07	Skilled	1	h	46.42	2.99	0.00	138.79	0.00
4.08	Semiskilled	2	h	92.84	2.38	0.00	220.95	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	178.85	13,674.45
Sub-total							9,605.37	73,784.87
Missing items and construction contingencies		%		1.50%			144.08	1,106.77
Total Direct Costs							9,749.45	74,891.64
Overheads, risks and profit on cement and admixtures		%		25.00%			32.40	291.63
Overhead, risks & profit on other costs		%		52.00%			4,333.94	39,005.44
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	1,250			11.29	91.34
AGGREGATE UNIT PRICE			m ³					102.63

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T7 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 008
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	59.41	2.19	17.12	130.09	1,017.11
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	371.30	0.00	1.34	0.00	496.80
	b) Grouted anchor bars	---	kg	464.13	0.00	0.84	0.00	389.87
	c) Formwork bond breaking compound	---	kg	7.43	0.00	3.23	0.00	23.99
	d) Motorcompressor, 5 m3/min.	Op.	h	2.97	0.08	11.32	0.24	33.62
		s.b.	h	0.59	0.00	2.99	0.00	1.78
	e) Immersion type vibrator, 77 mm dia.	Op.	h	8.91	0.01	1.46	0.09	13.01
		s.b.	h	1.78	0.00	0.42	0.00	0.75
	f) General foreman	---	h	0.55	0.00	47.25	0.00	26.05
	g) Gang foreman	---	h	5.51	6.60	0.00	36.39	0.00
	h) Skilled	---	h	55.14	2.77	0.00	152.73	0.00
	i) Semiskilled	---	h	119.19	2.77	0.00	330.15	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	3,341.46	1.33	10.22	4,447.49	34,159.77
	b) Portland cement, normal type	50%	t	601.46	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	601.46	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,405.85	0.00	1.44	0.00	3,464.43
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	381.20	0.40	47.95	152.48	18,278.52
		s.b.	h	76.24	0.00	14.53	0.00	1,107.77
	c) General foreman	----	h	4.19	0.00	47.25	0.00	198.13
	d) Gang foreman	----	h	41.93	6.60	0.00	276.75	0.00
	e) Transit mixer, operator	1	h	419.32	5.82	0.00	2,440.44	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	31.5%	----	----	2,306.26	18,031.31
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	3,341.46	0.00	12.20	0.00	40,757.59
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.57	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	6,149.27	0.00	0.24	0.00	1,475.82
		s.b.	h	1,229.85	0.00	0.17	0.00	209.08
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	68.76	0.17	15.78	11.69	1,085.02
		s.b.	h	13.75	0.00	10.59	0.00	145.63
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.98	0.00	350.00	0.00	692.30
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	395.60	0.00	3.58	0.00	1,416.25
3.07	Formwork bond breaking compound	---	kg	232.06	0.00	3.23	0.00	749.56
3.08	General foreman	---	h	24.39	0.00	47.25	0.00	1,152.53
3.09	Gang foreman	1	h	243.92	6.60	0.00	1,609.88	0.00
3.10	Specialist	3	h	731.76	3.69	0.00	2,700.21	0.00
03:11	Skilled	2	h	487.84	2.99	0.00	1,458.65	0.00
03:12	Semiskilled	1	h	243.92	2.38	0.00	580.53	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	114.80	0.61	44.83	70.03	5,146.36
		s.b.	h	22.96	0.00	13.85	0.00	317.99
4.02	Motorcompressors, 30 m3/min (41.3 m3/min. consumption)	Op.	h	114.80	0.45	136.85	52.15	15,710.52
		s.b.	h	22.96	0.00	16.49	0.00	378.66
4.03	General foreman	---	h	12.63	0.00	47.25	0.00	596.66
4.04	Gang foreman	1	h	126.28	6.60	0.00	833.43	0.00
4.05	Concrete pump, operator	1	h	126.28	5.82	0.00	734.93	0.00
4.06	Concrete pump, helper	1	h	126.28	2.38	0.00	300.54	0.00
4.07	Skilled	1	h	126.28	2.99	0.00	377.57	0.00
4.08	Semiskilled	2	h	252.55	2.38	0.00	601.08	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	338.82	22,673.20
Sub-total							19,942.61	169,750.06
Missing items and construction contingencies			%	1.50%			299.14	2,546.25
Total Direct Costs							20,241.75	172,296.32
Overheads, risks and profit on cement and admixtures			%	25.00%			88.15	793.35
Overhead, risks & profit on other costs			%	52.00%			9,828.63	88,457.64
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	3,401			8.87	76.91
AGGREGATE UNIT PRICE			m ³					85.77

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T8 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 009
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	92.04	2.41	18.64	222.00	1,715.35
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	575.26	0.00	1.34	0.00	769.70
	b) Grouted anchor bars	---	kg	719.08	0.00	0.84	0.00	604.02
	c) Formwork bond breaking compound	---	kg	11.51	0.00	3.23	0.00	37.16
	d) Motorcompressor, 5 m3/min.	Op.	h	4.60	0.08	11.32	0.37	52.10
		s.b.	h	0.92	0.00	2.99	0.00	2.75
	e) Immersion type vibrator, 77 mm dia.	Op.	h	13.81	0.01	1.46	0.14	20.16
		s.b.	h	2.76	0.00	0.42	0.00	1.16
	f) General foreman	---	h	0.85	0.00	47.25	0.00	40.36
	g) Gang foreman	---	h	8.54	6.60	0.00	56.38	0.00
	h) Skilled	---	h	85.43	2.77	0.00	236.63	0.00
	i) Semiskilled	---	h	184.66	2.77	0.00	511.50	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,751.89	1.33	10.22	3,662.76	28,132.56
	b) Portland cement, normal type	50%	t	495.34	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	495.34	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,981.36	0.00	1.44	0.00	2,853.16
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	395.13	0.40	47.95	158.05	18,946.60
		s.b.	h	79.03	0.00	14.53	0.00	1,148.25
	c) General foreman	----	h	4.35	0.00	47.25	0.00	205.37
	d) Gang foreman	----	h	43.46	6.60	0.00	286.87	0.00
	e) Transit mixer, operator	1	h	434.65	5.82	0.00	2,529.64	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	36.4%	----	----	2,415.51	18,664.42
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	2,751.89	0.00	14.11	0.00	38,840.94
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.66	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	4,797.77	0.00	0.24	0.00	1,151.47
		s.b.	h	959.55	0.00	0.17	0.00	163.12
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	106.53	0.17	15.78	18.11	1,681.04
		s.b.	h	21.31	0.00	10.59	0.00	225.63
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.72	0.00	350.00	0.00	600.39
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	343.08	0.00	3.58	0.00	1,228.22
3.07	Formwork bond breaking compound	---	kg	303.45	0.00	3.23	0.00	980.14
3.08	General foreman	---	h	28.11	0.00	47.25	0.00	1,328.03
3.09	Gang foreman	1	h	281.06	6.60	0.00	1,855.02	0.00
3.10	Specialist	3	h	843.19	3.69	0.00	3,111.38	0.00
03:11	Skilled	2	h	562.13	2.99	0.00	1,680.76	0.00
03:12	Semiskilled	1	h	281.06	2.38	0.00	668.93	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	96.00	0.61	44.83	58.56	4,303.57
		s.b.	h	19.20	0.00	13.85	0.00	265.91
4.02	Motorcompressors, 30 m3/min (34.8 m3/min. consumption)	Op.	h	96.00	0.38	115.32	36.75	11,070.03
		s.b.	h	19.20	0.00	13.90	0.00	266.81
4.03	General foreman	---	h	10.56	0.00	47.25	0.00	498.95
4.04	Gang foreman	1	h	105.60	6.60	0.00	696.94	0.00
4.05	Concrete pump, operator	1	h	105.60	5.82	0.00	614.58	0.00
4.06	Concrete pump, helper	1	h	105.60	2.38	0.00	251.32	0.00
4.07	Skilled	1	h	105.60	2.99	0.00	315.74	0.00
4.08	Semiskilled	2	h	211.19	2.38	0.00	502.64	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	283.92	19,338.17
Sub-total							20,174.50	155,135.51
Missing items and construction contingencies			%	1.50%			302.62	2,327.03
Total Direct Costs							20,477.11	157,462.55
Overheads, risks and profit on cement and admixtures			%	25.00%			73.71	663.43
Overhead, risks & profit on other costs			%	52.00%			9,099.54	81,895.82
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	2,844			10.43	84.40
AGGREGATE UNIT PRICE			m ³					94.82

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T22 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 010
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	164.53	2.43	18.78	400.18	3,089.12
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,028.32	0.00	1.34	0.00	1,375.89
	b) Grouted anchor bars	---	kg	1,285.40	0.00	0.84	0.00	1,079.74
	c) Formwork bond breaking compound	---	kg	20.57	0.00	3.23	0.00	66.43
	d) Motorcompressor, 5 m3/min.	Op.	h	8.23	0.08	11.32	0.66	93.12
		s.b.	h	1.65	0.00	2.99	0.00	4.92
	e) Immersion type vibrator, 77 mm dia.	Op.	h	24.68	0.01	1.46	0.25	36.03
		s.b.	h	4.94	0.00	0.42	0.00	2.07
	f) General foreman	---	h	1.53	0.00	47.25	0.00	72.15
	g) Gang foreman	---	h	15.27	6.60	0.00	100.79	0.00
	h) Skilled	---	h	152.71	2.77	0.00	422.99	0.00
	i) Semiskilled	---	h	330.09	2.77	0.00	914.35	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	4,073.81	1.33	10.22	5,422.24	41,646.55
	b) Portland cement, normal type	50%	t	733.29	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	733.29	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,933.14	0.00	1.44	0.00	4,223.72
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	595.93	0.40	47.95	238.37	28,575.02
		s.b.	h	119.19	0.00	14.53	0.00	1,731.78
	c) General foreman	----	h	6.56	0.00	47.25	0.00	309.74
	d) Gang foreman	----	h	65.55	6.60	0.00	432.65	0.00
	e) Transit mixer, operator	1	h	655.53	5.82	0.00	3,815.17	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	33.1%	----	----	3,282.65	25,339.98
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	4,073.81	0.00	12.83	0.00	52,271.73
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.60	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	8,449.74	0.00	0.24	0.00	2,027.94
		s.b.	h	1,689.95	0.00	0.17	0.00	287.29
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	261.84	0.15	13.48	39.28	3,529.61
		s.b.	h	52.37	0.00	8.88	0.00	465.03
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	2.50	0.00	350.00	0.00	873.35
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	499.06	0.00	3.58	0.00	1,786.63
3.07	Formwork bond breaking compound	---	kg	636.27	0.00	3.23	0.00	2,055.16
3.08	General foreman	---	h	59.45	0.00	47.25	0.00	2,808.83
3.09	Gang foreman	1	h	594.46	6.60	0.00	3,923.45	0.00
3.10	Specialist	3	h	1,783.38	3.69	0.00	6,580.69	0.00
03:11	Skilled	2	h	1,188.92	2.99	0.00	3,554.88	0.00
03:12	Semiskilled	1	h	594.46	2.38	0.00	1,414.82	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	143.07	0.61	44.83	87.27	6,413.66
		s.b.	h	28.61	0.00	13.85	0.00	396.29
4.02	Motorcompressors, 30 m3/min (40.8 m3/min. consumption)	Op.	h	143.07	0.45	135.20	64.21	19,342.22
		s.b.	h	28.61	0.00	16.29	0.00	466.19
4.03	General foreman	---	h	15.74	0.00	47.25	0.00	743.59
4.04	Gang foreman	1	h	157.37	6.60	0.00	1,038.66	0.00
4.05	Concrete pump, operator	1	h	157.37	5.82	0.00	915.91	0.00
4.06	Concrete pump, helper	1	h	157.37	2.38	0.00	374.55	0.00
4.07	Skilled	1	h	157.37	2.99	0.00	470.55	0.00
4.08	Semiskilled	2	h	314.75	2.38	0.00	749.10	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	434.90	37,459.42
Sub-total							34,678.54	238,573.22
Missing items and construction contingencies			%	1.50%			520.18	3,578.60
Total Direct Costs							35,198.72	242,151.82
Overheads, risks and profit on cement and admixtures			%	25.00%			109.86	988.72
Overhead, risks & profit on other costs			%	52.00%			14,193.72	127,743.52
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	4,238			11.68	87.51
AGGREGATE UNIT PRICE			m ³					99.19

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T37 (ARCH AND SIDEWALLS)

SEC 4-01
 ANA 011
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	203.20	2.49	19.15	505.38	3,891.24
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,270.00	0.00	1.34	0.00	1,699.26
	b) Grouted anchor bars	---	kg	1,587.50	0.00	0.84	0.00	1,333.50
	c) Formwork bond breaking compound	---	kg	25.40	0.00	3.23	0.00	82.04
	d) Motorcompressor, 5 m3/min.	Op.	h	10.16	0.08	11.32	0.81	115.01
		s.b.	h	2.03	0.00	2.99	0.00	6.08
	e) Immersion type vibrator, 77 mm dia.	Op.	h	30.48	0.01	1.46	0.30	44.50
		s.b.	h	6.10	0.00	0.42	0.00	2.56
	f) General foreman	---	h	1.89	0.00	47.25	0.00	89.11
	g) Gang foreman	---	h	18.86	6.60	0.00	124.47	0.00
	h) Skilled	---	h	188.60	2.77	0.00	522.41	0.00
	i) Semiskilled	---	h	407.67	2.77	0.00	1,129.25	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	6,248.40	1.33	10.22	8,316.62	63,877.39
	b) Portland cement, normal type	50%	t	1,124.71	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,124.71	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	4,498.85	0.00	1.44	0.00	6,478.34
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m3 nominal capacity	Op.	h	959.60	0.40	47.95	383.84	46,012.69
		s.b.	h	191.92	0.00	14.53	0.00	2,788.59
	c) General foreman	----	h	10.56	0.00	47.25	0.00	498.75
	d) Gang foreman	----	h	105.56	6.60	0.00	696.67	0.00
	e) Transit mixer, operator	1	h	1,055.56	5.82	0.00	6,143.34	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	41.7%	----	----	6,478.59	49,882.72
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	171.00	0.00	686.40	0.00	117,374.40
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	10,090.85	0.00	0.24	0.00	2,421.80
		s.b.	h	2,018.17	0.00	0.17	0.00	343.09
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	235.19	0.15	13.48	35.28	3,170.30
		s.b.	h	47.04	0.00	8.88	0.00	417.69
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	4.04	0.00	350.00	0.00	1,414.89
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	808.51	0.00	3.58	0.00	2,894.45
3.07	Formwork bond breaking compound	---	kg	603.25	0.00	3.23	0.00	1,948.50
3.08	General foreman	---	h	76.19	0.00	47.25	0.00	3,600.06
3.09	Gang foreman	1	h	761.92	6.60	0.00	5,028.66	0.00
3.10	Specialist	3	h	2,285.75	3.69	0.00	8,434.43	0.00
03:11	Skilled	2	h	1,523.84	2.99	0.00	4,556.27	0.00
03:12	Semiskilled	1	h	761.92	2.38	0.00	1,813.36	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	217.78	0.61	44.83	132.84	9,762.88
		s.b.	h	43.56	0.00	13.85	0.00	603.24
4.02	Motorcompressors, 30 m3/min (31.4 m3/min. consumption)	Op.	h	217.78	0.35	104.05	75.22	22,659.35
		s.b.	h	43.56	0.00	12.54	0.00	546.14
4.03	General foreman	---	h	23.96	0.00	47.25	0.00	1,131.89
4.04	Gang foreman	1	h	239.55	6.60	0.00	1,581.05	0.00
4.05	Concrete pump, operator	1	h	239.55	5.82	0.00	1,394.20	0.00
4.06	Concrete pump, helper	1	h	239.55	2.38	0.00	570.14	0.00
4.07	Skilled	1	h	239.55	2.99	0.00	716.26	0.00
4.08	Semiskilled	2	h	479.11	2.38	0.00	1,140.27	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	397.75	34,604.72
Sub-total							50,177.41	379,695.18
Missing items and construction contingencies			%	1.50%			752.66	5,695.43
Total Direct Costs							50,930.07	385,390.61
Overheads, risks and profit on cement and admixtures			%	25.00%			167.23	1,505.03
Overhead, risks & profit on other costs			%	52.00%			22,340.85	201,067.62
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	6,452			11.38	91.13
AGGREGATE UNIT PRICE			m ³					102.52

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T1 (INVERT CONCRETE)

SEC 4-01
 ANA 012
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	60.32	0.63	62.22	38.00	3,753.17
		s.b.	h	15.08	0.00	28.86	0.00	435.22
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	46.05	0.27	23.93	12.43	1,101.91
		s.b.	h	9.21	0.00	12.03	0.00	110.79
1.03	Hand-held breaker, medium weight type	Op.	h	214.12	0.04	2.03	8.56	434.66
		s.b.	h	42.82	0.00	1.21	0.00	51.82
1.04	Hand held breaker tool,moil point type	----	ea.	2.14	0.00	32.37	0.00	69.31
1.05	Breaker tool resharpenner	----	h	6.42	0.01	1.57	0.06	10.09
1.06	General foreman	----	h	5.35	0.00	47.25	0.00	252.93
1.07	Gang foreman	1	h	53.53	6.60	0.00	353.30	0.00
1.08	Dumper driver and backhoe operator	1	h	117.01	5.82	0.00	680.97	0.00
1.09	Skilled	2	h	107.06	2.99	0.00	320.11	0.00
1.10	Semiskilled	2	h	107.06	2.38	0.00	254.80	0.00
1.11	Unskilled	4	h	214.12	1.77	0.00	378.99	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,865.05	1.33	10.22	2,482.38	19,066.41
	b) Portland cement, normal type	50%	t	335.71	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	335.71	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,014.25	0.00	1.44	0.00	2,900.53
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	299.17	0.33	41.72	98.72	12,481.17
		s.b.	hr	59.83	0.00	13.62	0.00	814.93
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
3.03	General foreman	----	h	3.29	0.00	47.25	0.00	155.49
3.04	Gang foreman	----	h	32.91	6.60	0.00	217.19	0.00
3.05	Transit mixer operator	1	h	329.08	5.82	0.00	1,915.26	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	38.0%	----	----	1,790.51	13,454.26
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	54.02	0.61	44.83	32.95	2,421.87
		s.b.	h	10.80	0.00	13.85	0.00	149.65
5.03	Sliding vibrating bar	Op.	h	54.02	0.02	1.77	1.08	95.62
		s.b.	h	10.80	0.00	0.60	0.00	6.48
5.04	General foreman	1	h	15.98	0.00	47.25	0.00	755.26
5.05	Gang foreman	1	h	79.92	6.60	0.00	527.48	0.00
5.06	Concrete pump, operator	1	h	59.43	5.82	0.00	345.86	0.00
5.07	Concrete pump, helper	1	h	59.43	2.38	0.00	141.43	0.00
5.08	Skilled	2	h	159.84	2.99	0.00	477.93	0.00
5.09	Semiskilled	4	h	319.69	2.38	0.00	760.86	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	89.36	7,490.54
Sub-total		----->>>					10,928.27	66,012.09
Missing items and construction contingencies		%		1.50%	----->>>		163.92	990.18
Total Direct Costs		----->>>					11,092.19	67,002.27
Overheads, risks and profit on cement and admixtures		%		25.00%	----->>>		72.51	652.62
Overhead, risks & profit on other costs		%		52.00%	----->>>		3,910.08	35,190.76
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m3	1,865.05	----->>>		8.08	55.14
AGGREGATE UNIT PRICE			m3		----->>>			63.23

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T2 (INVERT CONCRETE)

SEC 4-01
 ANA 013
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	46.58	0.63	62.22	29.34	2,897.97
		s.b.	h	11.64	0.00	28.86	0.00	336.05
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	44.51	0.27	23.93	12.02	1,065.10
		s.b.	h	8.90	0.00	12.03	0.00	107.09
1.03	Hand-held breaker, medium weight type	Op.	h	206.97	0.04	2.03	8.28	420.14
		s.b.	h	41.39	0.00	1.21	0.00	50.09
1.04	Hand held breaker tool,moil point type	----	ea.	2.07	0.00	32.37	0.00	67.00
1.05	Breaker tool resharpenner	----	h	6.21	0.01	1.57	0.06	9.75
1.06	General foreman	----	h	5.17	0.00	47.25	0.00	244.48
1.07	Gang foreman	1	h	51.74	6.60	0.00	341.49	0.00
1.08	Dumper driver and backhoe operator	1	h	100.19	5.82	0.00	583.13	0.00
1.09	Skilled	2	h	103.48	2.99	0.00	309.42	0.00
1.10	Semiskilled	2	h	103.48	2.38	0.00	246.29	0.00
1.11	Unskilled	4	h	206.97	1.77	0.00	366.33	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	5,904.95	1.33	10.22	7,859.49	60,366.30
	b) Portland cement, normal type	50%	t	1,062.89	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,062.89	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	6,377.35	0.00	1.44	0.00	9,183.38
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	685.17	0.40	47.95	274.07	32,853.80
		s.b.	h	137.03	0.00	14.53	0.00	1,991.10
3.03	General foreman	----	h	7.54	0.00	47.25	0.00	356.12
3.04	Gang foreman	----	h	75.37	6.60	0.00	497.43	0.00
3.05	Transit mixer operator	1	h	753.68	5.82	0.00	4,386.45	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	15.0%	----	----	1,958.13	15,756.97
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	1,064.60	5.34	10.23	5,684.94	10,890.81
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	142.60	0.61	44.83	86.99	6,392.91
		s.b.	h	28.52	0.00	13.85	0.00	395.01
5.03	Sliding vibrating bar	Op.	h	142.60	0.02	1.77	2.85	252.41
		s.b.	h	28.52	0.00	0.60	0.00	17.11
5.04	General foreman	1	h	33.56	0.00	47.25	0.00	1,585.93
5.05	Gang foreman	1	h	167.82	6.60	0.00	1,107.64	0.00
5.06	Concrete pump, operator	1	h	156.86	5.82	0.00	912.95	0.00
5.07	Concrete pump, helper	1	h	156.86	2.38	0.00	373.34	0.00
5.08	Skilled	2	h	335.65	2.99	0.00	1,003.59	0.00
5.09	Semiskilled	4	h	671.29	2.38	0.00	1,597.68	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	day	9.36	18.94	1,269.30	177.22	11,876.70
	Sub-total						27,819.10	157,116.19
	Missing items and construction contingencies	%		1.50%			417.29	2,356.74
	Total Direct Costs						28,236.39	159,472.94
	Overheads, risks and profit on cement and admixtures	%		25.00%			229.58	2,066.26
	Overhead, risks & profit on other costs	%		52.00%			9,283.35	83,550.14
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	5,904.95			6.39	41.51
	AGGREGATE UNIT PRICE		m3					47.90

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T3 (INVERT CONCRETE)

SEC 4-01
 ANA 014
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	179.40	0.63	62.22	113.02	11,162.49
		s.b.	h	44.85	0.00	28.86	0.00	1,294.40
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	110.31	0.27	23.93	29.78	2,639.60
		s.b.	h	22.06	0.00	12.03	0.00	265.39
1.03	Hand-held breaker, medium weight type	Op.	h	512.92	0.04	2.03	20.52	1,041.22
		s.b.	h	102.58	0.00	1.21	0.00	124.13
1.04	Hand held breaker tool,moil point type	----	ea.	5.13	0.00	32.37	0.00	166.03
1.05	Breaker tool resharpenner	----	h	15.39	0.01	1.57	0.15	24.16
1.06	General foreman	----	h	12.82	0.00	47.25	0.00	605.88
1.07	Gang foreman	1	h	128.23	6.60	0.00	846.32	0.00
1.08	Dumper driver and backhoe operator	1	h	318.68	5.82	0.00	1,854.71	0.00
1.09	Skilled	2	h	256.46	2.99	0.00	766.81	0.00
1.10	Semiskilled	2	h	256.46	2.38	0.00	610.37	0.00
1.11	Unskilled	4	h	512.92	1.77	0.00	907.87	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	5,484.09	1.33	10.22	7,299.32	56,063.85
	b) Portland cement, normal type	50%	t	987.14	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	987.14	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	5,922.82	0.00	1.44	0.00	8,528.86
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	674.55	0.40	47.95	269.82	32,344.68
		s.b.	h	134.91	0.00	14.53	0.00	1,960.24
3.03	General foreman	----	h	7.42	0.00	47.25	0.00	350.60
3.04	Gang foreman	----	h	74.20	6.60	0.00	489.72	0.00
3.05	Transit mixer operator	1	h	742.01	5.82	0.00	4,318.47	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	5,037.58	40,394.03
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	161.98	0.61	44.83	98.81	7,261.44
		s.b.	h	32.40	0.00	13.85	0.00	448.68
5.03	Sliding vibrating bar	Op.	h	161.98	0.02	1.77	3.24	286.70
		s.b.	h	32.40	0.00	0.60	0.00	19.44
5.04	General foreman	1	h	47.86	0.00	47.25	0.00	2,261.48
5.05	Gang foreman	1	h	239.31	6.60	0.00	1,579.44	0.00
5.06	Concrete pump, operator	1	h	178.18	5.82	0.00	1,036.98	0.00
5.07	Concrete pump, helper	1	h	178.18	2.38	0.00	424.06	0.00
5.08	Skilled	2	h	478.62	2.99	0.00	1,431.07	0.00
5.09	Semiskilled	4	h	957.24	2.38	0.00	2,278.23	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	353.45	29,677.11
Sub-total		----->>>					29,769.75	196,920.41
Missing items and construction contingencies		%	1.50%	----->>>			446.55	2,953.81
Total Direct Costs		----->>>					30,216.29	199,874.21
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>>			213.22	1,918.99
Overhead, risks & profit on other costs		%	52.00%	----->>>			11,521.21	103,690.85
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	5,484.09	----->>>			7.65	55.70
AGGREGATE UNIT PRICE		m3	----->>>					63.35

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T3' (INVERT CONCRETE)

SEC 4-01
 ANA 015
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	55.85	0.63	62.22	35.19	3,475.01
		s.b.	h	13.96	0.00	28.86	0.00	402.96
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	42.10	0.27	23.93	11.37	1,007.38
		s.b.	h	8.42	0.00	12.03	0.00	101.29
1.03	Hand-held breaker, medium weight type	Op.	h	195.75	0.04	2.03	7.83	397.37
		s.b.	h	39.15	0.00	1.21	0.00	47.37
1.04	Hand held breaker tool,moil point type	----	ea.	1.96	0.00	32.37	0.00	63.36
1.05	Breaker tool resharpenner	----	h	5.87	0.01	1.57	0.06	9.22
1.06	General foreman	----	h	4.89	0.00	47.25	0.00	231.23
1.07	Gang foreman	1	h	48.94	6.60	0.00	322.99	0.00
1.08	Dumper driver and backhoe operator	1	h	107.74	5.82	0.00	627.06	0.00
1.09	Skilled	2	h	97.88	2.99	0.00	292.65	0.00
1.10	Semiskilled	2	h	97.88	2.38	0.00	232.94	0.00
1.11	Unskilled	4	h	195.75	1.77	0.00	346.48	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,041.36	1.33	10.22	2,717.05	20,868.82
	b) Portland cement, normal type	50%	t	367.44	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	367.44	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,204.67	0.00	1.44	0.00	3,174.72
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	301.51	0.40	47.95	120.60	14,457.37
		s.b.	h	60.30	0.00	14.53	0.00	876.19
3.03	General foreman	----	h	3.32	0.00	47.25	0.00	156.71
3.04	Gang foreman	----	h	33.17	6.60	0.00	218.90	0.00
3.05	Transit mixer operator	1	h	331.66	5.82	0.00	1,930.26	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	2,029.63	16,090.26
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	808.80	5.34	10.23	4,318.99	8,274.02
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	60.29	0.61	44.83	36.78	2,702.95
		s.b.	h	12.06	0.00	13.85	0.00	167.01
5.03	Sliding vibrating bar	Op.	h	60.29	0.02	1.77	1.21	106.72
		s.b.	h	12.06	0.00	0.60	0.00	7.24
5.04	General foreman	1	h	18.74	0.00	47.25	0.00	885.29
5.05	Gang foreman	1	h	93.68	6.60	0.00	618.30	0.00
5.06	Concrete pump, operator	1	h	66.32	5.82	0.00	386.00	0.00
5.07	Concrete pump, helper	1	h	66.32	2.38	0.00	157.85	0.00
5.08	Skilled	2	h	187.36	2.99	0.00	560.22	0.00
5.09	Semiskilled	4	h	374.73	2.38	0.00	891.85	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	124.12	8,364.87
Sub-total		----->>>					15,988.32	81,867.37
Missing items and construction contingencies		%	1.50%	----->>>			239.82	1,228.01
Total Direct Costs		----->>>					16,228.14	83,095.38
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>>			79.37	714.31
Overhead, risks & profit on other costs		%	52.00%	----->>>			4,999.74	44,997.64
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	2,041.36	----->>>			10.44	63.10
AGGREGATE UNIT PRICE		m3	----->>>					73.54

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T4 (INVERT CONCRETE)

SEC 4-01
 ANA 016
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	71.32	0.63	62.22	44.93	4,437.35
		s.b.	h	17.83	0.00	28.86	0.00	514.55
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	58.79	0.27	23.93	15.87	1,406.73
		s.b.	h	11.76	0.00	12.03	0.00	141.44
1.03	Hand-held breaker, medium weight type	Op.	h	273.35	0.04	2.03	10.93	554.90
		s.b.	h	54.67	0.00	1.21	0.00	66.15
1.04	Hand held breaker tool,moil point type	----	ea.	2.73	0.00	32.37	0.00	88.48
1.05	Breaker tool resharpenner	----	h	8.20	0.01	1.57	0.08	12.87
1.06	General foreman	----	h	6.83	0.00	47.25	0.00	322.90
1.07	Gang foreman	1	h	68.34	6.60	0.00	451.03	0.00
1.08	Dumper driver and backhoe operator	1	h	143.11	5.82	0.00	832.92	0.00
1.09	Skilled	2	h	136.68	2.99	0.00	408.66	0.00
1.10	Semiskilled	2	h	136.68	2.38	0.00	325.29	0.00
1.11	Unskilled	4	h	273.35	1.77	0.00	483.83	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,175.35	1.33	10.22	2,895.39	22,238.60
	b) Portland cement, normal type	50%	t	391.56	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	391.56	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,349.38	0.00	1.44	0.00	3,383.10
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	329.97	0.40	47.95	131.99	15,822.28
		s.b.	h	65.99	0.00	14.53	0.00	958.91
3.03	General foreman	----	h	3.63	0.00	47.25	0.00	171.50
3.04	Gang foreman	----	h	36.30	6.60	0.00	239.56	0.00
3.05	Transit mixer operator	1	h	362.97	5.82	0.00	2,112.50	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	2,189.43	17,327.78
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	1,532.80	5.34	10.23	8,185.15	15,680.54
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	64.25	0.61	44.83	39.19	2,880.37
		s.b.	h	12.85	0.00	13.85	0.00	177.97
5.03	Sliding vibrating bar	Op.	h	64.25	0.02	1.77	1.29	113.72
		s.b.	h	12.85	0.00	0.60	0.00	7.71
5.04	General foreman	1	h	21.28	0.00	47.25	0.00	1,005.28
5.05	Gang foreman	1	h	106.38	6.60	0.00	702.10	0.00
5.06	Concrete pump, operator	1	h	70.68	5.82	0.00	411.33	0.00
5.07	Concrete pump, helper	1	h	70.68	2.38	0.00	168.21	0.00
5.08	Skilled	2	h	212.76	2.99	0.00	636.15	0.00
5.09	Semiskilled	4	h	425.52	2.38	0.00	1,012.73	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	156.43	14,619.68
Sub-total		----->>>					21,455.00	101,932.84
Missing items and construction contingencies		%	1.50%	----->>>			321.82	1,528.99
Total Direct Costs		----->>>					21,776.82	103,461.83
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>>			84.58	761.20
Overhead, risks & profit on other costs		%	52.00%	----->>>			6,336.49	57,028.40
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	2,175.35	----->>>			12.96	74.13
AGGREGATE UNIT PRICE		m3	----->>>					87.09

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T5A (INVERT CONCRETE)

SEC 4-01
 ANA 017
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	17.86	0.63	62.22	11.25	1,111.33
		s.b.	h	4.47	0.00	28.86	0.00	128.87
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	12.79	0.27	23.93	3.45	305.95
		s.b.	h	2.56	0.00	12.03	0.00	30.76
1.03	Hand-held breaker, medium weight type	Op.	h	59.45	0.04	2.03	2.38	120.69
		s.b.	h	11.89	0.00	1.21	0.00	14.39
1.04	Hand held breaker tool,moil point type	----	ea.	0.59	0.00	32.37	0.00	19.24
1.05	Breaker tool resharpenner	----	h	1.78	0.01	1.57	0.02	2.80
1.06	General foreman	----	h	1.49	0.00	47.25	0.00	70.23
1.07	Gang foreman	1	h	14.86	6.60	0.00	98.09	0.00
1.08	Dumper driver and backhoe operator	1	h	33.71	5.82	0.00	196.20	0.00
1.09	Skilled	2	h	29.73	2.99	0.00	88.88	0.00
1.10	Semiskilled	2	h	29.73	2.38	0.00	70.75	0.00
1.11	Unskilled	4	h	59.45	1.77	0.00	105.23	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	808.98	1.33	10.22	1,076.75	8,270.20
	b) Portland cement, normal type	50%	t	145.62	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	145.62	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	873.70	0.00	1.44	0.00	1,258.13
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	115.47	0.33	41.72	38.11	4,817.55
		s.b.	hr	23.09	0.00	13.62	0.00	314.55
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
3.03	General foreman	----	h	1.27	0.00	47.25	0.00	60.02
3.04	Gang foreman	----	h	12.70	6.60	0.00	83.83	0.00
3.05	Transit mixer operator	1	h	127.02	5.82	0.00	739.26	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	27.9%	----	----	541.59	4,113.86
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	77.60	5.34	10.23	414.38	793.85
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	21.73	0.61	44.83	13.25	974.07
		s.b.	h	4.35	0.00	13.85	0.00	60.19
5.03	Sliding vibrating bar	Op.	h	21.73	0.02	1.77	0.43	38.46
		s.b.	h	4.35	0.00	0.60	0.00	2.61
5.04	General foreman	1	h	5.89	0.00	47.25	0.00	278.48
5.05	Gang foreman	1	h	29.47	6.60	0.00	194.49	0.00
5.06	Concrete pump, operator	1	h	23.90	5.82	0.00	139.10	0.00
5.07	Concrete pump, helper	1	h	23.90	2.38	0.00	56.88	0.00
5.08	Skilled	2	h	58.94	2.99	0.00	176.22	0.00
5.09	Semiskilled	4	h	117.87	2.38	0.00	280.54	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	32.13	2,686.43
	Sub-total						4,363.24	25,472.64
	Missing items and construction contingencies	%		1.50%			65.45	382.09
	Total Direct Costs						4,428.69	25,854.73
	Overheads, risks and profit on cement and admixtures	%		25.00%			31.45	283.08
	Overhead, risks & profit on other costs	%		52.00%			1,509.31	13,583.83
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	808.98			7.38	49.10
	AGGREGATE UNIT PRICE		m3					56.48

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T6 (INVERT CONCRETE)

SEC 4-01
 ANA 018
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	8.07	0.63	62.22	5.08	502.02
		s.b.	h	2.02	0.00	28.86	0.00	58.21
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	7.05	0.27	23.93	1.90	168.60
		s.b.	h	1.41	0.00	12.03	0.00	16.95
1.03	Hand-held breaker, medium weight type	Op.	h	32.76	0.04	2.03	1.31	66.51
		s.b.	h	6.55	0.00	1.21	0.00	7.93
1.04	Hand held breaker tool,moil point type	----	ea.	0.33	0.00	32.37	0.00	10.60
1.05	Breaker tool resharpenner	----	h	0.98	0.01	1.57	0.01	1.54
1.06	General foreman	----	h	0.82	0.00	47.25	0.00	38.70
1.07	Gang foreman	1	h	8.19	6.60	0.00	54.06	0.00
1.08	Dumper driver and backhoe operator	1	h	16.63	5.82	0.00	96.76	0.00
1.09	Skilled	2	h	16.38	2.99	0.00	48.98	0.00
1.10	Semiskilled	2	h	16.38	2.38	0.00	38.99	0.00
1.11	Unskilled	4	h	32.76	1.77	0.00	57.99	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	928.95	1.33	10.22	1,236.43	9,496.66
	b) Portland cement, normal type	50%	t	167.21	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	167.21	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,003.27	0.00	1.44	0.00	1,444.70
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	112.27	0.40	47.95	44.91	5,383.53
		s.b.	h	22.45	0.00	14.53	0.00	326.27
3.03	General foreman	----	h	1.24	0.00	47.25	0.00	58.35
3.04	Gang foreman	----	h	12.35	6.60	0.00	81.51	0.00
3.05	Transit mixer operator	1	h	123.50	5.82	0.00	718.78	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	15.1%	----	----	315.01	2,528.62
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	22.45	0.61	44.83	13.70	1,006.50
		s.b.	h	4.49	0.00	13.85	0.00	62.19
5.03	Sliding vibrating bar	Op.	h	22.45	0.02	1.77	0.45	39.74
		s.b.	h	4.49	0.00	0.60	0.00	2.69
5.04	General foreman	1	h	5.28	0.00	47.25	0.00	249.52
5.05	Gang foreman	1	h	26.40	6.60	0.00	174.27	0.00
5.06	Concrete pump, operator	1	h	24.70	5.82	0.00	143.74	0.00
5.07	Concrete pump, helper	1	h	24.70	2.38	0.00	58.78	0.00
5.08	Skilled	2	h	52.81	2.99	0.00	157.90	0.00
5.09	Semiskilled	4	h	105.62	2.38	0.00	251.37	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	33.42	2,555.52
Sub-total		----->>>					3,535.33	24,025.36
Missing items and construction contingencies		%		1.50%	----->>>		53.03	360.38
Total Direct Costs		----->>>					3,588.36	24,385.74
Overheads, risks and profit on cement and admixtures		%		25.00%	----->>>		36.12	325.06
Overhead, risks & profit on other costs		%		52.00%	----->>>		1,379.53	12,415.76
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3		928.95	----->>>		5.39	39.97
AGGREGATE UNIT PRICE		m3			----->>>			45.35

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T7 (INVERT CONCRETE)

SEC 4-01
 ANA 019
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	21.33	0.63	62.22	13.44	1,327.17
		s.b.	h	5.33	0.00	28.86	0.00	153.90
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	15.30	0.27	23.93	4.13	366.20
		s.b.	h	3.06	0.00	12.03	0.00	36.82
1.03	Hand-held breaker, medium weight type	Op.	h	71.16	0.04	2.03	2.85	144.45
		s.b.	h	14.23	0.00	1.21	0.00	17.22
1.04	Hand held breaker tool,moil point type	----	ea.	0.71	0.00	32.37	0.00	23.03
1.05	Breaker tool resharpenner	----	h	2.13	0.01	1.57	0.02	3.35
1.06	General foreman	----	h	1.78	0.00	47.25	0.00	84.06
1.07	Gang foreman	1	h	17.79	6.60	0.00	117.41	0.00
1.08	Dumper driver and backhoe operator	1	h	40.30	5.82	0.00	234.53	0.00
1.09	Skilled	2	h	35.58	2.99	0.00	106.38	0.00
1.10	Semiskilled	2	h	35.58	2.38	0.00	84.68	0.00
1.11	Unskilled	4	h	71.16	1.77	0.00	125.95	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	454.95	1.33	10.22	605.54	4,650.95
	b) Portland cement, normal type	50%	t	81.89	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	81.89	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	491.35	0.00	1.44	0.00	707.54
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	54.55	0.40	47.95	21.82	2,615.90
		s.b.	h	10.91	0.00	14.53	0.00	158.54
3.03	General foreman	----	h	0.60	0.00	47.25	0.00	28.35
3.04	Gang foreman	----	h	6.00	6.60	0.00	39.61	0.00
3.05	Transit mixer operator	1	h	60.01	5.82	0.00	349.26	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	413.60	3,321.64
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	111.33	5.34	10.23	594.50	1,138.91
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	13.44	0.61	44.83	8.20	602.40
		s.b.	h	2.69	0.00	13.85	0.00	37.22
5.03	Sliding vibrating bar	Op.	h	13.44	0.02	1.77	0.27	23.78
		s.b.	h	2.69	0.00	0.60	0.00	1.61
5.04	General foreman	1	h	4.69	0.00	47.25	0.00	221.37
5.05	Gang foreman	1	h	23.43	6.60	0.00	154.61	0.00
5.06	Concrete pump, operator	1	h	14.78	5.82	0.00	86.03	0.00
5.07	Concrete pump, helper	1	h	14.78	2.38	0.00	35.18	0.00
5.08	Skilled	2	h	46.85	2.99	0.00	140.09	0.00
5.09	Semiskilled	4	h	93.70	2.38	0.00	223.01	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	35.62	2,383.93
	Sub-total						3,396.73	18,048.37
	Missing items and construction contingencies	%		1.50%			50.95	270.73
	Total Direct Costs						3,447.68	18,319.09
	Overheads, risks and profit on cement and admixtures	%		25.00%			17.69	159.20
	Overhead, risks & profit on other costs	%		52.00%			1,095.08	9,855.72
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	454.95			10.02	62.28
	AGGREGATE UNIT PRICE		m3					72.30

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T8 (INVERT CONCRETE)

SEC 4-01
 ANA 020
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	21.52	0.63	62.22	13.56	1,338.92
		s.b.	h	5.38	0.00	28.86	0.00	155.26
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	18.50	0.27	23.93	4.99	442.70
		s.b.	h	3.70	0.00	12.03	0.00	44.51
1.03	Hand-held breaker, medium weight type	Op.	h	86.02	0.04	2.03	3.44	174.63
		s.b.	h	17.20	0.00	1.21	0.00	20.82
1.04	Hand held breaker tool,moil point type	----	ea.	0.86	0.00	32.37	0.00	27.85
1.05	Breaker tool resharpenner	----	h	2.58	0.01	1.57	0.03	4.05
1.06	General foreman	----	h	2.15	0.00	47.25	0.00	101.62
1.07	Gang foreman	1	h	21.51	6.60	0.00	141.94	0.00
1.08	Dumper driver and backhoe operator	1	h	44.02	5.82	0.00	256.20	0.00
1.09	Skilled	2	h	43.01	2.99	0.00	128.61	0.00
1.10	Semiskilled	2	h	43.01	2.38	0.00	102.37	0.00
1.11	Unskilled	4	h	86.02	1.77	0.00	152.26	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,044.10	1.33	10.22	1,389.70	10,673.83
	b) Portland cement, normal type	50%	t	187.94	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	187.94	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,127.63	0.00	1.44	0.00	1,623.78
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	146.87	0.40	47.95	58.75	7,042.32
		s.b.	h	29.37	0.00	14.53	0.00	426.80
3.03	General foreman	----	h	1.62	0.00	47.25	0.00	76.33
3.04	Gang foreman	----	h	16.16	6.60	0.00	106.63	0.00
3.05	Transit mixer operator	1	h	161.55	5.82	0.00	940.25	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	38.1%	----	----	950.39	7,557.63
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	230.10	5.34	10.23	1,228.76	2,353.96
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	30.27	0.61	44.83	18.46	1,356.81
		s.b.	h	6.05	0.00	13.85	0.00	83.84
5.03	Sliding vibrating bar	Op.	h	30.27	0.02	1.77	0.61	53.57
		s.b.	h	6.05	0.00	0.60	0.00	3.63
5.04	General foreman	1	h	8.71	0.00	47.25	0.00	411.76
5.05	Gang foreman	1	h	43.57	6.60	0.00	287.58	0.00
5.06	Concrete pump, operator	1	h	33.29	5.82	0.00	193.76	0.00
5.07	Concrete pump, helper	1	h	33.29	2.38	0.00	79.24	0.00
5.08	Skilled	2	h	87.15	2.99	0.00	260.56	0.00
5.09	Semiskilled	4	h	174.29	2.38	0.00	414.81	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	34.28	2,931.51
	Sub-total						6,767.17	36,906.14
	Missing items and construction contingencies	%		1.50%			101.51	553.59
	Total Direct Costs						6,868.67	37,459.73
	Overheads, risks and profit on cement and admixtures	%		25.00%			40.59	365.35
	Overhead, risks & profit on other costs	%		52.00%			2,220.64	19,985.76
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	1,044.10			8.74	55.37
	AGGREGATE UNIT PRICE		m3					64.11

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSPORTATION TUNNEL T22 (INVERT CONCRETE)

SEC 4-01
 ANA 021
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	29.84	0.63	62.22	18.80	1,856.58
		s.b.	h	7.46	0.00	28.86	0.00	215.29
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	36.49	0.27	23.93	9.85	873.13
		s.b.	h	7.30	0.00	12.03	0.00	87.79
1.03	Hand-held breaker, medium weight type	Op.	h	169.66	0.04	2.03	6.79	344.42
		s.b.	h	33.93	0.00	1.21	0.00	41.06
1.04	Hand held breaker tool,moil point type	----	ea.	1.70	0.00	32.37	0.00	54.92
1.05	Breaker tool resharpenner	----	h	5.09	0.01	1.57	0.05	7.99
1.06	General foreman	----	h	4.24	0.00	47.25	0.00	200.42
1.07	Gang foreman	1	h	42.42	6.60	0.00	279.95	0.00
1.08	Dumper driver and backhoe operator	1	h	72.96	5.82	0.00	424.62	0.00
1.09	Skilled	2	h	84.83	2.99	0.00	253.65	0.00
1.10	Semiskilled	2	h	84.83	2.38	0.00	201.90	0.00
1.11	Unskilled	4	h	169.66	1.77	0.00	300.31	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	3,178.52	1.33	10.22	4,230.61	32,494.01
	b) Portland cement, normal type	50%	t	572.13	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	572.13	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	3,432.80	0.00	1.44	0.00	4,943.23
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00
		s.b.	hr	0.00	0.00	13.62	0.00	0.00
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	415.31	0.40	47.95	166.13	19,914.26
		s.b.	h	83.06	0.00	14.53	0.00	1,206.90
3.03	General foreman	----	h	4.57	0.00	47.25	0.00	215.86
3.04	Gang foreman	----	h	45.68	6.60	0.00	301.52	0.00
3.05	Transit mixer operator	1	h	456.84	5.82	0.00	2,658.83	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	23.7%	----	----	1,744.77	13,938.61
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	82.55	0.61	44.83	50.35	3,700.61
		s.b.	h	16.51	0.00	13.85	0.00	228.66
5.03	Sliding vibrating bar	Op.	h	82.55	0.02	1.77	1.65	146.11
		s.b.	h	16.51	0.00	0.60	0.00	9.91
5.04	General foreman	1	h	21.09	0.00	47.25	0.00	996.59
5.05	Gang foreman	1	h	105.46	6.60	0.00	696.03	0.00
5.06	Concrete pump, operator	1	h	90.80	5.82	0.00	528.47	0.00
5.07	Concrete pump, helper	1	h	90.80	2.38	0.00	216.11	0.00
5.08	Skilled	2	h	210.92	2.99	0.00	630.65	0.00
5.09	Semiskilled	4	h	421.84	2.38	0.00	1,003.97	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	76.95	6,627.67
Sub-total							13,801.95	88,104.01
Missing items and construction contingencies				%	1.50%		207.03	1,321.56
Total Direct Costs							14,008.98	89,425.57
Overheads, risks and profit on cement and admixtures				%	25.00%		123.58	1,112.23
Overhead, risks & profit on other costs				%	52.00%		5,121.55	46,093.94
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	3,178.52		6.06	42.99
AGGREGATE UNIT PRICE				m3				49.04

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P1 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 001
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	149.35	2.71	19.47	404.88	2,907.60
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	933.44	0.00	1.34	0.00	1,248.94
	b) Grouted anchor bars	---	kg	1,166.80	0.00	0.84	0.00	980.11
	c) Formwork bond breaking compound	---	kg	18.67	0.00	3.23	0.00	60.30
	d) Motorcompressor, 5 m ³ /min.	Op.	h	7.47	0.08	11.32	0.60	84.53
		s.b.	h	1.49	0.00	2.99	0.00	4.47
	e) Immersion type vibrator, 77 mm dia.	Op.	h	22.40	0.01	1.46	0.22	32.71
		s.b.	h	4.48	0.00	0.42	0.00	1.88
	f) General foreman	---	h	1.39	0.00	47.25	0.00	65.50
	g) Gang foreman	---	h	13.86	6.60	0.00	91.49	0.00
	h) Skilled	---	h	138.62	2.77	0.00	383.97	0.00
	i) Semiskilled	---	h	299.63	2.77	0.00	829.99	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	3,774.60	1.33	10.22	5,023.99	38,587.73
	b) Portland cement, normal type	50%	t	679.43	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	679.43	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,717.71	0.00	1.44	0.00	3,913.50
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	698.40	0.33	41.12	230.47	28,718.28
		s.b.	h	139.68	0.00	13.62	0.00	1,902.45
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
	c) General foreman	---	h	7.68	0.00	47.25	0.00	362.99
	d) Gang foreman	---	h	76.82	6.60	0.00	507.04	0.00
	e) Transit mixer, operator	1	h	768.24	5.82	0.00	4,471.17	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	39.2%	---	---	4,006.49	28,772.19
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	3,774.60	0.00	13.20	0.00	49,824.71
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.71	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	6,539.09	0.00	0.24	0.00	1,569.38
		s.b.	h	1,307.82	0.00	0.17	0.00	222.33
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	172.86	0.15	13.48	25.93	2,330.14
		s.b.	h	34.57	0.00	8.88	0.00	307.00
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	2.41	0.00	350.00	0.00	845.16
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	482.95	0.00	3.58	0.00	1,728.95
3.07	Formwork bond breaking compound	---	kg	466.72	0.00	3.23	0.00	1,507.51
3.08	General foreman	---	h	52.71	0.00	47.25	0.00	2,490.58
3.09	Gang foreman	1	h	527.11	6.60	0.00	3,478.90	0.00
3.10	Specialist	3	h	1,581.32	3.69	0.00	5,835.07	0.00
03:11	Skilled	2	h	1,054.21	2.99	0.00	3,152.10	0.00
03:12	Semiskilled	1	h	527.11	2.38	0.00	1,254.51	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	132.45	0.61	44.83	80.80	5,937.91
		s.b.	h	26.49	0.00	13.85	0.00	366.90
4.02	Motorcompressors, 30 m ³ /min (33.0 m ³ /min. consumption)	Op.	h	132.45	0.36	109.35	48.08	14,483.98
		s.b.	h	26.49	0.00	13.18	0.00	349.10
4.03	General foreman	---	h	14.57	0.00	47.25	0.00	688.43
4.04	Gang foreman	1	h	145.70	6.60	0.00	961.62	0.00
4.05	Concrete pump, operator	1	h	145.70	5.82	0.00	847.97	0.00
4.06	Concrete pump, helper	1	h	145.70	2.38	0.00	346.76	0.00
4.07	Skilled	1	h	145.70	2.99	0.00	435.64	0.00
4.08	Semiskilled	2	h	291.40	2.38	0.00	693.53	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	660.47	44,510.14
Sub-total							33,771.68	234,805.40
Missing items and construction contingencies							506.58	3,522.08
Total Direct Costs							34,278.25	238,327.48
Overheads, risks and profit on cement and admixtures							101.71	915.38
Overhead, risks & profit on other costs							13,963.94	125,675.50
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							12.32	93.00
AGGREGATE UNIT PRICE								105.32

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P1B (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 002
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	94.40	3.66	22.38	345.64	2,112.61
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	590.00	0.00	0.89	0.00	526.52
	b) Grouted anchor bars	---	kg	737.50	0.00	0.84	0.00	619.50
	c) Formwork bond breaking compound	---	kg	11.80	0.00	3.23	0.00	38.11
	d) Motorcompressor, 5 m ³ /min.	Op.	h	4.72	0.08	11.32	0.38	53.43
		s.b.	h	0.94	0.00	2.99	0.00	2.82
	e) Immersion type vibrator, 77 mm dia.	Op.	h	14.16	0.01	1.46	0.14	20.67
		s.b.	h	2.83	0.00	0.42	0.00	1.19
	f) General foreman	---	h	0.70	0.00	47.25	0.00	33.12
	g) Gang foreman	---	h	7.01	6.60	0.00	46.26	0.00
	h) Skilled	---	h	70.09	2.77	0.00	194.15	0.00
	i) Semiskilled	---	h	159.06	2.77	0.00	440.61	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	972.31	1.33	10.22	1,294.14	9,939.93
	b) Portland cement, normal type	50%	t	175.02	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	175.02	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	700.06	0.00	1.44	0.00	1,008.09
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	0.00	0.28	25.38	0.00	0.00
		s.b.	h	0.00	0.00	10.68	0.00	0.00
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	306.28	0.27	32.54	82.70	9,966.41
		s.b.	h	61.26	0.00	11.20	0.00	686.07
	c) General foreman	----	h	3.37	0.00	47.25	0.00	159.19
	d) Gang foreman	----	h	33.69	6.60	0.00	222.36	0.00
	e) Transit mixer, operator	1	h	336.91	5.82	0.00	1,960.82	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	49.6%	----	----	1,767.35	10,802.49
3	Formworks							
3.01	Steel formworks	---	m ³	972.31	0.00	13.87	0.00	13,482.70
3.02	Side closure of formworks (construction joints)	1	m ³	0.00	0.00	1.03	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,102.80	0.00	0.24	0.00	504.67
		s.b.	h	420.56	0.00	0.17	0.00	71.50
3.04	Truck for shifting the forms, 15 t pay load	Op.	h	150.23	0.13	11.37	19.53	1,708.13
		s.b.	h	30.05	0.00	7.32	0.00	219.94
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.71	0.00	350.00	0.00	247.07
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	141.18	0.00	3.58	0.00	505.44
3.07	Formwork bond breaking compound	---	kg	184.67	0.00	3.23	0.00	596.48
3.08	General foreman	---	h	30.78	0.00	47.25	0.00	1,454.13
3.09	Gang foreman	1	h	307.75	6.60	0.00	2,031.16	0.00
3.10	Specialist	2	h	615.50	3.69	0.00	2,271.21	0.00
03:11	Skilled	2	h	615.50	2.99	0.00	1,840.35	0.00
03:12	Semiskilled	1	h	307.75	2.38	0.00	732.45	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	60.52	0.45	30.85	27.24	1,867.12
		s.b.	h	12.10	0.00	13.69	0.00	165.71
4.02	Motorcompressors, 15 m ³ /min (15.1 m ³ /min. consumption)	Op.	h	60.52	0.20	40.08	12.10	2,425.74
		s.b.	h	12.10	0.00	7.50	0.00	90.78
4.03	General foreman	---	h	6.66	0.00	47.25	0.00	314.57
4.04	Gang foreman	1	h	66.57	6.60	0.00	439.39	0.00
4.05	Concrete pump, operator	1	h	66.57	5.82	0.00	387.47	0.00
4.06	Concrete pump, helper	1	h	66.57	2.38	0.00	158.45	0.00
4.07	Skilled	1	h	66.57	2.99	0.00	199.06	0.00
4.08	Semiskilled	2	h	133.15	2.38	0.00	316.90	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	240.84	19,468.40
Sub-total							15,030.68	79,092.53
Missing items and construction contingencies				%	1.50%		225.46	1,186.39
Total Direct Costs							15,256.14	80,278.92
Overheads, risks and profit on cement and admixtures				%	25.00%		27.65	248.84
Overhead, risks & profit on other costs				%	52.00%		4,910.31	44,192.82
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	1,067		18.93	116.92
AGGREGATE UNIT PRICE				m³				135.85

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P3 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 003
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	96.13	3.24	20.36	311.33	1,957.43	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	600.84	0.00	0.89	0.00	536.19	
	b) Grouted anchor bars	---	kg	751.05	0.00	0.84	0.00	630.88	
	c) Formwork bond breaking compound	---	kg	12.02	0.00	3.23	0.00	38.81	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	4.81	0.08	11.32	0.38	54.41	
		s.b.	h	0.96	0.00	2.99	0.00	2.87	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	14.42	0.01	1.46	0.14	21.05	
		s.b.	h	2.88	0.00	0.42	0.00	1.21	
	f) General foreman	---	h	0.71	0.00	47.25	0.00	33.73	
	g) Gang foreman	---	h	7.14	6.60	0.00	47.11	0.00	
	h) Skilled	---	h	71.38	2.77	0.00	197.72	0.00	
	i) Semiskilled	---	h	161.99	2.77	0.00	448.70	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	1,478.21	1.33	10.22	1,967.49	15,111.70	
	b) Portland cement, normal type	50%	t	266.08	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	266.08	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,064.31	0.00	1.44	0.00	1,532.60	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	0.00	0.28	25.38	0.00	0.00	
		s.b.	h	0.00	0.00	10.68	0.00	0.00	
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	381.14	0.27	32.54	102.91	12,402.21	
		s.b.	h	76.23	0.00	11.20	0.00	853.75	
	c) General foreman	----	h	4.19	0.00	47.25	0.00	198.10	
	d) Gang foreman	----	h	41.93	6.60	0.00	276.71	0.00	
	e) Transit mixer, operator	1	h	419.25	5.82	0.00	2,440.04	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	1,948.37	12,250.03	
3	Formworks								
3.01	Steel formworks	---	m ³	1,478.21	0.00	12.24	0.00	18,086.28	
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.91	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	3,667.95	0.00	0.24	0.00	880.31	
		s.b.	h	733.59	0.00	0.17	0.00	124.71	
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	152.99	0.09	7.91	13.77	1,210.16	
		s.b.	h	30.60	0.00	5.13	0.00	156.97	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.98	0.00	350.00	0.00	342.86	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	195.92	0.00	3.58	0.00	701.39	
3.07	Formwork bond breaking compound	---	kg	249.35	0.00	3.23	0.00	805.40	
3.08	General foreman	---	h	35.99	0.00	47.25	0.00	1,700.45	
3.09	Gang foreman	1	h	359.88	6.60	0.00	2,375.23	0.00	
3.10	Specialist	2	h	719.77	3.69	0.00	2,655.94	0.00	
03:11	Skilled	2	h	719.77	2.99	0.00	2,152.10	0.00	
03:12	Semiskilled	1	h	359.88	2.38	0.00	856.52	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	89.32	0.45	30.85	40.20	2,755.65	
		s.b.	h	17.86	0.00	13.69	0.00	244.57	
4.02	Motorcompressors, 20 m ³ /min (20.1 m ³ /min. consumption)	Op.	h	89.32	0.25	58.15	22.44	5,194.14	
		s.b.	h	17.86	0.00	9.31	0.00	166.26	
4.03	General foreman	---	h	9.83	0.00	47.25	0.00	464.26	
4.04	Gang foreman	1	h	98.26	6.60	0.00	648.49	0.00	
4.05	Concrete pump, operator	1	h	98.26	5.82	0.00	571.85	0.00	
4.06	Concrete pump, helper	1	h	98.26	2.38	0.00	233.85	0.00	
4.07	Skilled	1	h	98.26	2.99	0.00	293.79	0.00	
4.08	Semiskilled	2	h	196.51	2.38	0.00	467.70	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	147.88	12,950.84	
Sub-total				----->>				18,220.68	91,409.22
Missing items and construction contingencies				%	1.50%	----->>		273.31	1,371.14
Total Direct Costs				----->>				18,493.99	92,780.36
Overheads, risks and profit on cement and admixtures				%	25.00%	----->>		40.81	367.26
Overhead, risks & profit on other costs				%	52.00%	----->>		5,701.39	51,312.49
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	1,574	----->>		15.39	91.76
AGGREGATE UNIT PRICE				m³	----->>				107.15

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P11 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 004
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	68.80	2.66	19.16	183.00	1,318.51	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	430.00	0.00	1.34	0.00	575.34	
	b) Grouted anchor bars	---	kg	537.50	0.00	0.84	0.00	451.50	
	c) Formwork bond breaking compound	---	kg	8.60	0.00	3.23	0.00	27.78	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.44	0.08	11.32	0.28	38.94	
		s.b.	h	0.69	0.00	2.99	0.00	2.06	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	10.32	0.01	1.46	0.10	15.07	
		s.b.	h	2.06	0.00	0.42	0.00	0.87	
	f) General foreman	---	h	0.64	0.00	47.25	0.00	30.17	
	g) Gang foreman	---	h	6.39	6.60	0.00	42.14	0.00	
	h) Skilled	---	h	63.86	2.77	0.00	176.88	0.00	
	i) Semiskilled	---	h	138.03	2.77	0.00	382.34	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	2,765.13	1.33	10.22	3,680.39	28,267.92	
	b) Portland cement, normal type	50%	t	497.72	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	497.72	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,990.89	0.00	1.44	0.00	2,866.89	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	492.68	0.33	41.12	162.58	20,258.90	
		s.b.	h	98.54	0.00	13.62	0.00	1,342.05	
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00	
		s.b.	h	0.00	0.00	14.53	0.00	0.00	
	c) General foreman	----	h	5.42	0.00	47.25	0.00	256.07	
	d) Gang foreman	----	h	54.19	6.60	0.00	357.68	0.00	
	e) Transit mixer, operator	1	h	541.95	5.82	0.00	3,154.12	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	39.2%	----	----	2,879.68	20,748.34	
3	Formworks								
3.01	Steel formworks exluding side closure	---	m ³	2,765.13	0.00	13.20	0.00	36,499.72	
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.71	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	4,273.30	0.00	0.24	0.00	1,025.59	
		s.b.	h	854.66	0.00	0.17	0.00	145.29	
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	79.63	0.15	13.48	11.94	1,073.41	
		s.b.	h	15.93	0.00	8.88	0.00	141.42	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.74	0.00	350.00	0.00	610.38	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	348.79	0.00	3.58	0.00	1,248.67	
3.07	Formwork bond breaking compound	---	kg	206.40	0.00	3.23	0.00	666.67	
3.08	General foreman	---	h	28.59	0.00	47.25	0.00	1,351.01	
3.09	Gang foreman	1	h	285.93	6.60	0.00	1,887.13	0.00	
3.10	Specialist	3	h	857.79	3.69	0.00	3,165.23	0.00	
03:11	Skilled	2	h	571.86	2.99	0.00	1,709.85	0.00	
03:12	Semiskilled	1	h	285.93	2.38	0.00	680.51	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	95.66	0.61	44.83	58.35	4,288.44	
		s.b.	h	19.13	0.00	13.85	0.00	264.98	
4.02	Motorcompressors, 30 m ³ /min (31.7 m ³ /min. consumption)	Op.	h	95.66	0.35	105.04	33.36	10,048.44	
		s.b.	h	19.13	0.00	12.66	0.00	242.19	
4.03	General foreman	---	h	10.52	0.00	47.25	0.00	497.19	
4.04	Gang foreman	1	h	105.23	6.60	0.00	694.49	0.00	
4.05	Concrete pump, operator	1	h	105.23	5.82	0.00	612.42	0.00	
4.06	Concrete pump, helper	1	h	105.23	2.38	0.00	250.44	0.00	
4.07	Skilled	1	h	105.23	2.99	0.00	314.63	0.00	
4.08	Semiskilled	2	h	210.45	2.38	0.00	500.88	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	167.99	14,964.95	
Sub-total				----->>				21,106.41	149,268.76
Missing items and construction contingencies				%	1.50%	----->>		316.60	2,239.03
Total Direct Costs				----->>				21,423.01	151,507.79
Overheads, risks and profit on cement and admixtures				%	25.00%	----->>		73.46	661.10
Overhead, risks & profit on other costs				%	52.00%	----->>		8,839.61	79,556.53
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	2,833.93	----->>		10.70	81.77
AGGREGATE UNIT PRICE				m³	----->>				92.47

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P13 (ARCH AND SIDEWALLS)

SEC 4-02
 ANA 005
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	57.60	4.12	21.80	237.10	1,255.72
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	360.00	0.00	0.89	0.00	321.26
	b) Grouted anchor bars	---	kg	450.00	0.00	0.84	0.00	378.00
	c) Formwork bond breaking compound	---	kg	7.20	0.00	3.23	0.00	23.26
	d) Motorcompressor, 5 m ³ /min.	Op.	h	2.88	0.08	11.32	0.23	32.60
		s.b.	h	0.58	0.00	2.99	0.00	1.72
	e) Immersion type vibrator, 77 mm dia.	Op.	h	8.64	0.01	1.46	0.09	12.61
		s.b.	h	1.73	0.00	0.42	0.00	0.73
	f) General foreman	---	h	0.43	0.00	47.25	0.00	20.21
	g) Gang foreman	---	h	4.28	6.60	0.00	28.23	0.00
	h) Skilled	---	h	42.77	2.77	0.00	118.47	0.00
	i) Semiskilled	---	h	97.06	2.77	0.00	268.85	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,319.65	1.33	10.22	1,756.45	13,490.78
	b) Portland cement, normal type	50%	t	237.54	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	237.54	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	950.15	0.00	1.44	0.00	1,368.21
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	496.16	0.28	25.38	138.93	12,592.63
		s.b.	h	99.23	0.00	10.68	0.00	1,059.80
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00
		s.b.	h	0.00	0.00	11.20	0.00	0.00
	c) General foreman	----	h	5.46	0.00	47.25	0.00	257.88
	d) Gang foreman	----	h	54.58	6.60	0.00	360.21	0.00
	e) Transit mixer, operator	1	h	545.78	5.82	0.00	3,176.44	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	48.5%	----	----	2,636.65	13,964.33
3	Formworks							
3.01	Steel formworks	---	m ³	1,319.65	0.00	13.57	0.00	17,901.34
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	3,111.17	0.00	0.24	0.00	746.68
		s.b.	h	622.23	0.00	0.17	0.00	105.78
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	91.67	0.09	7.91	8.25	725.08
		s.b.	h	18.33	0.00	5.13	0.00	94.05
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.90	0.00	350.00	0.00	316.65
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	180.94	0.00	3.58	0.00	647.77
3.07	Formwork bond breaking compound	---	kg	144.90	0.00	3.23	0.00	468.03
3.08	General foreman	---	h	24.16	0.00	47.25	0.00	1,141.51
3.09	Gang foreman	1	h	241.59	6.60	0.00	1,594.49	0.00
3.10	Specialist	2	h	483.18	3.69	0.00	1,782.93	0.00
03:11	Skilled	2	h	483.18	2.99	0.00	1,444.71	0.00
03:12	Semiskilled	1	h	241.59	2.38	0.00	574.98	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	78.14	0.45	30.85	35.16	2,410.68
		s.b.	h	15.63	0.00	13.69	0.00	213.95
4.02	Motorcompressors, 20 m ³ /min (19.5 m ³ /min. consumption)	Op.	h	78.14	0.24	56.41	19.05	4,408.25
		s.b.	h	15.63	0.00	9.03	0.00	141.10
4.03	General foreman	---	h	8.60	0.00	47.25	0.00	406.14
4.04	Gang foreman	1	h	85.96	6.60	0.00	567.31	0.00
4.05	Concrete pump, operator	1	h	85.96	5.82	0.00	500.26	0.00
4.06	Concrete pump, helper	1	h	85.96	2.38	0.00	204.58	0.00
4.07	Skilled	1	h	85.96	2.99	0.00	257.01	0.00
4.08	Semiskilled	2	h	171.91	2.38	0.00	409.15	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	107.68	9,574.36
Sub-total							16,227.20	84,081.12
Missing items and construction contingencies				%	1.50%		243.41	1,261.22
Total Direct Costs							16,470.61	85,342.34
Overheads, risks and profit on cement and admixtures				%	25.00%		35.70	321.28
Overhead, risks & profit on other costs				%	52.00%		5,220.02	46,980.19
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	1,377		15.78	96.31
AGGREGATE UNIT PRICE				m³				112.09

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P16 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 006
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	69.78	4.04	21.52	281.98	1,501.38	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	436.12	0.00	0.89	0.00	389.19	
	b) Grouted anchor bars	---	kg	545.15	0.00	0.84	0.00	457.93	
	c) Formwork bond breaking compound	---	kg	8.72	0.00	3.23	0.00	28.17	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.49	0.08	11.32	0.28	39.50	
		s.b.	h	0.70	0.00	2.99	0.00	2.09	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	10.47	0.01	1.46	0.10	15.28	
		s.b.	h	2.09	0.00	0.42	0.00	0.88	
	f) General foreman	---	h	0.52	0.00	47.25	0.00	24.48	
	g) Gang foreman	---	h	5.18	6.60	0.00	34.20	0.00	
	h) Skilled	---	h	51.81	2.77	0.00	143.52	0.00	
	i) Semiskilled	---	h	117.58	2.77	0.00	325.69	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	909.42	1.33	10.22	1,210.44	9,297.01	
	b) Portland cement, normal type	50%	t	163.70	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	163.70	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	654.78	0.00	1.44	0.00	942.89	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	332.69	0.28	25.38	93.15	8,443.77	
		s.b.	h	66.54	0.00	10.68	0.00	710.63	
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
	c) General foreman	----	h	3.66	0.00	47.25	0.00	172.92	
	d) Gang foreman	----	h	36.60	6.60	0.00	241.54	0.00	
	e) Transit mixer, operator	1	h	365.96	5.82	0.00	2,129.91	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	47.5%	----	----	1,746.89	9,301.08	
3	Formworks								
3.01	Steel formworks	---	m ³	909.42	0.00	13.28	0.00	12,074.01	
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.98	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,820.35	0.00	0.24	0.00	436.89	
		s.b.	h	364.07	0.00	0.17	0.00	61.89	
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	111.05	0.09	7.91	9.99	878.40	
		s.b.	h	22.21	0.00	5.13	0.00	113.94	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.64	0.00	350.00	0.00	223.61	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	127.77	0.00	3.58	0.00	457.43	
3.07	Formwork bond breaking compound	---	kg	135.42	0.00	3.23	0.00	437.39	
3.08	General foreman	---	h	23.73	0.00	47.25	0.00	1,121.10	
3.09	Gang foreman	1	h	237.27	6.60	0.00	1,565.98	0.00	
3.10	Specialist	2	h	474.54	3.69	0.00	1,751.05	0.00	
03:11	Skilled	2	h	474.54	2.99	0.00	1,418.87	0.00	
03:12	Semiskilled	1	h	237.27	2.38	0.00	564.70	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	55.56	0.45	30.85	25.00	1,713.95	
		s.b.	h	11.11	0.00	13.69	0.00	152.12	
4.02	Motorcompressors, 15 m ³ /min (15.0 m ³ /min. consumption)	Op.	h	55.56	0.20	40.08	11.11	2,226.74	
		s.b.	h	11.11	0.00	7.50	0.00	83.34	
4.03	General foreman	---	h	6.11	0.00	47.25	0.00	288.76	
4.04	Gang foreman	1	h	61.11	6.60	0.00	403.35	0.00	
4.05	Concrete pump, operator	1	h	61.11	5.82	0.00	355.68	0.00	
4.06	Concrete pump, helper	1	h	61.11	2.38	0.00	145.45	0.00	
4.07	Skilled	1	h	61.11	2.99	0.00	182.73	0.00	
4.08	Semiskilled	2	h	122.23	2.38	0.00	290.90	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	91.34	8,219.74	
Sub-total				----->>				13,023.85	59,816.50
Missing items and construction contingencies				%	1.50%	----->>		195.36	897.25
Total Direct Costs				----->>				13,219.21	60,713.74
Overheads, risks and profit on cement and admixtures				%	25.00%	----->>		25.38	228.43
Overhead, risks & profit on other costs				%	52.00%	----->>		3,791.72	34,125.49
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m ³	979.20	----->>		17.40	97.09
AGGREGATE UNIT PRICE				m ³	----->>				114.49

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P16B (ARCH AND SIDEWALLS)

SEC 4-02
 ANA 007
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	34.56	3.22	20.30	111.46	701.46	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	216.00	0.00	0.89	0.00	192.76	
	b) Grouted anchor bars	---	kg	270.00	0.00	0.84	0.00	226.80	
	c) Formwork bond breaking compound	---	kg	4.32	0.00	3.23	0.00	13.95	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	1.73	0.08	11.32	0.14	19.56	
		s.b.	h	0.35	0.00	2.99	0.00	1.03	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	5.18	0.01	1.46	0.05	7.57	
		s.b.	h	1.04	0.00	0.42	0.00	0.44	
	f) General foreman	---	h	0.26	0.00	47.25	0.00	12.12	
	g) Gang foreman	---	h	2.57	6.60	0.00	16.94	0.00	
	h) Skilled	---	h	25.66	2.77	0.00	71.08	0.00	
	i) Semiskilled	---	h	58.23	2.77	0.00	161.31	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	1,172.41	1.33	10.22	1,560.48	11,985.55	
	b) Portland cement, normal type	50%	t	211.03	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	211.03	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	844.14	0.00	1.44	0.00	1,215.55	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	0.00	0.28	25.38	0.00	0.00	
		s.b.	h	0.00	0.00	10.68	0.00	0.00	
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	300.15	0.27	32.54	81.04	9,766.91	
		s.b.	h	60.03	0.00	11.20	0.00	672.34	
	c) General foreman	----	h	3.30	0.00	47.25	0.00	156.00	
	d) Gang foreman	----	h	33.02	6.60	0.00	217.91	0.00	
	e) Transit mixer, operator	1	h	330.17	5.82	0.00	1,921.57	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	47.5%	----	----	1,797.26	11,311.36	
3	Formworks								
3.01	Steel formworks	---	m ³	1,172.41	0.00	15.49	0.00	18,159.88	
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.98	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,458.19	0.00	0.24	0.00	589.97	
		s.b.	h	491.64	0.00	0.17	0.00	83.58	
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	55.00	0.09	7.91	4.95	435.05	
		s.b.	h	11.00	0.00	5.13	0.00	56.43	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.79	0.00	350.00	0.00	275.62	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	157.50	0.00	3.58	0.00	563.84	
3.07	Formwork bond breaking compound	---	kg	81.54	0.00	3.23	0.00	263.37	
3.08	General foreman	---	h	14.75	0.00	47.25	0.00	696.86	
3.09	Gang foreman	1	h	147.48	6.60	0.00	973.39	0.00	
3.10	Specialist	2	h	294.97	3.69	0.00	1,088.43	0.00	
03:11	Skilled	2	h	294.97	2.99	0.00	881.95	0.00	
03:12	Semiskilled	1	h	147.48	2.38	0.00	351.01	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	68.48	0.45	30.85	30.82	2,112.63	
		s.b.	h	13.70	0.00	13.69	0.00	187.50	
4.02	Motorcompressors, 20 m ³ /min (18.3 m ³ /min. consumption)	Op.	h	68.48	0.23	52.94	15.66	3,625.49	
		s.b.	h	13.70	0.00	8.47	0.00	116.05	
4.03	General foreman	---	h	7.53	0.00	47.25	0.00	355.93	
4.04	Gang foreman	1	h	75.33	6.60	0.00	497.17	0.00	
4.05	Concrete pump, operator	1	h	75.33	5.82	0.00	438.41	0.00	
4.06	Concrete pump, helper	1	h	75.33	2.38	0.00	179.28	0.00	
4.07	Skilled	1	h	75.33	2.99	0.00	225.23	0.00	
4.08	Semiskilled	2	h	150.66	2.38	0.00	358.56	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	67.46	6,183.80	
Sub-total				----->>				11,051.55	69,989.41
Missing items and construction contingencies				%	1.50%	----->>		165.77	1,049.84
Total Direct Costs				----->>				11,217.33	71,039.25
Overheads, risks and profit on cement and admixtures				%	25.00%	----->>		31.28	281.56
Overhead, risks & profit on other costs				%	52.00%	----->>		4,212.27	37,910.43
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m ³	1,207	----->>		12.81	90.50
AGGREGATE UNIT PRICE				m ³	----->>				103.31

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P21 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 008
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	74.88	4.13	21.83	308.89	1,634.97	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	468.00	0.00	0.89	0.00	417.64	
	b) Grouted anchor bars	---	kg	585.00	0.00	0.84	0.00	491.40	
	c) Formwork bond breaking compound	---	kg	9.36	0.00	3.23	0.00	30.23	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.74	0.08	11.32	0.30	42.38	
		s.b.	h	0.75	0.00	2.99	0.00	2.24	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	11.23	0.01	1.46	0.11	16.40	
		s.b.	h	2.25	0.00	0.42	0.00	0.94	
	f) General foreman	---	h	0.56	0.00	47.25	0.00	26.27	
	g) Gang foreman	---	h	5.56	6.60	0.00	36.69	0.00	
	h) Skilled	---	h	55.60	2.77	0.00	154.01	0.00	
	i) Semiskilled	---	h	126.17	2.77	0.00	349.50	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	643.46	1.33	10.22	856.45	6,578.09	
	b) Portland cement, normal type	50%	t	115.82	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	115.82	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	463.29	0.00	1.44	0.00	667.14	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	242.70	0.28	25.38	67.96	6,159.82	
		s.b.	h	48.54	0.00	10.68	0.00	518.42	
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
	c) General foreman	----	h	2.67	0.00	47.25	0.00	126.15	
	d) Gang foreman	----	h	26.70	6.60	0.00	176.20	0.00	
	e) Transit mixer, operator	1	h	266.97	5.82	0.00	1,553.79	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	1,080.34	5,718.19	
3	Formworks								
3.01	Steel formworks	---	m ³	643.46	0.00	13.28	0.00	8,542.96	
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.98	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,551.09	0.00	0.24	0.00	372.26	
		s.b.	h	310.22	0.00	0.17	0.00	52.74	
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	119.17	0.09	7.91	10.73	942.61	
		s.b.	h	23.83	0.00	5.13	0.00	122.27	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.45	0.00	350.00	0.00	156.44	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	89.39	0.00	3.58	0.00	320.03	
3.07	Formwork bond breaking compound	---	kg	162.63	0.00	3.23	0.00	525.29	
3.08	General foreman	---	h	24.05	0.00	47.25	0.00	1,136.46	
3.09	Gang foreman	1	h	240.52	6.60	0.00	1,587.43	0.00	
3.10	Specialist	2	h	481.04	3.69	0.00	1,775.04	0.00	
03:11	Skilled	2	h	481.04	2.99	0.00	1,438.31	0.00	
03:12	Semiskilled	1	h	240.52	2.38	0.00	572.44	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	40.76	0.45	30.85	18.34	1,257.35	
		s.b.	h	8.15	0.00	13.69	0.00	111.59	
4.02	Motorcompressors, 15 m ³ /min (16.8 m ³ /min. consumption)	Op.	h	40.76	0.22	44.89	9.13	1,829.56	
		s.b.	h	8.15	0.00	8.40	0.00	68.47	
4.03	General foreman	---	h	4.48	0.00	47.25	0.00	211.83	
4.04	Gang foreman	1	h	44.83	6.60	0.00	295.89	0.00	
4.05	Concrete pump, operator	1	h	44.83	5.82	0.00	260.93	0.00	
4.06	Concrete pump, helper	1	h	44.83	2.38	0.00	106.70	0.00	
4.07	Skilled	1	h	44.83	2.99	0.00	134.05	0.00	
4.08	Semiskilled	2	h	89.67	2.38	0.00	213.40	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	187.30	15,467.84	
Sub-total				----->>				11,193.94	53,547.98
Missing items and construction contingencies				%	1.50%	----->>		167.91	803.22
Total Direct Costs				----->>				11,361.85	54,351.20
Overheads, risks and profit on cement and admixtures				%	25.00%	----->>		18.62	167.57
Overhead, risks & profit on other costs				%	52.00%	----->>		3,378.35	30,405.15
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	718	----->>		20.55	118.22
AGGREGATE UNIT PRICE				m³	----->>				138.77

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P23 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 009
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	137.97	4.04	21.51	557.45	2,968.24	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	862.34	0.00	0.89	0.00	769.55	
	b) Grouted anchor bars	---	kg	1,077.93	0.00	0.84	0.00	905.46	
	c) Formwork bond breaking compound	---	kg	17.25	0.00	3.23	0.00	55.71	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	6.90	0.08	11.32	0.55	78.09	
		s.b.	h	1.38	0.00	2.99	0.00	4.13	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	20.70	0.01	1.46	0.21	30.22	
		s.b.	h	4.14	0.00	0.42	0.00	1.74	
	f) General foreman	---	h	1.02	0.00	47.25	0.00	48.41	
	g) Gang foreman	---	h	10.24	6.60	0.00	67.61	0.00	
	h) Skilled	---	h	102.45	2.77	0.00	283.78	0.00	
	i) Semiskilled	---	h	232.49	2.77	0.00	643.99	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	1,582.59	1.33	10.22	2,106.42	16,178.77	
	b) Portland cement, normal type	50%	t	284.87	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	284.87	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,139.46	0.00	1.44	0.00	1,640.82	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	578.78	0.28	25.38	162.06	14,689.48	
		s.b.	h	115.76	0.00	10.68	0.00	1,236.28	
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
	c) General foreman	----	h	6.37	0.00	47.25	0.00	300.82	
	d) Gang foreman	----	h	63.67	6.60	0.00	420.20	0.00	
	e) Transit mixer, operator	1	h	636.66	5.82	0.00	3,705.36	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	46.5%	----	----	2,975.08	15,841.35	
3	Formworks								
3.01	Steel formworks	---	m ³	1,582.59	0.00	13.00	0.00	20,573.61	
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.96	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	4,051.76	0.00	0.24	0.00	972.42	
		s.b.	h	810.35	0.00	0.17	0.00	137.76	
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	219.58	0.09	7.91	19.76	1,736.86	
		s.b.	h	43.92	0.00	5.13	0.00	225.29	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.11	0.00	350.00	0.00	390.22	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	222.98	0.00	3.58	0.00	798.28	
3.07	Formwork bond breaking compound	---	kg	334.16	0.00	3.23	0.00	1,079.33	
3.08	General foreman	---	h	48.20	0.00	47.25	0.00	2,277.22	
3.09	Gang foreman	1	h	481.95	6.60	0.00	3,180.88	0.00	
3.10	Specialist	2	h	963.90	3.69	0.00	3,556.80	0.00	
03:11	Skilled	2	h	963.90	2.99	0.00	2,882.07	0.00	
03:12	Semiskilled	1	h	481.95	2.38	0.00	1,147.05	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	97.62	0.45	30.85	43.93	3,011.59	
		s.b.	h	19.52	0.00	13.69	0.00	267.28	
4.02	Motorcompressors, 20 m ³ /min (18.8 m ³ /min. consumption)	Op.	h	97.62	0.24	54.39	22.94	5,309.42	
		s.b.	h	19.52	0.00	8.70	0.00	169.95	
4.03	General foreman	---	h	10.74	0.00	47.25	0.00	507.38	
4.04	Gang foreman	1	h	107.38	6.60	0.00	708.72	0.00	
4.05	Concrete pump, operator	1	h	107.38	5.82	0.00	624.97	0.00	
4.06	Concrete pump, helper	1	h	107.38	2.38	0.00	255.57	0.00	
4.07	Skilled	1	h	107.38	2.99	0.00	321.07	0.00	
4.08	Semiskilled	2	h	214.76	2.38	0.00	511.14	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	389.02	32,125.36	
Sub-total				----->>				24,586.63	124,331.04
Missing items and construction contingencies				%	1.50%	----->>		368.80	1,864.97
Total Direct Costs				----->>				24,955.43	126,196.00
Overheads, risks and profit on cement and admixtures				%	25.00%	----->>		44.60	401.37
Overhead, risks & profit on other costs				%	52.00%	----->>		7,767.11	69,904.02
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m ³	1,720.56	----->>		19.04	114.21
AGGREGATE UNIT PRICE				m ³	----->>				133.25

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P25 & 25' (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 010
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	178.85	3.48	20.29	621.80	3,628.04
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,117.80	0.00	0.89	0.00	997.52
	b) Grouted anchor bars	---	kg	1,397.25	0.00	0.84	0.00	1,173.69
	c) Formwork bond breaking compound	---	kg	22.36	0.00	3.23	0.00	72.21
	d) Motorcompressor, 5 m ³ /min.	Op.	h	8.94	0.08	11.32	0.72	101.23
		s.b.	h	1.79	0.00	2.99	0.00	5.35
	e) Immersion type vibrator, 77 mm dia.	Op.	h	26.83	0.01	1.46	0.27	39.17
		s.b.	h	5.37	0.00	0.42	0.00	2.25
	f) General foreman	---	h	1.33	0.00	47.25	0.00	62.75
	g) Gang foreman	---	h	13.28	6.60	0.00	87.64	0.00
	h) Skilled	---	h	132.79	2.77	0.00	367.84	0.00
	i) Semiskilled	---	h	301.36	2.77	0.00	834.76	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	5,338.16	1.33	10.22	7,105.09	54,572.03
	b) Portland cement, normal type	50%	t	960.87	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	960.87	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	3,843.48	0.00	1.44	0.00	5,534.61
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	885.22	0.28	25.38	247.86	22,466.85
		s.b.	h	177.04	0.00	10.68	0.00	1,890.83
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	661.86	0.27	32.54	178.70	21,536.96
		s.b.	h	132.37	0.00	11.20	0.00	1,482.57
	c) General foreman	----	h	17.02	0.00	47.25	0.00	804.09
	d) Gang foreman	----	h	170.18	6.60	0.00	1,123.18	0.00
	e) Transit mixer, operator	1	h	1,701.79	5.82	0.00	9,904.41	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	36.8%	----	----	6,826.18	39,828.85
3	Formworks							
3.01	Steel formworks	---	m ³	5,338.16	0.00	11.93	0.00	63,707.90
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.76	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	13,742.23	0.00	0.24	0.00	3,298.13
		s.b.	h	2,748.45	0.00	0.17	0.00	467.24
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	284.63	0.09	7.91	25.62	2,251.38
		s.b.	h	56.93	0.00	5.13	0.00	292.03
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	3.34	0.00	350.00	0.00	1,168.01
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	667.44	0.00	3.58	0.00	2,389.42
3.07	Formwork bond breaking compound	---	kg	547.72	0.00	3.23	0.00	1,769.14
3.08	General foreman	---	h	75.02	0.00	47.25	0.00	3,544.75
3.09	Gang foreman	1	h	750.21	6.60	0.00	4,951.40	0.00
3.10	Specialist	2	h	1,500.42	3.69	0.00	5,536.56	0.00
03:11	Skilled	2	h	1,500.42	2.99	0.00	4,486.27	0.00
03:12	Semiskilled	1	h	750.21	2.38	0.00	1,785.50	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	313.02	0.45	30.85	140.86	9,656.72
		s.b.	h	62.60	0.00	13.69	0.00	857.05
4.02	Motorcompressors, 25 m ³ /min (23.7 m ³ /min. consumption)	Op.	h	313.02	0.27	73.93	86.06	23,143.12
		s.b.	h	62.60	0.00	10.17	0.00	636.81
4.03	General foreman	---	h	34.43	0.00	47.25	0.00	1,626.93
4.04	Gang foreman	1	h	344.32	6.60	0.00	2,272.54	0.00
4.05	Concrete pump, operator	1	h	344.32	5.82	0.00	2,003.97	0.00
4.06	Concrete pump, helper	1	h	344.32	2.38	0.00	819.49	0.00
4.07	Skilled	1	h	344.32	2.99	0.00	1,029.53	0.00
4.08	Semiskilled	2	h	688.65	2.38	0.00	1,638.98	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	652.00	55,252.88
Sub-total							52,727.24	324,260.52
Missing items and construction contingencies							790.91	4,863.91
Total Direct Costs							53,518.15	329,124.43
Overheads, risks and profit on cement and admixtures							143.00	1,287.01
Overhead, risks & profit on other costs							19,599.97	176,399.75
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	5,517.01		13.28	91.86
AGGREGATE UNIT PRICE				m³				105.14

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADI P 25A (ARCH AND SIDEWALLS)

SEC 4-02
 ANA 011
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	36.75	2.67	19.24	98.21	707.02
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	229.70	0.00	1.34	0.00	307.34
	b) Grouted anchor bars	---	kg	287.13	0.00	0.84	0.00	241.19
	c) Formwork bond breaking compound	---	kg	4.59	0.00	3.23	0.00	14.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	1.84	0.08	11.32	0.15	20.80
		s.b.	h	0.37	0.00	2.99	0.00	1.10
	e) Immersion type vibrator, 77 mm dia.	Op.	h	5.51	0.01	1.46	0.06	8.05
		s.b.	h	1.10	0.00	0.42	0.00	0.46
	f) General foreman	---	h	0.34	0.00	47.25	0.00	16.12
	g) Gang foreman	---	h	3.41	6.60	0.00	22.51	0.00
	h) Skilled	---	h	34.11	2.77	0.00	94.49	0.00
	i) Semiskilled	---	h	73.73	2.77	0.00	204.24	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	836.75	1.33	10.22	1,113.71	8,554.07
	b) Portland cement, normal type	50%	t	150.61	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	150.61	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	602.46	0.00	1.44	0.00	867.54
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	150.47	0.33	41.12	49.65	6,187.22
		s.b.	h	30.09	0.00	13.62	0.00	409.87
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
	c) General foreman	----	h	1.66	0.00	47.25	0.00	78.21
	d) Gang foreman	----	h	16.55	6.60	0.00	109.24	0.00
	e) Transit mixer, operator	1	h	165.51	5.82	0.00	963.29	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	34.9%	----	----	780.73	5,620.69
3	Formworks							
3.01	Steel formworks exluding side closure	---	m ³	836.75	0.00	11.75	0.00	9,834.65
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.63	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,471.56	0.00	0.24	0.00	353.18
		s.b.	h	294.31	0.00	0.17	0.00	50.03
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	42.54	0.15	13.48	6.38	573.40
		s.b.	h	8.51	0.00	8.88	0.00	75.55
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.52	0.00	350.00	0.00	182.41
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	104.24	0.00	3.58	0.00	373.16
3.07	Formwork bond breaking compound	---	kg	117.15	0.00	3.23	0.00	378.38
3.08	General foreman	---	h	12.51	0.00	47.25	0.00	591.31
3.09	Gang foreman	1	h	125.14	6.60	0.00	825.95	0.00
3.10	Specialist	3	h	375.43	3.69	0.00	1,385.35	0.00
03:11	Skilled	2	h	250.29	2.99	0.00	748.36	0.00
03:12	Semiskilled	1	h	125.14	2.38	0.00	297.84	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	29.49	0.61	44.83	17.99	1,321.82
		s.b.	h	5.90	0.00	13.85	0.00	81.67
4.02	Motorcompressors, 30 m ³ /min (33.7 m ³ /min. consumption)	Op.	h	29.49	0.37	111.67	10.93	3,292.63
		s.b.	h	5.90	0.00	13.46	0.00	79.36
4.03	General foreman	---	h	3.24	0.00	47.25	0.00	153.25
4.04	Gang foreman	1	h	32.43	6.60	0.00	214.06	0.00
4.05	Concrete pump, operator	1	h	32.43	5.82	0.00	188.76	0.00
4.06	Concrete pump, helper	1	h	32.43	2.38	0.00	77.19	0.00
4.07	Skilled	1	h	32.43	2.99	0.00	96.98	0.00
4.08	Semiskilled	2	h	64.87	2.38	0.00	154.38	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	93.49	8,073.62
Sub-total							7,553.96	48,448.94
Missing items and construction contingencies				%	1.50%		113.31	726.73
Total Direct Costs							7,667.26	49,175.67
Overheads, risks and profit on cement and admixtures				%	25.00%		22.64	203.77
Overhead, risks & profit on other costs				%	52.00%		2,908.74	26,178.65
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	873.50		12.13	86.50
AGGREGATE UNIT PRICE				m³				98.63

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P28 (ARCH AND SIDEWALLS)

SEC 4-02
 ANA 012
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	72.12	4.12	21.80	296.95	1,572.62
1.02	Formworks and concrete placing:							
	a) Formwork	---	m2	450.78	0.00	0.89	0.00	402.28
	b) Grouted anchor bars	---	kg	563.48	0.00	0.84	0.00	473.32
	c) Formwork bond breaking compound	---	kg	9.02	0.00	3.23	0.00	29.12
	d) Motorcompressor, 5 m3/min.	Op.	h	3.61	0.08	11.32	0.29	40.82
		s.b.	h	0.72	0.00	2.99	0.00	2.16
	e) Immersion type vibrator, 77 mm dia.	Op.	h	10.82	0.01	1.46	0.11	15.80
		s.b.	h	2.16	0.00	0.42	0.00	0.91
	f) General foreman	---	h	0.54	0.00	47.25	0.00	25.30
	g) Gang foreman	---	h	5.36	6.60	0.00	35.34	0.00
	h) Skilled	---	h	53.55	2.77	0.00	148.34	0.00
	i) Semiskilled	---	h	121.53	2.77	0.00	336.64	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m3	1,284.22	1.33	10.22	1,709.29	13,128.53
	b) Portland cement, normal type	50%	t	231.16	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	231.16	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	924.63	0.00	1.44	0.00	1,331.47
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	483.00	0.28	25.38	135.24	12,258.43
		s.b.	h	96.60	0.00	10.68	0.00	1,031.68
	b) Transit mixer, 6 m3 nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00
		s.b.	h	0.00	0.00	11.20	0.00	0.00
	c) General foreman	----	h	5.31	0.00	47.25	0.00	251.04
	d) Gang foreman	----	h	53.13	6.60	0.00	350.65	0.00
	e) Transit mixer, operator	1	h	531.30	5.82	0.00	3,092.14	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	2,151.94	11,396.47
3	Formworks							
3.01	Steel formworks	---	m3	1,284.22	0.00	13.00	0.00	16,694.80
3.02	Side closure of formworks (construction joints)	0	m3	0.00	0.00	0.96	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	3,527.68	0.00	0.24	0.00	846.64
		s.b.	h	705.54	0.00	0.17	0.00	119.94
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	114.78	0.09	7.91	10.33	907.93
		s.b.	h	22.96	0.00	5.13	0.00	117.77
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	0.84	0.00	350.00	0.00	295.38
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	168.79	0.00	3.58	0.00	604.26
3.07	Formwork bond breaking compound	---	kg	212.99	0.00	3.23	0.00	687.97
3.08	General foreman	---	h	28.96	0.00	47.25	0.00	1,368.13
3.09	Gang foreman	1	h	289.55	6.60	0.00	1,911.03	0.00
3.10	Specialist	2	h	579.10	3.69	0.00	2,136.88	0.00
03:11	Skilled	2	h	579.10	2.99	0.00	1,731.51	0.00
03:12	Semiskilled	1	h	289.55	2.38	0.00	689.13	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m3/h max. capacity	Op.	h	76.96	0.45	30.85	34.63	2,374.08
		s.b.	h	15.39	0.00	13.69	0.00	210.70
4.02	Motorcompressors, 25 m3/min (22.9 m3/min. consumption)	Op.	h	76.96	0.27	32.47	20.44	2,498.91
		s.b.	h	15.39	0.00	9.83	0.00	151.27
4.03	General foreman	---	h	8.47	0.00	47.25	0.00	399.98
4.04	Gang foreman	1	h	84.65	6.60	0.00	558.70	0.00
4.05	Concrete pump, operator	1	h	84.65	5.82	0.00	492.67	0.00
4.06	Concrete pump, helper	1	h	84.65	2.38	0.00	201.47	0.00
4.07	Skilled	1	h	84.65	2.99	0.00	253.11	0.00
4.08	Semiskilled	2	h	169.30	2.38	0.00	402.94	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	218.32	18,407.77
Sub-total							16,918.10	87,645.48
Missing items and construction contingencies							253.77	1,314.68
Total Direct Costs							17,171.87	88,960.16
Overheads, risks and profit on cement and admixtures							35.16	316.41
Overhead, risks & profit on other costs							5,445.74	49,011.66
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							16.70	101.96
AGGREGATE UNIT PRICE							118.66	

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P35 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 013
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	54.26	3.73	22.70	202.26	1,231.45
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	339.10	0.00	0.89	0.00	302.61
	b) Grouted anchor bars	---	kg	423.88	0.00	0.84	0.00	356.06
	c) Formwork bond breaking compound	---	kg	6.78	0.00	3.23	0.00	21.91
	d) Motorcompressor, 5 m ³ /min.	Op.	h	2.71	0.08	11.32	0.22	30.71
		s.b.	h	0.54	0.00	2.99	0.00	1.62
	e) Immersion type vibrator, 77 mm dia.	Op.	h	8.14	0.01	1.46	0.08	11.88
		s.b.	h	1.63	0.00	0.42	0.00	0.68
	f) General foreman	---	h	0.40	0.00	47.25	0.00	19.03
	g) Gang foreman	---	h	4.03	6.60	0.00	26.59	0.00
	h) Skilled	---	h	40.29	2.77	0.00	111.59	0.00
	i) Semiskilled	---	h	91.42	2.77	0.00	253.24	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	146.19	1.33	10.22	194.58	1,494.54
	b) Portland cement, normal type	50%	t	26.31	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	26.31	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	105.26	0.00	1.44	0.00	151.57
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	0.00	0.28	25.38	0.00	0.00
		s.b.	h	0.00	0.00	10.68	0.00	0.00
	b) Transit mixer, 6 m ³ nominal capacity	Op.	h	47.37	0.27	32.54	12.79	1,541.33
		s.b.	h	9.47	0.00	11.20	0.00	106.10
	c) General foreman	----	h	0.52	0.00	47.25	0.00	24.62
	d) Gang foreman	----	h	5.21	6.60	0.00	34.39	0.00
	e) Transit mixer, operator	1	h	52.10	5.82	0.00	303.25	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	221.82	1,350.49
3	Formworks							
3.01	Steel formworks	---	m ³	65.79	0.00	15.83	0.00	1,041.16
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	751.91	0.00	0.24	0.00	180.46
		s.b.	h	150.38	0.00	0.17	0.00	25.57
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	86.34	0.09	7.91	7.77	682.99
		s.b.	h	17.27	0.00	5.13	0.00	88.59
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.12	0.00	350.00	0.00	43.65
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	24.94	0.00	3.58	0.00	89.30
3.07	Formwork bond breaking compound	---	kg	149.20	0.00	3.23	0.00	481.93
3.08	General foreman	---	h	2.47	0.00	47.25	0.00	116.63
3.09	Gang foreman	1	h	24.68	6.60	0.00	162.91	0.00
3.10	Specialist	2	h	49.37	3.69	0.00	182.17	0.00
03:11	Skilled	2	h	49.37	2.99	0.00	147.61	0.00
03:12	Semiskilled	1	h	24.68	2.38	0.00	58.75	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	11.37	0.45	30.85	5.12	350.86
		s.b.	h	2.27	0.00	13.69	0.00	31.14
4.02	Motorcompressors, 25 m ³ /min (23.7 m ³ /min. consumption)	Op.	h	11.37	0.27	73.93	3.13	840.86
		s.b.	h	2.27	0.00	10.17	0.00	23.14
4.03	General foreman	---	h	1.25	0.00	47.25	0.00	59.11
4.04	Gang foreman	1	h	12.51	6.60	0.00	82.57	0.00
4.05	Concrete pump, operator	1	h	12.51	5.82	0.00	72.81	0.00
4.06	Concrete pump, helper	1	h	12.51	2.38	0.00	29.77	0.00
4.07	Skilled	1	h	12.51	2.99	0.00	37.41	0.00
4.08	Semiskilled	2	h	25.02	2.38	0.00	59.55	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	15.41	1,431.67
Sub-total							2,225.77	12,131.66
Missing items and construction contingencies				%	1.50%		33.39	181.97
Total Direct Costs							2,259.16	12,313.64
Overheads, risks and profit on cement and admixtures				%	25.00%		5.20	46.76
Overhead, risks & profit on other costs				%	52.00%		746.98	6,722.81
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m ³	200.45		15.02	95.20
AGGREGATE UNIT PRICE				m ³				110.22

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P40 (ARCH AND SIDEWALLS)

SEC 4-02
 ANA 014
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	67.85	4.50	23.27	305.61	1,578.80
1.02	Formworks and concrete placing:							
	a) Formwork	---	m2	424.08	0.00	0.89	0.00	378.45
	b) Grouted anchor bars	---	kg	530.10	0.00	0.84	0.00	445.28
	c) Formwork bond breaking compound	---	kg	8.48	0.00	3.23	0.00	27.40
	d) Motorcompressor, 5 m3/min.	Op.	h	3.39	0.08	11.32	0.27	38.40
		s.b.	h	0.68	0.00	2.99	0.00	2.03
	e) Immersion type vibrator, 77 mm dia.	Op.	h	10.18	0.01	1.46	0.10	14.86
		s.b.	h	2.04	0.00	0.42	0.00	0.85
	f) General foreman	---	h	0.50	0.00	47.25	0.00	23.80
	g) Gang foreman	---	h	5.04	6.60	0.00	33.25	0.00
	h) Skilled	---	h	50.38	2.77	0.00	139.55	0.00
	i) Semiskilled	---	h	114.33	2.77	0.00	316.70	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m3	627.00	1.33	10.22	834.53	6,409.79
	b) Portland cement, normal type	50%	t	112.86	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	112.86	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	451.44	0.00	1.44	0.00	650.07
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	268.56	0.28	25.38	75.20	6,815.93
		s.b.	h	53.71	0.00	10.68	0.00	573.63
	b) Transit mixer, 6 m3 nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00
		s.b.	h	0.00	0.00	11.20	0.00	0.00
	c) General foreman	----	h	2.95	0.00	47.25	0.00	139.58
	d) Gang foreman	----	h	29.54	6.60	0.00	194.97	0.00
	e) Transit mixer, operator	1	h	295.41	5.82	0.00	1,719.29	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	1,149.36	5,937.72
3	Formworks							
3.01	Steel formworks	---	m3	627.00	0.00	13.28	0.00	8,324.39
3.02	Side closure of formworks (construction joints)	0	m3	0.00	0.00	0.98	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,320.87	0.00	0.24	0.00	317.01
		s.b.	h	264.17	0.00	0.17	0.00	44.91
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	107.98	0.09	7.91	9.72	854.15
		s.b.	h	21.60	0.00	5.13	0.00	110.79
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	0.43	0.00	350.00	0.00	151.32
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	86.47	0.00	3.58	0.00	309.56
3.07	Formwork bond breaking compound	---	kg	131.68	0.00	3.23	0.00	425.32
3.08	General foreman	---	h	21.43	0.00	47.25	0.00	1,012.34
3.09	Gang foreman	1	h	214.25	6.60	0.00	1,414.06	0.00
3.10	Specialist	2	h	428.50	3.69	0.00	1,581.17	0.00
03:11	Skilled	2	h	428.50	2.99	0.00	1,281.22	0.00
03:12	Semiskilled	1	h	214.25	2.38	0.00	509.92	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m3/h max. capacity	Op.	h	39.42	0.45	30.85	17.74	1,216.23
		s.b.	h	7.88	0.00	13.69	0.00	107.94
4.02	Motorcompressors, 20 m3/min (22.5 m3/min. consumption)	Op.	h	39.42	0.28	65.09	11.09	2,566.21
		s.b.	h	7.88	0.00	10.42	0.00	82.14
4.03	General foreman	---	h	4.34	0.00	47.25	0.00	204.91
4.04	Gang foreman	1	h	43.37	6.60	0.00	286.22	0.00
4.05	Concrete pump, operator	1	h	43.37	5.82	0.00	252.39	0.00
4.06	Concrete pump, helper	1	h	43.37	2.38	0.00	103.21	0.00
4.07	Skilled	1	h	43.37	2.99	0.00	129.67	0.00
4.08	Semiskilled	2	h	86.73	2.38	0.00	206.42	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	134.24	11,157.87
Sub-total							10,705.91	49,921.71
Missing items and construction contingencies				%	1.50%		160.59	748.83
Total Direct Costs							10,866.50	50,670.53
Overheads, risks and profit on cement and admixtures				%	25.00%		18.01	162.09
Overhead, risks & profit on other costs				%	52.00%		3,162.46	28,462.18
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	694.85		20.22	114.12
AGGREGATE UNIT PRICE				m3				134.33

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P80 (ARCH AND SIDEWALLS)**

**SEC 4-02
ANA 015
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	115.07	2.81	20.03	322.82	2,304.88
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	719.16	0.00	1.34	0.00	962.24
	b) Grouted anchor bars	---	kg	898.95	0.00	0.84	0.00	755.12
	c) Formwork bond breaking compound	---	kg	14.38	0.00	3.23	0.00	46.46
	d) Motorcompressor, 5 m ³ /min.	Op.	h	5.75	0.08	11.32	0.46	65.13
		s.b.	h	1.15	0.00	2.99	0.00	3.44
	e) Immersion type vibrator, 77 mm dia.	Op.	h	17.26	0.01	1.46	0.17	25.20
		s.b.	h	3.45	0.00	0.42	0.00	1.45
	f) General foreman	---	h	1.07	0.00	47.25	0.00	50.46
	g) Gang foreman	---	h	10.68	6.60	0.00	70.48	0.00
	h) Skilled	---	h	106.80	2.77	0.00	295.82	0.00
	i) Semiskilled	---	h	230.85	2.77	0.00	639.46	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:		m ³					
	a) Concrete at the batching and mixing plant	---	m ³	1,329.22	1.33	10.22	1,769.20	13,588.66
	b) Portland cement, normal type	50%	t	239.26	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	239.26	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	957.04	0.00	1.44	0.00	1,378.14
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	262.80	0.33	41.12	86.73	10,806.47
		s.b.	h	52.56	0.00	13.62	0.00	715.88
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
	c) General foreman	----	h	2.89	0.00	47.25	0.00	136.59
	d) Gang foreman	----	h	28.91	6.60	0.00	190.80	0.00
	e) Transit mixer, operator	1	h	289.08	5.82	0.00	1,682.47	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	39.2%	----	----	1,460.12	10,425.00
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	1,329.22	0.00	13.20	0.00	17,545.76
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.71	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,824.17	0.00	0.24	0.00	677.80
		s.b.	h	564.83	0.00	0.17	0.00	96.02
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	133.18	0.15	13.48	19.98	1,795.24
		s.b.	h	26.64	0.00	8.88	0.00	236.52
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.89	0.00	350.00	0.00	311.08
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	177.76	0.00	3.58	0.00	636.38
3.07	Formwork bond breaking compound	---	kg	359.58	0.00	3.23	0.00	1,161.44
3.08	General foreman	---	h	33.55	0.00	47.25	0.00	1,585.28
3.09	Gang foreman	1	h	335.51	6.60	0.00	2,214.37	0.00
3.10	Specialist	3	h	1,006.53	3.69	0.00	3,714.10	0.00
03:11	Skilled	2	h	671.02	2.99	0.00	2,006.35	0.00
03:12	Semiskilled	1	h	335.51	2.38	0.00	798.51	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	48.75	0.61	44.83	29.74	2,185.57
		s.b.	h	9.75	0.00	13.85	0.00	135.04
4.02	Motorcompressors, 30 m ³ /min (33.0 m ³ /min. consumption)	Op.	h	48.75	0.36	109.35	17.70	5,331.12
		s.b.	h	9.75	0.00	13.18	0.00	128.49
4.03	General foreman	---	h	5.36	0.00	47.25	0.00	253.39
4.04	Gang foreman	1	h	53.63	6.60	0.00	353.94	0.00
4.05	Concrete pump, operator	1	h	53.63	5.82	0.00	312.11	0.00
4.06	Concrete pump, helper	1	h	53.63	2.38	0.00	127.63	0.00
4.07	Skilled	1	h	53.63	2.99	0.00	160.35	0.00
4.08	Semiskilled	2	h	107.26	2.38	0.00	255.27	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	184.85	15,821.05
Sub-total							16,713.41	89,165.32
Missing items and construction contingencies				%	1.50%		250.70	1,337.48
Total Direct Costs							16,964.12	90,502.80
Overheads, risks and profit on cement and admixtures				%	25.00%		37.44	336.92
Overhead, risks & profit on other costs				%	52.00%		5,510.41	49,593.71
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	1,444.29		15.59	97.23
AGGREGATE UNIT PRICE				m³				112.82

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P1 (INVERT CONCRETE)

SEC 4-02
ANA 016
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	22.85	0.63	62.22	14.40	1,422.04
		s.b.	h	5.71	0.00	28.86	0.00	164.90
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	29.50	0.27	23.93	7.96	705.89
		s.b.	h	5.90	0.00	12.03	0.00	70.97
1.03	Hand-held breaker, medium weight type	Op.	h	137.17	0.04	2.03	5.49	278.45
		s.b.	h	27.43	0.00	1.21	0.00	33.19
1.04	Hand held breaker tool,moil point type	----	ea.	1.37	0.00	32.37	0.00	44.40
1.05	Breaker tool resharpenner	----	h	4.11	0.01	1.57	0.04	6.46
1.06	General foreman	----	h	3.43	0.00	47.25	0.00	162.03
1.07	Gang foreman	1	h	34.29	6.60	0.00	226.32	0.00
1.08	Dumper driver and backhoe operator	1	h	57.59	5.82	0.00	335.16	0.00
1.09	Skilled	2	h	68.58	2.99	0.00	205.06	0.00
1.10	Semiskilled	2	h	68.58	2.38	0.00	163.23	0.00
1.11	Unskilled	4	h	137.17	1.77	0.00	242.78	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,259.88	1.33	10.22	1,676.90	12,879.75
	b) Portland cement, normal type	50%	t	226.78	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	226.78	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,360.67	0.00	1.44	0.00	1,959.37
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	220.19	0.33	41.72	72.66	9,186.23
		s.b.	hr	44.04	0.00	13.62	0.00	599.79
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00
		s.b.	h	0.00	0.00	14.53	0.00	0.00
3.03	General foreman	----	h	2.42	0.00	47.25	0.00	114.44
3.04	Gang foreman	----	h	24.22	6.60	0.00	159.86	0.00
3.05	Transit mixer operator	1	h	242.21	5.82	0.00	1,409.64	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	36.6%	----	----	1,216.10	9,064.53
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	186.69	5.34	10.23	996.91	1,909.82
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	36.14	0.61	44.83	22.04	1,620.06
		s.b.	h	7.23	0.00	13.85	0.00	100.10
5.03	Sliding vibrating bar	Op.	h	36.14	0.02	1.77	0.72	63.96
		s.b.	h	7.23	0.00	0.60	0.00	4.34
5.04	General foreman	1	h	10.77	0.00	47.25	0.00	509.01
5.05	Gang foreman	1	h	53.86	6.60	0.00	355.50	0.00
5.06	Concrete pump, operator	1	h	39.75	5.82	0.00	231.35	0.00
5.07	Concrete pump, helper	1	h	39.75	2.38	0.00	94.61	0.00
5.08	Skilled	2	h	107.73	2.99	0.00	322.11	0.00
5.09	Semiskilled	4	h	215.46	2.38	0.00	512.78	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	48.32	4,093.64
Sub-total							8,319.97	44,993.38
Missing items and construction contingencies		%	1.50%	----->>			124.80	674.90
Total Direct Costs							8,444.77	45,668.28
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			48.98	440.86
Overhead, risks & profit on other costs		%	52.00%	----->>			2,711.99	24,407.93
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	1,259.88	----->>		
AGGREGATE UNIT PRICE				m3	----->>			64.87

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P1B (INVERT CONCRETE)

SEC 4-02
 ANA 017
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	61.59	0.06	7.75	3.70	477.35	
		s.b.	h	15.40	0.00	5.08	0.00	78.22	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	18.96	0.27	23.93	5.12	453.71	
		s.b.	h	3.79	0.00	12.03	0.00	45.62	
1.03	Hand-held breaker, medium weight type	Op.	h	88.16	0.04	2.03	3.53	178.97	
		s.b.	h	17.63	0.00	1.21	0.00	21.34	
1.04	Hand held breaker tool,moil point type	----	ea.	0.88	0.00	32.37	0.00	28.54	
1.05	Breaker tool resharpen	----	h	2.64	0.01	1.57	0.03	4.15	
1.06	General foreman	----	h	2.20	0.00	47.25	0.00	104.14	
1.07	Gang foreman	1	h	22.04	6.60	0.00	145.47	0.00	
1.08	Dumper driver and backhoe operator	1	h	88.61	5.82	0.00	515.70	0.00	
1.09	Skilled	2	h	44.08	2.99	0.00	131.80	0.00	
1.10	Semiskilled	2	h	44.08	2.38	0.00	104.91	0.00	
1.11	Unskilled	4	h	88.16	1.77	0.00	156.05	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	944.00	1.33	10.22	1,256.46	9,650.51	
	b) Portland cement, normal type	0.5	t	169.92	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	169.92	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,019.52	0.00	1.44	0.00	1,468.11	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5 m ³ nom. capaci	Op.	hr	304.27	0.28	25.38	85.20	7,722.38	
		s.b.	hr	60.85	0.00	10.68	0.00	649.92	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	3.35	0.00	47.25	0.00	158.14	
3.04	Gang foreman	----	h	33.47	6.60	0.00	220.90	0.00	
3.05	Transit mixer operator	1	h	334.70	5.82	0.00	1,947.94	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	23.7%	----	----	832.53	4,659.87	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	41.21	0.45	30.85	18.54	1,271.27	
		s.b.	h	8.24	0.00	13.69	0.00	112.83	
5.03	Sliding vibrating bar	Op.	h	41.21	0.02	1.77	0.82	72.94	
		s.b.	h	8.24	0.00	0.60	0.00	4.94	
5.04	General foreman	1	h	9.82	0.00	47.25	0.00	464.13	
5.05	Gang foreman	1	h	49.11	6.60	0.00	324.16	0.00	
5.06	Concrete pump, operator	1	h	45.33	5.82	0.00	263.81	0.00	
5.07	Concrete pump, helper	1	h	45.33	2.38	0.00	107.88	0.00	
5.08	Skilled	2	h	98.23	2.99	0.00	293.70	0.00	
5.09	Semiskilled	4	h	196.46	2.38	0.00	467.57	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	41.41	3,347.41	
Sub-total							6,927.24	30,974.49	
Missing items and construction contingencies		%	1.50%	----->>			103.91	464.62	
Total Direct Costs							7,031.15	31,439.11	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			36.70	330.32	
Overhead, risks & profit on other costs		%	52.00%	----->>			1,924.11	17,317.01	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	944.00	----->>		9.53	52.00
AGGREGATE UNIT PRICE				m3	----->>			61.52	

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P3 (INVERT CONCRETE)

SEC 4-02
ANA 018
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)		
1	Preparation of Invert Surface									
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	54.32	0.06	7.75	3.26	420.97		
		s.b.	h	13.58	0.00	5.08	0.00	68.98		
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	18.69	0.27	23.93	5.05	447.22		
		s.b.	h	3.74	0.00	12.03	0.00	44.96		
1.03	Hand-held breaker, medium weight type	Op.	h	86.90	0.04	2.03	3.48	176.41		
		s.b.	h	17.38	0.00	1.21	0.00	21.03		
1.04	Hand held breaker tool,moil point type	----	ea.	0.87	0.00	32.37	0.00	28.13		
1.05	Breaker tool resharpen	----	h	2.61	0.01	1.57	0.03	4.09		
1.06	General foreman	----	h	2.17	0.00	47.25	0.00	102.65		
1.07	Gang foreman	1	h	21.73	6.60	0.00	143.39	0.00		
1.08	Dumper driver and backhoe operator	1	h	80.31	5.82	0.00	467.39	0.00		
1.09	Skilled	2	h	43.45	2.99	0.00	129.92	0.00		
1.10	Semiskilled	2	h	43.45	2.38	0.00	103.41	0.00		
1.11	Unskilled	4	h	86.90	1.77	0.00	153.82	0.00		
2	Concrete Class B2-25/37									
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	395.32	1.33	10.22	526.17	4,041.36		
	b) Portland cement, normal type	0.5	t	71.16	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	0.5	t	71.16	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	426.95	0.00	1.44	0.00	614.80		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
3	Concrete Transport									
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	127.56	0.28	25.38	35.72	3,237.44		
		s.b.	hr	25.51	0.00	10.68	0.00	272.47		
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00		
		s.b.	h	0.00	0.00	11.20	0.00	0.00		
3.03	General foreman	----	h	1.40	0.00	47.25	0.00	66.30		
3.04	Gang foreman	----	h	14.03	6.60	0.00	92.61	0.00		
3.05	Transit mixer operator	1	h	140.31	5.82	0.00	816.63	0.00		
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	598.75	3,350.57		
5	Formworks and Concrete Placing									
5.01	Formworks	---	m ²	120.17	5.34	10.23	641.70	1,229.32		
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	19.63	0.45	30.85	8.83	605.46		
		s.b.	h	3.93	0.00	13.69	0.00	53.74		
5.03	Sliding vibrating bar	Op.	h	19.63	0.02	1.77	0.39	34.74		
		s.b.	h	3.93	0.00	0.60	0.00	2.36		
5.04	General foreman	1	h	5.83	0.00	47.25	0.00	275.45		
5.05	Gang foreman	1	h	29.15	6.60	0.00	192.38	0.00		
5.06	Concrete pump, operator	1	h	21.59	5.82	0.00	125.64	0.00		
5.07	Concrete pump, helper	1	h	21.59	2.38	0.00	51.38	0.00		
5.08	Skilled	2	h	58.30	2.99	0.00	174.31	0.00		
5.09	Semiskilled	4	h	116.59	2.38	0.00	277.49	0.00		
6	General Services									
6.01	Ventilation, lighting & other general services	---	---	---	---	---	15.18	1,349.70		
Sub-total							4,566.91	16,448.15		
Missing items and construction contingencies		%	1.50%	----->>			68.50	246.72		
Total Direct Costs							4,635.42	16,694.87		
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			15.37	138.33		
Overhead, risks & profit on other costs		%	52.00%	----->>			1,077.21	9,694.85		
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	395.32	----->>			14.49	67.11
AGGREGATE UNIT PRICE				m3	----->>			81.59		

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P11 (INVERT CONCRETE)

SEC 4-02
ANA 019
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P (US\$)	L.C.P (US\$ eq.)	F.C.P (US\$)	
1	Preparation of Invert Surface								
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	14.77	0.63	62.22	9.31	919.00	
		s.b.	h	3.69	0.00	28.86	0.00	106.57	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	11.10	0.27	23.93	3.00	265.72	
		s.b.	h	2.22	0.00	12.03	0.00	26.72	
1.03	Hand-held breaker, medium weight type	Op.	h	51.63	0.04	2.03	2.07	104.82	
		s.b.	h	10.33	0.00	1.21	0.00	12.50	
1.04	Hand held breaker tool,moil point type	----	ea.	0.52	0.00	32.37	0.00	16.71	
1.05	Breaker tool resharpen	----	h	1.55	0.01	1.57	0.02	2.43	
1.06	General foreman	----	h	1.29	0.00	47.25	0.00	60.99	
1.07	Gang foreman	1	h	12.91	6.60	0.00	85.20	0.00	
1.08	Dumper driver and backhoe operator	1	h	28.46	5.82	0.00	165.65	0.00	
1.09	Skilled	2	h	25.82	2.99	0.00	77.19	0.00	
1.10	Semiskilled	2	h	25.82	2.38	0.00	61.45	0.00	
1.11	Unskilled	4	h	51.63	1.77	0.00	91.39	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	709.50	1.33	10.22	944.34	7,253.22	
	b) Portland cement, normal type	0.5	t	127.71	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	127.71	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	766.26	0.00	1.44	0.00	1,103.41	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	0.00	0.33	41.72	0.00	0.00	
		s.b.	hr	0.00	0.00	13.62	0.00	0.00	
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	94.82	0.40	47.95	37.93	4,546.64	
		s.b.	h	18.96	0.00	14.53	0.00	275.55	
3.03	General foreman	----	h	1.04	0.00	47.25	0.00	49.28	
3.04	Gang foreman	----	h	10.43	6.60	0.00	68.84	0.00	
3.05	Transit mixer operator	1	h	104.30	5.82	0.00	607.04	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	33.7%	----	----	559.05	4,459.89	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	129.00	5.34	10.23	688.86	1,319.67	
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	19.92	0.61	44.83	12.15	892.81	
		s.b.	h	3.98	0.00	13.85	0.00	55.17	
5.03	Sliding vibrating bar	Op.	h	19.92	0.02	1.77	0.40	35.25	
		s.b.	h	3.98	0.00	0.60	0.00	2.39	
5.04	General foreman	1	h	5.70	0.00	47.25	0.00	269.50	
5.05	Gang foreman	1	h	28.52	6.60	0.00	188.22	0.00	
5.06	Concrete pump, operator	1	h	21.91	5.82	0.00	127.50	0.00	
5.07	Concrete pump, helper	1	h	21.91	2.38	0.00	52.14	0.00	
5.08	Skilled	2	h	57.04	2.99	0.00	170.54	0.00	
5.09	Semiskilled	4	h	114.08	2.38	0.00	271.50	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	16.83	1,499.26	
Sub-total							4,240.61	23,277.50	
Missing items and construction contingencies		%	1.50%	----->>			63.61	349.16	
Total Direct Costs							4,304.21	23,626.66	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			27.59	248.27	
Overhead, risks & profit on other costs		%	52.00%	----->>			1,395.03	12,555.25	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	709.50	----->>		8.07	51.35
AGGREGATE UNIT PRICE				m3	----->>			59.42	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P13 (INVERT CONCRETE)

SEC 4-02
 ANA 020
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	41.75	0.06	7.75	2.51	323.59	
		s.b.	h	10.44	0.00	5.08	0.00	53.03	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	10.79	0.27	23.93	2.91	258.26	
		s.b.	h	2.16	0.00	12.03	0.00	25.97	
1.03	Hand-held breaker, medium weight type	Op.	h	50.19	0.04	2.03	2.01	101.88	
		s.b.	h	10.04	0.00	1.21	0.00	12.14	
1.04	Hand held breaker tool,moil point type	----	ea.	0.50	0.00	32.37	0.00	16.24	
1.05	Breaker tool resharpen	----	h	1.51	0.01	1.57	0.02	2.36	
1.06	General foreman	----	h	1.25	0.00	47.25	0.00	59.28	
1.07	Gang foreman	1	h	12.55	6.60	0.00	82.81	0.00	
1.08	Dumper driver and backhoe operator	1	h	57.80	5.82	0.00	336.40	0.00	
1.09	Skilled	2	h	25.09	2.99	0.00	75.03	0.00	
1.10	Semiskilled	2	h	25.09	2.38	0.00	59.72	0.00	
1.11	Unskilled	4	h	50.19	1.77	0.00	88.83	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	607.50	1.33	10.22	808.58	6,210.47	
	b) Portland cement, normal type	0.5	t	109.35	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	109.35	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	656.10	0.00	1.44	0.00	944.78	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5 m ³ nom. capaci	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	132.75	0.27	32.54	35.84	4,319.77	
		s.b.	h	26.55	0.00	11.20	0.00	297.37	
3.03	General foreman	----	h	1.46	0.00	47.25	0.00	69.00	
3.04	Gang foreman	----	h	14.60	6.60	0.00	96.38	0.00	
3.05	Transit mixer operator	1	h	146.03	5.82	0.00	849.88	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	21.1%	----	----	377.88	2,498.83	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	25.96	0.45	30.85	11.68	800.83	
		s.b.	h	5.19	0.00	13.69	0.00	71.08	
5.03	Sliding vibrating bar	Op.	h	25.96	0.02	1.77	0.52	45.95	
		s.b.	h	5.19	0.00	0.60	0.00	3.12	
5.04	General foreman	1	h	6.10	0.00	47.25	0.00	288.25	
5.05	Gang foreman	1	h	30.50	6.60	0.00	201.32	0.00	
5.06	Concrete pump, operator	1	h	28.55	5.82	0.00	166.19	0.00	
5.07	Concrete pump, helper	1	h	28.55	2.38	0.00	67.96	0.00	
5.08	Skilled	2	h	61.01	2.99	0.00	182.41	0.00	
5.09	Semiskilled	4	h	122.01	2.38	0.00	290.39	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	22.30	1,925.25	
Sub-total							3,761.55	18,327.45	
Missing items and construction contingencies		%	1.50%	----->>			56.42	274.91	
Total Direct Costs							3,817.98	18,602.36	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			23.62	212.58	
Overhead, risks & profit on other costs		%	52.00%	----->>			1,116.73	10,050.56	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	607.50	----->>		8.16	47.52
AGGREGATE UNIT PRICE				m3	----->>			55.68	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P16 (INVERT CONCRETE)

SEC 4-02
 ANA 021
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	34.42	0.06	7.75	2.06	266.72	
		s.b.	h	8.60	0.00	5.08	0.00	43.71	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	12.59	0.27	23.93	3.40	301.24	
		s.b.	h	2.52	0.00	12.03	0.00	30.29	
1.03	Hand-held breaker, medium weight type	Op.	h	58.54	0.04	2.03	2.34	118.83	
		s.b.	h	11.71	0.00	1.21	0.00	14.17	
1.04	Hand held breaker tool,moil point type	----	ea.	0.59	0.00	32.37	0.00	18.95	
1.05	Breaker tool resharpen	----	h	1.76	0.01	1.57	0.02	2.76	
1.06	General foreman	----	h	1.46	0.00	47.25	0.00	69.15	
1.07	Gang foreman	1	h	14.63	6.60	0.00	96.58	0.00	
1.08	Dumper driver and backhoe operator	1	h	51.70	5.82	0.00	300.92	0.00	
1.09	Skilled	2	h	29.27	2.99	0.00	87.51	0.00	
1.10	Semiskilled	2	h	29.27	2.38	0.00	69.66	0.00	
1.11	Unskilled	4	h	58.54	1.77	0.00	103.61	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	126.47	1.33	10.22	168.33	1,292.90	
	b) Portland cement, normal type	0.5	t	22.76	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	22.76	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	136.59	0.00	1.44	0.00	196.69	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	40.98	0.28	25.38	11.47	1,040.05	
		s.b.	hr	8.20	0.00	10.68	0.00	87.53	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	0.45	0.00	47.25	0.00	21.30	
3.04	Gang foreman	----	h	4.51	6.60	0.00	29.75	0.00	
3.05	Transit mixer operator	1	h	45.08	5.82	0.00	262.35	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	192.07	1,073.86	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	6.28	0.45	30.85	2.83	193.70	
		s.b.	h	1.26	0.00	13.69	0.00	17.19	
5.03	Sliding vibrating bar	Op.	h	6.28	0.02	1.77	0.13	11.11	
		s.b.	h	1.26	0.00	0.60	0.00	0.75	
5.04	General foreman	1	h	2.68	0.00	47.25	0.00	126.73	
5.05	Gang foreman	1	h	13.41	6.60	0.00	88.51	0.00	
5.06	Concrete pump, operator	1	h	6.91	5.82	0.00	40.20	0.00	
5.07	Concrete pump, helper	1	h	6.91	2.38	0.00	16.44	0.00	
5.08	Skilled	2	h	26.82	2.99	0.00	80.19	0.00	
5.09	Semiskilled	4	h	53.64	2.38	0.00	127.67	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	8.48	763.27	
Sub-total							1,694.51	5,690.87	
Missing items and construction contingencies		%	1.50%	----->>			25.42	85.36	
Total Direct Costs							1,719.92	5,776.24	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			4.92	44.25	
Overhead, risks & profit on other costs		%	52.00%	----->>			379.57	3,416.15	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	126.47	----->>		16.64	73.03
AGGREGATE UNIT PRICE				m3	----->>			89.67	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P16B (INVERT CONCRETE)

SEC 4-02
 ANA 022
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	22.12	0.06	7.75	1.33	171.42	
		s.b.	h	5.53	0.00	5.08	0.00	28.09	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	6.89	0.27	23.93	1.86	164.80	
		s.b.	h	1.38	0.00	12.03	0.00	16.57	
1.03	Hand-held breaker, medium weight type	Op.	h	32.02	0.04	2.03	1.28	65.01	
		s.b.	h	6.40	0.00	1.21	0.00	7.75	
1.04	Hand held breaker tool,moil point type	----	ea.	0.32	0.00	32.37	0.00	10.37	
1.05	Breaker tool resharpen	----	h	0.96	0.01	1.57	0.01	1.51	
1.06	General foreman	----	h	0.80	0.00	47.25	0.00	37.83	
1.07	Gang foreman	1	h	8.01	6.60	0.00	52.84	0.00	
1.08	Dumper driver and backhoe operator	1	h	31.91	5.82	0.00	185.70	0.00	
1.09	Skilled	2	h	16.01	2.99	0.00	47.88	0.00	
1.10	Semiskilled	2	h	16.01	2.38	0.00	38.11	0.00	
1.11	Unskilled	4	h	32.02	1.77	0.00	56.68	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	291.60	1.33	10.22	388.12	2,981.03	
	b) Portland cement, normal type	0.5	t	52.49	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	52.49	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	314.93	0.00	1.44	0.00	453.50	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	65.06	0.27	32.54	17.57	2,116.94	
		s.b.	h	13.01	0.00	11.20	0.00	145.73	
3.03	General foreman	----	h	0.72	0.00	47.25	0.00	33.81	
3.04	Gang foreman	----	h	7.16	6.60	0.00	47.23	0.00	
3.05	Transit mixer operator	1	h	71.56	5.82	0.00	416.49	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	32.4%	----	----	281.33	1,854.47	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	64.80	5.34	10.23	346.03	662.90	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	13.62	0.45	30.85	6.13	420.13	
		s.b.	h	2.72	0.00	13.69	0.00	37.29	
5.03	Sliding vibrating bar	Op.	h	13.62	0.02	1.77	0.27	24.10	
		s.b.	h	2.72	0.00	0.60	0.00	1.63	
5.04	General foreman	1	h	3.39	0.00	47.25	0.00	160.18	
5.05	Gang foreman	1	h	16.95	6.60	0.00	111.87	0.00	
5.06	Concrete pump, operator	1	h	14.98	5.82	0.00	87.18	0.00	
5.07	Concrete pump, helper	1	h	14.98	2.38	0.00	35.65	0.00	
5.08	Skilled	2	h	33.90	2.99	0.00	101.36	0.00	
5.09	Semiskilled	4	h	67.80	2.38	0.00	161.37	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	7.25	664.80	
Sub-total							2,393.55	10,059.86	
Missing items and construction contingencies		%	1.50%	----->>			35.90	150.90	
Total Direct Costs							2,429.45	10,210.75	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			11.34	102.04	
Overhead, risks & profit on other costs		%	52.00%	----->>			633.71	5,703.38	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	291.60	----->>		10.54	54.93
AGGREGATE UNIT PRICE				m3	----->>			65.47	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P21 (INVERT CONCRETE)

SEC 4-02
 ANA 023
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	52.92	0.06	7.75	3.18	410.11	
		s.b.	h	13.23	0.00	5.08	0.00	67.20	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	14.97	0.27	23.93	4.04	358.26	
		s.b.	h	2.99	0.00	12.03	0.00	36.02	
1.03	Hand-held breaker, medium weight type	Op.	h	69.62	0.04	2.03	2.78	141.32	
		s.b.	h	13.92	0.00	1.21	0.00	16.85	
1.04	Hand held breaker tool,moil point type	----	ea.	0.70	0.00	32.37	0.00	22.53	
1.05	Breaker tool resharpen	----	h	2.09	0.01	1.57	0.02	3.28	
1.06	General foreman	----	h	1.74	0.00	47.25	0.00	82.23	
1.07	Gang foreman	1	h	17.40	6.60	0.00	114.87	0.00	
1.08	Dumper driver and backhoe operator	1	h	74.68	5.82	0.00	434.62	0.00	
1.09	Skilled	2	h	34.81	2.99	0.00	104.08	0.00	
1.10	Semiskilled	2	h	34.81	2.38	0.00	82.84	0.00	
1.11	Unskilled	4	h	69.62	1.77	0.00	123.22	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	795.60	1.33	10.22	1,058.94	8,133.42	
	b) Portland cement, normal type	0.5	t	143.21	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	143.21	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	859.25	0.00	1.44	0.00	1,237.32	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	233.67	0.28	25.38	65.43	5,930.56	
		s.b.	hr	46.73	0.00	10.68	0.00	499.12	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	2.57	0.00	47.25	0.00	121.45	
3.04	Gang foreman	----	h	25.70	6.60	0.00	169.64	0.00	
3.05	Transit mixer operator	1	h	257.04	5.82	0.00	1,495.96	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	22.3%	----	----	622.40	3,551.93	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	140.40	5.34	10.23	749.74	1,436.29	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	34.33	0.45	30.85	15.45	1,059.23	
		s.b.	h	6.87	0.00	13.69	0.00	94.01	
5.03	Sliding vibrating bar	Op.	h	34.33	0.02	1.77	0.69	60.77	
		s.b.	h	6.87	0.00	0.60	0.00	4.12	
5.04	General foreman	1	h	8.10	0.00	47.25	0.00	382.64	
5.05	Gang foreman	1	h	40.49	6.60	0.00	267.24	0.00	
5.06	Concrete pump, operator	1	h	37.77	5.82	0.00	219.81	0.00	
5.07	Concrete pump, helper	1	h	37.77	2.38	0.00	89.89	0.00	
5.08	Skilled	2	h	80.98	2.99	0.00	242.14	0.00	
5.09	Semiskilled	4	h	161.96	2.38	0.00	385.48	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	35.48	2,930.21	
Sub-total							6,287.93	26,578.87	
Missing items and construction contingencies		%	1.50%	----->>			94.32	398.68	
Total Direct Costs							6,382.25	26,977.55	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			30.93	278.40	
Overhead, risks & profit on other costs		%	52.00%	----->>			1,670.37	15,033.33	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	795.60	----->>		10.16	53.15
AGGREGATE UNIT PRICE				m3	----->>			63.31	

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P23 (INVERT CONCRETE)

SEC 4-02
ANA 024
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	87.14	0.06	7.75	5.23	675.35	
		s.b.	h	21.79	0.00	5.08	0.00	110.67	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	25.73	0.27	23.93	6.95	615.63	
		s.b.	h	5.15	0.00	12.03	0.00	61.90	
1.03	Hand-held breaker, medium weight type	Op.	h	119.63	0.04	2.03	4.79	242.85	
		s.b.	h	23.93	0.00	1.21	0.00	28.95	
1.04	Hand held breaker tool,moil point type	----	ea.	1.20	0.00	32.37	0.00	38.72	
1.05	Breaker tool resharpen	----	h	3.59	0.01	1.57	0.04	5.63	
1.06	General foreman	----	h	2.99	0.00	47.25	0.00	141.31	
1.07	Gang foreman	1	h	29.91	6.60	0.00	197.39	0.00	
1.08	Dumper driver and backhoe operator	1	h	124.16	5.82	0.00	722.59	0.00	
1.09	Skilled	2	h	59.81	2.99	0.00	178.84	0.00	
1.10	Semiskilled	2	h	59.81	2.38	0.00	142.36	0.00	
1.11	Unskilled	4	h	119.63	1.77	0.00	211.74	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	1,329.98	1.33	10.22	1,770.20	13,596.39	
	b) Portland cement, normal type	0.5	t	239.40	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	239.40	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,436.38	0.00	1.44	0.00	2,068.38	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5 m ³ nom. capaci	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	281.52	0.27	32.54	76.01	9,160.69	
		s.b.	h	56.30	0.00	11.20	0.00	630.61	
3.03	General foreman	----	h	3.10	0.00	47.25	0.00	146.32	
3.04	Gang foreman	----	h	30.97	6.60	0.00	204.38	0.00	
3.05	Transit mixer operator	1	h	309.67	5.82	0.00	1,802.30	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	22.9%	----	----	882.76	5,865.89	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	258.70	5.34	10.23	1,381.47	2,646.52	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	57.68	0.45	30.85	25.96	1,779.42	
		s.b.	h	11.54	0.00	13.69	0.00	157.93	
5.03	Sliding vibrating bar	Op.	h	57.68	0.02	1.77	1.15	102.09	
		s.b.	h	11.54	0.00	0.60	0.00	6.92	
5.04	General foreman	1	h	13.78	0.00	47.25	0.00	650.91	
5.05	Gang foreman	1	h	68.88	6.60	0.00	454.61	0.00	
5.06	Concrete pump, operator	1	h	63.45	5.82	0.00	369.26	0.00	
5.07	Concrete pump, helper	1	h	63.45	2.38	0.00	151.01	0.00	
5.08	Skilled	2	h	137.76	2.99	0.00	411.90	0.00	
5.09	Semiskilled	4	h	275.52	2.38	0.00	655.73	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	43.85	3,679.84	
Sub-total							9,700.50	42,412.94	
Missing items and construction contingencies		%	1.50%	----->>			145.51	636.19	
Total Direct Costs							9,846.01	43,049.13	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			51.71	465.39	
Overhead, risks & profit on other costs		%	52.00%	----->>			2,642.99	23,786.92	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	1,329.98	----->>		9.43	50.60
AGGREGATE UNIT PRICE				m3	----->>			60.03	

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P25 & 25' (INVERT CONCRETE)

SEC 4-02
ANA 025
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	29.18	0.63	62.22	18.38	1,815.37	
		s.b.	h	7.29	0.00	28.86	0.00	210.51	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	36.44	0.27	23.93	9.84	872.06	
		s.b.	h	7.29	0.00	12.03	0.00	87.68	
1.03	Hand-held breaker, medium weight type	Op.	h	169.46	0.04	2.03	6.78	343.99	
		s.b.	h	33.89	0.00	1.21	0.00	41.01	
1.04	Hand held breaker tool,moil point type	----	ea.	1.69	0.00	32.37	0.00	54.85	
1.05	Breaker tool resharpen	----	h	5.08	0.01	1.57	0.05	7.98	
1.06	General foreman	----	h	4.24	0.00	47.25	0.00	200.17	
1.07	Gang foreman	1	h	42.36	6.60	0.00	279.60	0.00	
1.08	Dumper driver and backhoe operator	1	h	72.18	5.82	0.00	420.09	0.00	
1.09	Skilled	2	h	84.73	2.99	0.00	253.34	0.00	
1.10	Semiskilled	2	h	84.73	2.38	0.00	201.65	0.00	
1.11	Unskilled	4	h	169.46	1.77	0.00	299.94	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	1,094.80	1.33	10.22	1,457.18	11,192.14	
	b) Portland cement, normal type	0.5	t	197.06	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	197.06	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,182.38	0.00	1.44	0.00	1,702.63	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	202.66	0.33	41.72	66.88	8,454.80	
		s.b.	hr	40.53	0.00	13.62	0.00	552.03	
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00	
		s.b.	h	0.00	0.00	14.53	0.00	0.00	
3.03	General foreman	----	h	2.23	0.00	47.25	0.00	105.33	
3.04	Gang foreman	----	h	22.29	6.60	0.00	147.13	0.00	
3.05	Transit mixer operator	1	h	222.92	5.82	0.00	1,297.40	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	1,208.21	8,956.82	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	143.83	5.34	10.23	768.06	1,471.40	
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	32.34	0.61	44.83	19.72	1,449.62	
		s.b.	h	6.47	0.00	13.85	0.00	89.57	
5.03	Sliding vibrating bar	Op.	h	32.34	0.02	1.77	0.65	57.23	
		s.b.	h	6.47	0.00	0.60	0.00	3.88	
5.04	General foreman	1	h	10.94	0.00	47.25	0.00	516.68	
5.05	Gang foreman	1	h	54.68	6.60	0.00	360.86	0.00	
5.06	Concrete pump, operator	1	h	35.57	5.82	0.00	207.01	0.00	
5.07	Concrete pump, helper	1	h	35.57	2.38	0.00	84.66	0.00	
5.08	Skilled	2	h	109.35	2.99	0.00	326.96	0.00	
5.09	Semiskilled	4	h	218.70	2.38	0.00	520.51	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	51.23	4,341.59	
Sub-total							8,006.12	42,527.36	
Missing items and construction contingencies		%	1.50%				120.09	637.91	
Total Direct Costs							8,126.21	43,165.27	
Overheads, risks and profit on cement and admixtures		%	25.00%				42.57	383.09	
Overhead, risks & profit on other costs		%	52.00%				2,578.62	23,207.58	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	1,094.80			9.82	60.98
AGGREGATE UNIT PRICE				m3				70.79	

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P25A (INVERT CONCRETE)

SEC 4-02
ANA 026
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P (US\$)	L.C.P (US\$ eq.)	F.C.P (US\$)	
1	Preparation of Invert Surface								
1.01	Articulated tunnel dump truck, 20 t pay load	Op.	h	7.04	0.63	62.22	4.43	437.78	
		s.b.	h	1.76	0.00	28.86	0.00	50.77	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	7.16	0.27	23.93	1.93	171.35	
		s.b.	h	1.43	0.00	12.03	0.00	17.23	
1.03	Hand-held breaker, medium weight type	Op.	h	33.30	0.04	2.03	1.33	67.59	
		s.b.	h	6.66	0.00	1.21	0.00	8.06	
1.04	Hand held breaker tool,moil point type	----	ea.	0.33	0.00	32.37	0.00	10.78	
1.05	Breaker tool resharpen	----	h	1.00	0.01	1.57	0.01	1.57	
1.06	General foreman	----	h	0.83	0.00	47.25	0.00	39.33	
1.07	Gang foreman	1	h	8.32	6.60	0.00	54.94	0.00	
1.08	Dumper driver and backhoe operator	1	h	15.62	5.82	0.00	90.89	0.00	
1.09	Skilled	2	h	16.65	2.99	0.00	49.78	0.00	
1.10	Semiskilled	2	h	16.65	2.38	0.00	39.62	0.00	
1.11	Unskilled	4	h	33.30	1.77	0.00	58.94	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	157.34	1.33	10.22	209.42	1,608.49	
	b) Portland cement, normal type	0.5	t	28.32	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	28.32	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	169.93	0.00	1.44	0.00	244.70	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer, 8 m ³ nominal capacity	Op.	hr	28.26	0.33	41.72	9.33	1,179.20	
		s.b.	hr	5.65	0.00	13.62	0.00	76.99	
3.02	Transit mixer, 10 m ³ nominal capacity	Op.	h	0.00	0.40	47.95	0.00	0.00	
		s.b.	h	0.00	0.00	14.53	0.00	0.00	
3.03	General foreman	----	h	0.31	0.00	47.25	0.00	14.69	
3.04	Gang foreman	----	h	3.11	6.60	0.00	20.52	0.00	
3.05	Transit mixer operator	1	h	31.09	5.82	0.00	180.95	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	171.03	1,271.49	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 79 m3/h max. c.	Op.	h	4.65	0.61	44.83	2.83	208.33	
		s.b.	h	0.93	0.00	13.85	0.00	12.87	
5.03	Sliding vibrating bar	Op.	h	4.65	0.02	1.77	0.09	8.23	
		s.b.	h	0.93	0.00	0.60	0.00	0.56	
5.04	General foreman	1	h	1.93	0.00	47.25	0.00	91.31	
5.05	Gang foreman	1	h	9.66	6.60	0.00	63.77	0.00	
5.06	Concrete pump, operator	1	h	5.11	5.82	0.00	29.75	0.00	
5.07	Concrete pump, helper	1	h	5.11	2.38	0.00	12.17	0.00	
5.08	Skilled	2	h	19.32	2.99	0.00	57.78	0.00	
5.09	Semiskilled	4	h	38.65	2.38	0.00	91.99	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	11.55	997.50	
Sub-total							1,163.05	6,518.82	
Missing items and construction contingencies		%	1.50%	----->>			17.45	97.78	
Total Direct Costs							1,180.50	6,616.60	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			6.12	55.06	
Overhead, risks & profit on other costs		%	52.00%	----->>			392.72	3,534.52	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	157.34	----->>		10.04	64.87
AGGREGATE UNIT PRICE				m3	----->>			74.90	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P28 (INVERT CONCRETE)

SEC 4-02
 ANA 027
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	46.05	0.06	7.75	2.76	356.92	
		s.b.	h	11.51	0.00	5.08	0.00	58.49	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	14.39	0.27	23.93	3.88	344.29	
		s.b.	h	2.88	0.00	12.03	0.00	34.62	
1.03	Hand-held breaker, medium weight type	Op.	h	66.90	0.04	2.03	2.68	135.81	
		s.b.	h	13.38	0.00	1.21	0.00	16.19	
1.04	Hand held breaker tool,moil point type	----	ea.	0.67	0.00	32.37	0.00	21.66	
1.05	Breaker tool resharpen	----	h	2.01	0.01	1.57	0.02	3.15	
1.06	General foreman	----	h	1.67	0.00	47.25	0.00	79.03	
1.07	Gang foreman	1	h	16.73	6.60	0.00	110.39	0.00	
1.08	Dumper driver and backhoe operator	1	h	66.49	5.82	0.00	386.94	0.00	
1.09	Skilled	2	h	33.45	2.99	0.00	100.02	0.00	
1.10	Semiskilled	2	h	33.45	2.38	0.00	79.61	0.00	
1.11	Unskilled	4	h	66.90	1.77	0.00	118.42	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	304.35	1.33	10.22	405.09	3,111.37	
	b) Portland cement, normal type	0.5	t	54.78	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	54.78	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	328.70	0.00	1.44	0.00	473.33	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	108.38	0.28	25.38	30.35	2,750.68	
		s.b.	hr	21.68	0.00	10.68	0.00	231.50	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	1.19	0.00	47.25	0.00	56.33	
3.04	Gang foreman	----	h	11.92	6.60	0.00	78.68	0.00	
3.05	Transit mixer operator	1	h	119.22	5.82	0.00	693.85	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	491.64	2,695.64	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	135.23	5.34	10.23	722.15	1,383.44	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	15.11	0.45	30.85	6.80	466.13	
		s.b.	h	3.02	0.00	13.69	0.00	41.37	
5.03	Sliding vibrating bar	Op.	h	15.11	0.02	1.77	0.30	26.74	
		s.b.	h	3.02	0.00	0.60	0.00	1.81	
5.04	General foreman	1	h	4.46	0.00	47.25	0.00	210.70	
5.05	Gang foreman	1	h	22.30	6.60	0.00	147.16	0.00	
5.06	Concrete pump, operator	1	h	16.62	5.82	0.00	96.73	0.00	
5.07	Concrete pump, helper	1	h	16.62	2.38	0.00	39.56	0.00	
5.08	Skilled	2	h	44.59	2.99	0.00	133.33	0.00	
5.09	Semiskilled	4	h	89.19	2.38	0.00	212.26	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	21.88	1,845.04	
Sub-total							3,884.51	14,344.23	
Missing items and construction contingencies		%	1.50%	----->>			58.27	215.16	
Total Direct Costs							3,942.78	14,559.39	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			11.83	106.50	
Overhead, risks & profit on other costs		%	52.00%	----->>			937.50	8,437.50	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	304.35	----->>		16.07	75.91
AGGREGATE UNIT PRICE				m3	----->>			91.98	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P35 (INVERT CONCRETE)

SEC 4-02
 ANA 028
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P (US\$)	L.C.P (US\$ eq.)	F.C.P (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	36.96	0.06	7.75	2.22	286.45	
		s.b.	h	9.24	0.00	5.08	0.00	46.94	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	11.23	0.27	23.93	3.03	268.63	
		s.b.	h	2.25	0.00	12.03	0.00	27.01	
1.03	Hand-held breaker, medium weight type	Op.	h	52.20	0.04	2.03	2.09	105.96	
		s.b.	h	10.44	0.00	1.21	0.00	12.63	
1.04	Hand held breaker tool,moil point type	----	ea.	0.52	0.00	32.37	0.00	16.90	
1.05	Breaker tool resharpen	----	h	1.57	0.01	1.57	0.02	2.46	
1.06	General foreman	----	h	1.30	0.00	47.25	0.00	61.66	
1.07	Gang foreman	1	h	13.05	6.60	0.00	86.13	0.00	
1.08	Dumper driver and backhoe operator	1	h	53.00	5.82	0.00	308.49	0.00	
1.09	Skilled	2	h	26.10	2.99	0.00	78.04	0.00	
1.10	Semiskilled	2	h	26.10	2.38	0.00	62.12	0.00	
1.11	Unskilled	4	h	52.20	1.77	0.00	92.39	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	367.12	1.33	10.22	488.64	3,753.07	
	b) Portland cement, normal type	0.5	t	66.08	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	66.08	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	396.49	0.00	1.44	0.00	570.95	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	83.70	0.27	32.54	22.60	2,723.65	
		s.b.	h	16.74	0.00	11.20	0.00	187.49	
3.03	General foreman	----	h	0.92	0.00	47.25	0.00	43.50	
3.04	Gang foreman	----	h	9.21	6.60	0.00	60.77	0.00	
3.05	Transit mixer operator	1	h	92.07	5.82	0.00	535.86	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	35.9%	----	----	397.46	2,611.29	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	17.60	0.45	30.85	7.92	542.99	
		s.b.	h	3.52	0.00	13.69	0.00	48.19	
5.03	Sliding vibrating bar	Op.	h	17.60	0.02	1.77	0.35	31.15	
		s.b.	h	3.52	0.00	0.60	0.00	2.11	
5.04	General foreman	1	h	4.54	0.00	47.25	0.00	214.29	
5.05	Gang foreman	1	h	22.68	6.60	0.00	149.66	0.00	
5.06	Concrete pump, operator	1	h	19.36	5.82	0.00	112.68	0.00	
5.07	Concrete pump, helper	1	h	19.36	2.38	0.00	46.08	0.00	
5.08	Skilled	2	h	45.35	2.99	0.00	135.60	0.00	
5.09	Semiskilled	4	h	90.70	2.38	0.00	215.88	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	9.99	928.53	
Sub-total							2,818.01	12,485.86	
Missing items and construction contingencies		%	1.50%	----->>			42.27	187.29	
Total Direct Costs							2,860.28	12,673.15	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			14.27	128.46	
Overhead, risks & profit on other costs		%	52.00%	----->>			778.05	7,002.44	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	367.12	----->>		9.95	53.94
AGGREGATE UNIT PRICE				m3	----->>			63.89	

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - ACCESS ADIT P40 (INVERT CONCRETE)

SEC 4-02
 ANA 029
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	35.57	0.06	7.75	2.13	275.70	
		s.b.	h	8.89	0.00	5.08	0.00	45.18	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	12.24	0.27	23.93	3.31	292.92	
		s.b.	h	2.45	0.00	12.03	0.00	29.45	
1.03	Hand-held breaker, medium weight type	Op.	h	56.92	0.04	2.03	2.28	115.55	
		s.b.	h	11.38	0.00	1.21	0.00	13.77	
1.04	Hand held breaker tool,moil point type	----	ea.	0.57	0.00	32.37	0.00	18.43	
1.05	Breaker tool resharpen	----	h	1.71	0.01	1.57	0.02	2.68	
1.06	General foreman	----	h	1.42	0.00	47.25	0.00	67.24	
1.07	Gang foreman	1	h	14.23	6.60	0.00	93.92	0.00	
1.08	Dumper driver and backhoe operator	1	h	52.60	5.82	0.00	306.11	0.00	
1.09	Skilled	2	h	28.46	2.99	0.00	85.10	0.00	
1.10	Semiskilled	2	h	28.46	2.38	0.00	67.73	0.00	
1.11	Unskilled	4	h	56.92	1.77	0.00	100.75	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	224.30	1.33	10.22	298.54	2,293.02	
	b) Portland cement, normal type	0.5	t	40.37	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	40.37	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	242.24	0.00	1.44	0.00	348.83	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5 m ³ nom. capaci	Op.	hr	86.69	0.28	25.38	24.27	2,200.20	
		s.b.	hr	17.34	0.00	10.68	0.00	185.17	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	0.95	0.00	47.25	0.00	45.06	
3.04	Gang foreman	----	h	9.54	6.60	0.00	62.94	0.00	
3.05	Transit mixer operator	1	h	95.36	5.82	0.00	554.99	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	382.88	2,064.42	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	11.14	0.45	30.85	5.01	343.53	
		s.b.	h	2.23	0.00	13.69	0.00	30.49	
5.03	Sliding vibrating bar	Op.	h	11.14	0.02	1.77	0.22	19.71	
		s.b.	h	2.23	0.00	0.60	0.00	1.34	
5.04	General foreman	1	h	3.54	0.00	47.25	0.00	167.44	
5.05	Gang foreman	1	h	17.72	6.60	0.00	116.94	0.00	
5.06	Concrete pump, operator	1	h	12.25	5.82	0.00	71.29	0.00	
5.07	Concrete pump, helper	1	h	12.25	2.38	0.00	29.15	0.00	
5.08	Skilled	2	h	35.44	2.99	0.00	105.95	0.00	
5.09	Semiskilled	4	h	70.87	2.38	0.00	168.68	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	16.44	1,366.59	
Sub-total							2,498.65	9,926.70	
Missing items and construction contingencies		%	1.50%	----->>			37.48	148.90	
Total Direct Costs							2,536.13	10,075.60	
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			8.72	78.49	
Overhead, risks & profit on other costs		%	52.00%	----->>			637.67	5,739.04	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	224.30	----->>		14.19	70.86
AGGREGATE UNIT PRICE				m3	----->>			85.05	

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - ACCESS ADIT P80 (INVERT CONCRETE)

SEC 4-02
ANA 030
Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	104.38	0.06	7.75	6.26	808.93
		s.b.	h	26.09	0.00	5.08	0.00	132.56
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	22.70	0.27	23.93	6.13	543.17
		s.b.	h	4.54	0.00	12.03	0.00	54.61
1.03	Hand-held breaker, medium weight type	Op.	h	105.55	0.04	2.03	4.22	214.26
		s.b.	h	21.11	0.00	1.21	0.00	25.54
1.04	Hand held breaker tool,moil point type	----	ea.	1.06	0.00	32.37	0.00	34.17
1.05	Breaker tool resharpen	----	h	3.17	0.01	1.57	0.03	4.97
1.06	General foreman	----	h	2.64	0.00	47.25	0.00	124.68
1.07	Gang foreman	1	h	26.39	6.60	0.00	174.15	0.00
1.08	Dumper driver and backhoe operator	1	h	139.78	5.82	0.00	813.54	0.00
1.09	Skilled	2	h	52.77	2.99	0.00	157.79	0.00
1.10	Semiskilled	2	h	52.77	2.38	0.00	125.60	0.00
1.11	Unskilled	4	h	105.55	1.77	0.00	186.82	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	839.42	1.33	10.22	1,117.27	8,581.39
	b) Portland cement, normal type	0.5	t	151.10	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	0.5	t	151.10	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	906.57	0.00	1.44	0.00	1,305.47
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00
		s.b.	hr	0.00	0.00	10.68	0.00	0.00
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	205.92	0.27	32.54	55.60	6,700.56
		s.b.	h	41.18	0.00	11.20	0.00	461.26
3.03	General foreman	----	h	2.27	0.00	47.25	0.00	107.03
3.04	Gang foreman	----	h	22.65	6.60	0.00	149.50	0.00
3.05	Transit mixer operator	1	h	226.51	5.82	0.00	1,318.28	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	1,074.74	6,982.37
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	143.83	5.34	10.23	768.06	1,471.40
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	41.67	0.45	30.85	18.75	1,285.62
		s.b.	h	8.33	0.00	13.69	0.00	114.10
5.03	Sliding vibrating bar	Op.	h	41.67	0.02	1.77	0.83	73.76
		s.b.	h	8.33	0.00	0.60	0.00	5.00
5.04	General foreman	1	h	11.10	0.00	47.25	0.00	524.25
5.05	Gang foreman	1	h	55.48	6.60	0.00	366.15	0.00
5.06	Concrete pump, operator	1	h	45.84	5.82	0.00	266.79	0.00
5.07	Concrete pump, helper	1	h	45.84	2.38	0.00	109.10	0.00
5.08	Skilled	2	h	110.95	2.99	0.00	331.75	0.00
5.09	Semiskilled	4	h	221.91	2.38	0.00	528.14	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	35.69	3,054.31
Sub-total							7,615.21	32,609.41
Missing items and construction contingencies		%	1.50%	----->>			114.23	489.14
Total Direct Costs							7,729.44	33,098.55
Overheads, risks and profit on cement and admixtures		%	25.00%	----->>			32.64	293.73
Overhead, risks & profit on other costs		%	52.00%	----->>			2,055.17	18,496.54
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	839.42	----->>		
AGGREGATE UNIT PRICE				m3	----->>			73.51

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - LEVEL 1 DIVERSION TUNNEL, PRESSURE STRETCH (ARCH LINING)**

**SEC 4-03
ANA 001
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	296.52	2.32	18.04	689.12	5,348.28
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	823.68	0.00	1.34	0.00	1,102.08
	b) Grouted anchor bars	---	kg	1,029.60	0.00	0.84	0.00	864.86
	c) Formwork bond breaking compound	---	kg	24.71	0.00	3.23	0.00	79.81
	d) Motorcompressor, 5 m ³ /min.	Op.	h	14.83	0.08	11.32	1.19	167.83
		s.b.	h	2.97	0.00	2.99	0.00	8.87
	e) Immersion type vibrator, 77 mm dia.	Op.	h	44.48	0.01	1.46	0.44	64.94
		s.b.	h	8.90	0.00	0.42	0.00	3.74
	f) General foreman	---	h	1.22	0.00	47.25	0.00	57.79
	g) Gang foreman	---	h	12.23	6.60	0.00	80.73	0.00
	h) Skilled	---	h	122.32	2.77	0.00	338.82	0.00
	i) Semiskilled	---	h	289.11	2.77	0.00	800.84	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	13,870.29	1.33	10.22	18,461.35	141,795.93
	b) Portland cement, normal type	50%	t	2,496.65	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	2,496.65	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	9,986.61	0.00	1.44	0.00	14,380.71
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	1,829.57	0.40	47.95	731.83	87,727.83
		s.b.	h	365.91	0.00	14.53	0.00	5,316.73
	c) General foreman	---	h	20.13	0.00	47.25	0.00	950.92
	d) Gang foreman	---	h	201.25	6.60	0.00	1,328.27	0.00
	e) Transit mixer, operator	1	h	2,012.53	5.82	0.00	11,712.90	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	21.4%	---	---	6,910.24	53,630.65
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	155.43	0.00	802.80	0.00	124,779.20
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 14000 N type	Op.	h	22,871.45	0.01	0.31	228.71	7,090.15
		s.b.	h	4,574.29	0.00	0.21	0.00	960.60
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	209.73	0.15	13.48	31.46	2,827.21
		s.b.	h	41.95	0.00	8.88	0.00	372.49
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	7.61	0.00	350.00	0.00	2,662.84
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	1,521.62	0.00	3.58	0.00	5,447.40
3.07	Formwork bond breaking compound	---	kg	355.62	0.00	3.23	0.00	1,148.67
3.08	General foreman	---	h	74.45	0.00	47.25	0.00	3,517.88
3.09	Gang foreman	1	h	744.52	6.60	0.00	4,913.86	0.00
3.10	Specialist	3	h	2,233.57	3.69	0.00	8,241.89	0.00
03:11	Skilled	3	h	2,233.57	2.99	0.00	6,678.39	0.00
03:12	Semiskilled	2	h	1,489.05	2.38	0.00	3,543.94	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	478.20	0.61	44.83	291.70	21,437.91
		s.b.	h	95.64	0.00	13.85	0.00	1,324.63
4.02	Motorcompressors, 30 m ³ /min (28.5 m ³ /min. consumption)	Op.	h	478.20	0.31	94.44	149.92	45,161.40
		s.b.	h	95.64	0.00	11.38	0.00	1,088.49
4.03	General foreman	---	h	52.60	0.00	47.25	0.00	2,485.47
4.04	Gang foreman	1	h	526.03	6.60	0.00	3,471.77	0.00
4.05	Concrete pump, operator	1	h	526.03	5.82	0.00	3,061.47	0.00
5.06	Concrete pump, helper	1	h	526.03	2.38	0.00	1,251.94	0.00
5.07	Skilled	1	h	526.03	2.99	0.00	1,572.81	0.00
5.08	Semiskilled	2	h	1,052.05	2.38	0.00	2,503.88	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	548.31	49,132.29
Sub-total							77,545.76	580,937.59
Missing items and construction contingencies							1,163.19	8,714.06
Total Direct Costs							78,708.95	589,651.65
Overheads, risks and profit on cement and admixtures							367.20	3,304.83
Overhead, risks & profit on other costs							33,990.97	305,918.71
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							7.98	63.45
AGGREGATE UNIT PRICE								71.43

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 4-03

ANA 002

UNDERGROUND CONCRETE - LEVEL 1 DIVERSION TUNNEL, FREE-FLOW STRETCH LEFT BANK (ARCH LINING)

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	395.42	2.37	18.32	935.56	7,245.36
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,098.38	0.00	1.34	0.00	1,469.63
	b) Grouted anchor bars	---	kg	1,372.98	0.00	0.84	0.00	1,153.30
	c) Formwork bond breaking compound	---	kg	32.95	0.00	3.23	0.00	106.43
	d) Motorcompressor, 5 m ³ /min.	Op.	h	19.77	0.08	11.32	1.58	223.81
		s.b.	h	3.95	0.00	2.99	0.00	11.82
	e) Immersion type vibrator, 77 mm dia.	Op.	h	59.31	0.01	1.46	0.59	86.60
		s.b.	h	11.86	0.00	0.42	0.00	4.98
	f) General foreman	---	h	1.63	0.00	47.25	0.00	77.07
	g) Gang foreman	---	h	16.31	6.60	0.00	107.65	0.00
	h) Skilled	---	h	163.11	2.77	0.00	451.81	0.00
	i) Semiskilled	---	h	385.53	2.77	0.00	1,067.92	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	21,714.80	1.33	10.22	28,902.40	221,990.43
	b) Portland cement, normal type	50%	t	3,908.66	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	3,908.66	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	15,634.66	0.00	1.44	0.00	22,513.91
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	2,985.53	0.40	47.95	1,194.21	143,155.99
		s.b.	h	597.11	0.00	14.53	0.00	8,675.94
	c) General foreman	---	h	32.84	0.00	47.25	0.00	1,551.73
	d) Gang foreman	---	h	328.41	6.60	0.00	2,167.49	0.00
	e) Transit mixer, operator	1	h	3,284.08	5.82	0.00	19,113.34	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	21.4%	---	---	11,014.04	85,297.24
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	197.82	0.00	936.60	0.00	185,278.21
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 14000 N type	Op.	h	43,145.56	0.01	0.31	431.46	13,375.12
		s.b.	h	8,629.11	0.00	0.21	0.00	1,812.11
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	279.68	0.17	15.78	47.55	4,413.35
		s.b.	h	55.94	0.00	10.59	0.00	592.36
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	11.87	0.00	350.00	0.00	4,155.90
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	2,374.80	0.00	3.58	0.00	8,501.79
3.07	Formwork bond breaking compound	---	kg	603.56	0.00	3.23	0.00	1,949.50
3.08	General foreman	---	h	103.02	0.00	47.25	0.00	4,867.73
3.09	Gang foreman	1	h	1,030.21	6.60	0.00	6,799.38	0.00
3.10	Specialist	3	h	3,090.63	3.69	0.00	11,404.41	0.00
03:11	Skilled	3	h	3,090.63	2.99	0.00	9,240.97	0.00
03:12	Semiskilled	2	h	2,060.42	2.38	0.00	4,903.79	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	746.34	0.61	44.83	455.27	33,458.27
		s.b.	h	149.27	0.00	13.85	0.00	2,067.35
4.02	Motorcompressors, 30 m ³ /min (36.3 m ³ /min. consumption)	Op.	h	746.34	0.40	120.29	298.01	89,773.91
		s.b.	h	149.27	0.00	14.50	0.00	2,163.75
4.03	General foreman	---	h	82.10	0.00	47.25	0.00	3,879.08
4.04	Gang foreman	1	h	820.97	6.60	0.00	5,418.40	0.00
4.05	Concrete pump, operator	1	h	820.97	5.82	0.00	4,778.05	0.00
5.06	Concrete pump, helper	1	h	820.97	2.38	0.00	1,953.91	0.00
5.07	Skilled	1	h	820.97	2.99	0.00	2,454.70	0.00
5.08	Semiskilled	2	h	1,641.94	2.38	0.00	3,907.82	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	1,979.15	169,924.67
Sub-total							119,029.46	1,019,777.36
Missing items and construction contingencies							1,785.44	15,296.66
Total Direct Costs							120,814.90	1,035,074.02
Overheads, risks and profit on cement and admixtures							573.10	5,157.87
Overhead, risks & profit on other costs							58,914.18	530,227.64
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							8.15	71.03
AGGREGATE UNIT PRICE								79.18

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - LEVEL 1 DIVERSION TUNNEL, FREE-FLOW STRETCH RIGH BANK (ARCH LINING)**

**SEC 4-03
ANA 003
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	214.85	2.31	17.93	495.80	3,851.22
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	596.80	0.00	1.34	0.00	798.52
	b) Grouted anchor bars	---	kg	746.00	0.00	0.84	0.00	626.64
	c) Formwork bond breaking compound	---	kg	17.90	0.00	3.23	0.00	57.83
	d) Motorcompressor, 5 m ³ /min.	Op.	h	10.74	0.08	11.32	0.86	121.60
		s.b.	h	2.15	0.00	2.99	0.00	6.42
	e) Immersion type vibrator, 77 mm dia.	Op.	h	32.23	0.01	1.46	0.32	47.05
		s.b.	h	6.45	0.00	0.42	0.00	2.71
	f) General foreman	---	h	0.89	0.00	47.25	0.00	41.88
	g) Gang foreman	---	h	8.86	6.60	0.00	58.49	0.00
	h) Skilled	---	h	88.62	2.77	0.00	245.49	0.00
	i) Semiskilled	---	h	209.48	2.77	0.00	580.25	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	8,334.71	1.33	10.22	11,093.50	85,205.76
	b) Portland cement, normal type	50%	t	1,500.25	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,500.25	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	6,000.99	0.00	1.44	0.00	8,641.43
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	1,081.35	0.40	47.95	432.54	51,850.67
		s.b.	h	216.27	0.00	14.53	0.00	3,142.40
	c) General foreman	---	h	11.89	0.00	47.25	0.00	562.03
	d) Gang foreman	---	h	118.95	6.60	0.00	785.06	0.00
	e) Transit mixer, operator	1	h	1,189.48	5.82	0.00	6,922.79	0.00
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	21.4%	---	---	4,123.27	32,028.12
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	131.88	0.00	936.60	0.00	123,518.81
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 14000 N type	Op.	h	14,952.37	0.01	0.31	149.52	4,635.24
		s.b.	h	2,990.47	0.00	0.21	0.00	628.00
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	165.78	0.17	15.78	28.18	2,615.97
		s.b.	h	33.16	0.00	10.59	0.00	351.12
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	6.89	0.00	350.00	0.00	2,410.50
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	1,377.43	0.00	3.58	0.00	4,931.20
3.07	Formwork bond breaking compound	---	kg	327.94	0.00	3.23	0.00	1,059.25
3.08	General foreman	---	h	59.69	0.00	47.25	0.00	2,820.41
3.09	Gang foreman	1	h	596.91	6.60	0.00	3,939.61	0.00
3.10	Specialist	3	h	1,790.73	3.69	0.00	6,607.81	0.00
03:11	Skilled	3	h	1,790.73	2.99	0.00	5,354.29	0.00
03:12	Semiskilled	2	h	1,193.82	2.38	0.00	2,841.30	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	288.59	0.61	44.83	176.04	12,937.61
		s.b.	h	57.72	0.00	13.85	0.00	799.40
4.02	Motorcompressors, 30 m ³ /min (36.3 m ³ /min. consumption)	Op.	h	288.59	0.40	120.29	115.24	34,713.70
		s.b.	h	57.72	0.00	14.50	0.00	836.68
4.03	General foreman	---	h	31.75	0.00	47.25	0.00	1,499.96
4.04	Gang foreman	1	h	317.45	6.60	0.00	2,095.18	0.00
4.05	Concrete pump, operator	1	h	317.45	5.82	0.00	1,847.57	0.00
5.06	Concrete pump, helper	1	h	317.45	2.38	0.00	755.54	0.00
5.07	Skilled	1	h	317.45	2.99	0.00	949.18	0.00
5.08	Semiskilled	2	h	634.90	2.38	0.00	1,511.07	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	410.27	35,638.73
Sub-total							51,519.19	416,380.84
Missing items and construction contingencies							772.79	6,245.71
Total Direct Costs							52,291.98	422,626.56
Overheads, risks and profit on cement and admixtures							221.60	1,994.44
Overhead, risks & profit on other costs							24,234.83	218,113.44
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							8.98	75.18
AGGREGATE UNIT PRICE								84.15

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - AUXILIARY TUNNEL OF LEVEL 1 DIVERSION TUNNEL (ARCH AND SIDEWALLS)**

**SEC 4-03
ANA 010
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Side Curbs for Formwork Anchoring								
1.01	Concrete, supply and transport (see n. 2 below):								
	a) Concrete Class B2-25/37	---	m ³	53.73	2.27	17.68	122.05	949.85	
1.02	Formworks and concrete placing:								
	a) Formwork	---	m ²	335.82	0.00	1.34	0.00	449.33	
	b) Grouted anchor bars	---	kg	419.78	0.00	0.84	0.00	352.61	
	c) Formwork bond breaking compound	---	kg	6.72	0.00	3.23	0.00	21.69	
	d) Motorcompressor, 5 m ³ /min.	Op.	h	2.69	0.08	11.32	0.21	30.41	
		s.b.	h	0.54	0.00	2.99	0.00	1.61	
	e) Immersion type vibrator, 77 mm dia.	Op.	h	8.06	0.01	1.46	0.08	11.77	
		s.b.	h	1.61	0.00	0.42	0.00	0.68	
	f) General foreman	---	h	0.50	0.00	47.25	0.00	23.56	
	g) Gang foreman	---	h	4.99	6.60	0.00	32.91	0.00	
	h) Skilled	---	h	49.87	2.77	0.00	138.14	0.00	
	i) Semiskilled	---	h	107.80	2.77	0.00	298.60	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	2,274.69	1.33	10.22	3,027.61	23,254.14	
	b) Portland cement, normal type	50%	t	409.44	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	409.44	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	1,637.78	0.00	1.44	0.00	2,358.40	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
2.02	Concrete transport:								
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00	
		s.b.	h	0.00	0.00	13.62	0.00	0.00	
	b) Transit mixer, 10 m ³ nominal capacity	Op.	h	284.16	0.40	47.95	113.66	13,625.37	
		s.b.	h	56.83	0.00	14.53	0.00	825.76	
	c) General foreman	---	h	3.13	0.00	47.25	0.00	147.69	
	d) Gang foreman	---	h	31.26	6.60	0.00	206.30	0.00	
	e) Transit mixer, operator	1	h	312.57	5.82	0.00	1,819.18	0.00	
	f) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	21.4%	---	---	1,107.62	8,620.31	
3	Formworks								
3.01	Steel formworks excluding side closure	---	m ³	2,274.69	0.00	9.75	0.00	22,178.22	
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.39	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,422.54	0.00	0.24	0.00	581.41	
		s.b.	h	484.51	0.00	0.17	0.00	82.37	
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	93.28	0.17	15.78	15.86	1,472.01	
		s.b.	h	18.66	0.00	10.59	0.00	197.57	
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.88	0.00	350.00	0.00	656.49	
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	375.13	0.00	3.58	0.00	1,342.98	
3.07	Formwork bond breaking compound	---	kg	178.99	0.00	3.23	0.00	578.14	
3.08	General foreman	---	h	25.40	0.00	47.25	0.00	1,200.15	
3.09	Gang foreman	1	h	254.00	6.60	0.00	1,676.41	0.00	
3.10	Specialist	3	h	762.00	3.69	0.00	2,811.79	0.00	
03:11	Skilled	2	h	508.00	2.99	0.00	1,518.93	0.00	
03:12	Semiskilled	1	h	254.00	2.38	0.00	604.52	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	78.60	0.61	44.83	47.94	3,523.48	
		s.b.	h	15.72	0.00	13.85	0.00	217.71	
4.02	Motorcompressors, 25 m ³ /min (23.5 m ³ /min. consumption)	Op.	h	78.60	0.27	73.31	21.43	5,761.95	
		s.b.	h	15.72	0.00	10.09	0.00	158.55	
4.03	General foreman	---	h	8.65	0.00	47.25	0.00	408.51	
4.04	Gang foreman	1	h	86.46	6.60	0.00	570.61	0.00	
4.05	Concrete pump, operator	1	h	86.46	5.82	0.00	503.17	0.00	
5.06	Concrete pump, helper	1	h	86.46	2.38	0.00	205.77	0.00	
5.07	Skilled	1	h	86.46	2.99	0.00	258.50	0.00	
5.08	Semiskilled	2	h	172.91	2.38	0.00	411.53	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	338.78	28,745.48	
Sub-total								15,851.61	117,778.20
Missing items and construction contingencies		%		1.50%			237.77	1,766.67	
Total Direct Costs								16,089.38	119,544.87
Overheads, risks and profit on cement and admixtures		%		25.00%			60.35	543.17	
Overhead, risks & profit on other costs		%		52.00%			6,927.45	62,347.03	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m³	2,328.42			9.91	78.35	
AGGREGATE UNIT PRICE			m³					88.26	

UNDERGROUND CONCRETE - MAINTENANCE GATE CHAMBER OF DIVERSION TUNNELS (ARCH)

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	26.88	2.55	18.52	68.60	497.92
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	168.00	0.00	1.34	0.00	224.78
	b) Grouted anchor bars	---	kg	210.00	0.00	0.84	0.00	176.40
	c) Formwork bond breaking compound	---	kg	3.36	0.00	3.23	0.00	10.85
	d) Motorcompressor, 5 m ³ /min.	Op.	h	1.34	0.08	11.32	0.11	15.21
		s.b.	h	0.27	0.00	2.99	0.00	0.80
	e) Immersion type vibrator, 77 mm dia.	Op.	h	4.03	0.01	1.46	0.04	5.89
		s.b.	h	0.81	0.00	0.42	0.00	0.34
	f) General foreman	---	h	0.25	0.00	47.25	0.00	11.79
	g) Gang foreman	---	h	2.49	6.60	0.00	16.47	0.00
	h) Skilled	---	h	24.95	2.77	0.00	69.11	0.00
	i) Semiskilled	---	h	53.93	2.77	0.00	149.38	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,773.52	1.33	10.22	2,360.56	18,130.69
	b) Portland cement, normal type	50%	t	319.23	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	319.23	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,276.93	0.00	1.44	0.00	1,838.79
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	290.39	0.33	41.12	95.83	11,940.85
		s.b.	h	58.08	0.00	13.62	0.00	791.02
	b) General foreman	----	h	3.19	0.00	47.25	0.00	150.93
	c) Gang foreman	----	h	31.94	6.60	0.00	210.82	0.00
	d) Transit mixer, operator	1	h	319.43	5.82	0.00	1,859.08	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	21.4%	----	----	970.32	7,042.71
3	Formworks							
3.01	Steel formworks excluding side closure, arch	---	m ²	85.56	0.00	936.00	0.00	80,084.16
3.02	Steel formworks excluding side closure, vertical	---	m ²	45.60	0.00	416.00	0.00	18,969.60
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,180.26	0.00	0.24	0.00	283.26
		s.b.	h	236.05	0.00	0.17	0.00	40.13
3.04	Truck for shifting the forms with aux. wheel, 15 t pay load	Op.	h	46.67	0.13	11.37	6.07	530.60
		s.b.	h	9.33	0.00	7.32	0.00	68.32
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.45	0.00	350.00	0.00	507.61
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	290.06	0.00	3.58	0.00	1,038.43
3.07	Formwork bond breaking compound	---	kg	59.89	0.00	3.23	0.00	193.45
3.08	General foreman	---	h	14.78	0.00	47.25	0.00	698.29
3.09	Gang foreman	1	h	147.79	6.60	0.00	975.39	0.00
3.10	Specialist	3	h	443.36	3.69	0.00	1,635.99	0.00
03:11	Skilled	2	h	295.57	2.99	0.00	883.76	0.00
03:12	Semiskilled	1	h	147.79	2.38	0.00	351.73	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	60.77	0.61	44.83	37.07	2,724.45
		s.b.	h	12.15	0.00	13.85	0.00	168.34
4.02	Motorcompressors, 15 m ³ /min (15.7 m ³ /min. consumption)	Op.	h	60.77	0.21	41.95	12.72	2,549.45
		s.b.	h	12.15	0.00	7.85	0.00	95.41
4.03	General foreman	---	h	6.69	0.00	47.25	0.00	315.87
4.04	Gang foreman	1	h	66.85	6.60	0.00	441.21	0.00
4.05	Concrete pump, operator	1	h	66.85	5.82	0.00	389.07	0.00
4.06	Concrete pump, helper	1	h	66.85	2.38	0.00	159.10	0.00
4.07	Skilled	1	h	66.85	2.99	0.00	199.88	0.00
4.08	Semiskilled	2	h	133.70	2.38	0.00	318.21	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	138.92	12,063.70
Sub-total							11,349.45	161,170.06
Missing items and construction contingencies				%	1.50%		170.24	2,417.55
Total Direct Costs							11,519.69	163,587.61
Overheads, risks and profit on cement and admixtures				%	25.00%		46.67	420.00
Overhead, risks & profit on other costs				%	52.00%		9,008.51	81,076.62
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m ³	1,800.40		11.43	136.13
AGGREGATE UNIT PRICE				m ³				147.56

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - POWERHOUSE, ARCH AND SHOULDERS OF ARCH

SEC 4-05
 ANA 001
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Concrete B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	7,190.00	1.33	10.22	9,569.89	73,503.37
1.02	Portland cement, normal type	50%	t	1,294.20	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	50%	t	1,294.20	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	5,176.80	0.00	1.44	0.00	7,454.59
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Concrete transport:							
2.01	Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
2.02	Transit mixer, 10 m3 nominal capacity	Op.	h	1,150.50	0.40	47.95	460.20	55,166.33
		s.b.	h	230.10	0.00	14.53	0.00	3,343.34
2.03	General foreman	---	h	12.66	0.00	47.25	0.00	597.97
2.04	Gang foreman	----	h	126.55	6.60	0.00	835.26	0.00
2.05	Transit mixer, operator	1	h	1,265.55	5.82	0.00	7,365.48	0.00
2.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
3	Concrete for overbreaks and losses	---	%	36.4%	----	----	6,634.72	50,973.88
4	Formworks							
3.01	Steel formworks exluding side closure, arch	---	m2	149.25	0.00	1,518.00	0.00	226,561.50
3.02	Steel formworks exluding side closure, vertical shoulders	0	m2	50.00	0.00	416.00	0.00	20,800.00
3.03	Pneumatic external vibrators, 14000 N type	Op.	h	8,922.97	0.00	0.31	0.00	2,766.12
		s.b.	h	1,784.59	0.00	0.21	0.00	374.76
3.04	Hydraulic jacking-system for shifting the forms	Op.	h	242.00	0.33	37.39	79.86	9,048.38
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	7.81	0.00	350.00	0.00	2,732.20
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	1,561.26	0.00	3.58	0.00	5,589.30
3.07	Formwork bond breaking compound	---	kg	328.35	0.00	3.23	0.00	1,060.57
3.08	General foreman	---	h	68.52	0.00	47.25	0.00	3,237.80
3.09	Gang foreman	1	h	685.25	6.60	0.00	4,522.64	0.00
3.10	Specialist	3	h	2,055.74	3.69	0.00	7,585.70	0.00
03:11	Skilled	5	h	3,426.24	2.99	0.00	10,244.46	0.00
03:12	Semiskilled	2	h	1,370.50	2.38	0.00	3,261.78	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	242.70	0.61	44.83	148.05	10,880.26
		s.b.	h	48.54	0.00	13.85	0.00	672.28
4.02	Motorcompressors, 30 m3/min (32.8 m3/min. consumption)	Op.	h	242.70	0.35	104.05	83.83	25,252.77
		s.b.	h	48.54	0.00	12.54	0.00	608.65
4.03	General foreman	---	h	26.70	0.00	47.25	0.00	1,261.44
4.04	Gang foreman	1	h	266.97	6.60	0.00	1,762.01	0.00
4.05	Concrete pump, operator	1	h	266.97	5.82	0.00	1,553.77	0.00
5.06	Concrete pump, helper	1	h	266.97	2.38	0.00	635.39	0.00
5.07	Skilled	1	h	266.97	2.99	0.00	798.24	0.00
5.08	Semiskilled	2	h	533.94	2.38	0.00	1,270.78	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	1,061.12	92,270.94
Sub-total							57,873.16	594,156.46
Missing items and construction contingencies		%		1.50%			868.10	8,912.35
Total Direct Costs							58,741.26	603,068.81
Overheads, risks and profit on cement and admixtures		%		25.00%			186.36	1,677.28
Overhead, risks & profit on other costs		%		52.00%			34,026.48	306,238.36
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m3	7,190.00			12.93	126.70
AGGREGATE UNIT PRICE			m3					139.63

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - COLLECTOR OF DRAFT TUBES OF UNITS 1-2-3, ARCH LINING

SEC 4-05
 ANA 003
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	105.58	2.56	19.64	270.13	2,073.32
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	293.28	0.00	1.34	0.00	392.41
	b) Grouted anchor bars	---	kg	366.60	0.00	0.84	0.00	307.94
	c) Formwork bond breaking compound	---	kg	8.80	0.00	3.23	0.00	28.42
	d) Motorcompressor, 5 m ³ /min.	Op.	h	5.28	0.08	11.32	0.42	59.76
		s.b.	h	1.06	0.00	2.99	0.00	3.16
	e) Immersion type vibrator, 77 mm dia.	Op.	h	15.84	0.01	1.46	0.16	23.12
		s.b.	h	3.17	0.00	0.42	0.00	1.33
	f) General foreman	---	h	0.44	0.00	47.25	0.00	20.58
	g) Gang foreman	---	h	4.36	6.60	0.00	28.74	0.00
	h) Skilled	---	h	43.55	2.77	0.00	120.64	0.00
	h) Semiskilled	---	h	102.94	2.77	0.00	285.15	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,130.68	1.33	10.22	2,835.93	21,781.93
	b) Portland cement, normal type	50%	t	383.52	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	383.52	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,534.09	0.00	1.44	0.00	2,209.09
2.02	Concrete transport:							
	a) Transit mixer, 10 m ³ nominal capacity	Op.	h	347.44	0.40	47.95	138.97	16,659.54
		s.b.	h	69.49	0.00	14.53	0.00	1,009.65
	b) General foreman	----	h	3.82	0.00	47.25	0.00	180.58
	c) Gang foreman	----	h	38.22	6.60	0.00	252.24	0.00
	d) Transit mixer, operator	1	h	382.18	5.82	0.00	2,224.28	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	39.2%	----	----	2,134.44	16,382.28
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ²	131.88	0.00	936.60	0.00	123,518.81
3.02	Side closure of formworks	0	m ²	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 14000 N type	Op.	h	5,878.59	0.01	0.31	58.79	1,822.36
		s.b.	h	1,175.72	0.00	0.21	0.00	246.90
3.04	Truck for shifting the forms with auxiliary wheels, 25 t pay	Op.	h	81.47	0.17	15.78	13.85	1,285.54
		s.b.	h	16.29	0.00	10.59	0.00	172.55
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	2.06	0.00	350.00	0.00	722.48
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	412.85	0.00	3.58	0.00	1,478.00
3.07	Formwork bond breaking compound	---	kg	161.16	0.00	3.23	0.00	520.54
3.08	General foreman	---	h	22.94	0.00	47.25	0.00	1,083.85
3.09	Gang foreman	1	h	229.39	6.60	0.00	1,513.94	0.00
3.10	Specialist	3	h	688.16	3.69	0.00	2,539.29	0.00
03:11	Skilled	3	h	688.16	2.99	0.00	2,057.59	0.00
03:12	Semiskilled	2	h	458.77	2.38	0.00	1,091.87	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	75.49	0.61	44.83	46.05	3,384.02
		s.b.	h	15.10	0.00	13.85	0.00	209.10
4.02	Motorcompressors, 25 m ³ /min (24.2 m ³ /min. consumption)	Op.	h	75.49	0.28	75.49	21.19	5,698.73
		s.b.	h	15.10	0.00	10.39	0.00	156.81
4.03	General foreman	---	h	8.30	0.00	47.25	0.00	392.34
4.04	Gang foreman	1	h	83.03	6.60	0.00	548.03	0.00
4.05	Concrete pump, operator	1	h	83.03	5.82	0.00	483.26	0.00
5.06	Concrete pump, helper	1	h	83.03	2.38	0.00	197.62	0.00
5.07	Skilled	1	h	83.03	2.99	0.00	248.27	0.00
5.08	Semiskilled	2	h	166.07	2.38	0.00	395.24	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	346.04	29,395.20
Sub-total							17,852.14	231,220.32
Missing items and construction contingencies							267.78	3,468.30
Total Direct Costs							18,119.92	234,688.62
Overheads, risks and profit on cement and admixtures							57.96	521.67
Overhead, risks & profit on other costs							13,025.48	117,229.32
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							13.95	157.60
AGGREGATE UNIT PRICE								171.56

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TRANSFORMER CHAMBER, ARCH

SEC 4-06
 ANA 001
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Concrete B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	3,262.00	1.33	10.22	4,341.72	33,347.43
1.02	Portland cement, normal type	50%	t	587.16	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	50%	t	587.16	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	2,348.64	0.00	1.44	0.00	3,382.04
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Concrete transport:							
2.01	Transit mixer, 8 m3 nominal capacity	Op.	h	0.00	0.33	41.12	0.00	0.00
		s.b.	h	0.00	0.00	13.62	0.00	0.00
2.02	Transit mixer, 10 m3 nominal capacity	Op.	h	475.59	0.40	47.95	190.24	22,804.60
		s.b.	h	95.12	0.00	14.53	0.00	1,382.07
2.03	General foreman	----	h	5.23	0.00	47.25	0.00	247.19
2.04	Gang foreman	----	h	52.32	6.60	0.00	345.28	0.00
2.05	Transit mixer, operator	1	h	523.15	5.82	0.00	3,044.74	0.00
2.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
3	Concrete for overbreak and losses	---	%	36.4%	----	----	2,883.03	22,259.08
4	Formworks							
3.01	Steel formworks exluding side closure	---	m2	115.00	0.00	1,315.60	0.00	151,294.00
3.02	Steel formworks exluding side closure, vertical shoulders	0	m2	10.00	0.00	416.00	0.00	4,160.00
3.03	Pneumatic external vibrators, 14000 N type	Op.	h	3,374.25	0.00	0.31	0.00	1,046.02
		s.b.	h	674.85	0.00	0.21	0.00	141.72
3.04	Hydraulic jacking-system for shifting the forms	Op.	h	219.56	0.33	37.39	72.45	8,209.35
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	3.54	0.00	350.00	0.00	1,239.56
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	708.32	0.00	3.58	0.00	2,535.79
3.07	Formwork bond breaking compound	---	kg	229.54	0.00	3.23	0.00	741.41
3.08	General foreman	---	h	45.41	0.00	47.25	0.00	2,145.64
3.09	Gang foreman	1	h	454.10	6.60	0.00	2,997.08	0.00
3.10	Specialist	3	h	1,362.31	3.69	0.00	5,026.93	0.00
03:11	Skilled	5	h	2,270.52	2.99	0.00	6,788.85	0.00
03:12	Semiskilled	2	h	908.21	2.38	0.00	2,161.53	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	110.11	0.61	44.83	67.17	4,936.22
		s.b.	h	22.02	0.00	13.85	0.00	305.00
4.02	Motorcompressors, 30 m3/min (25.3 m3/min. consumption)	Op.	h	110.11	0.28	83.84	30.64	9,231.13
		s.b.	h	22.02	0.00	10.10	0.00	222.49
4.03	General foreman	---	h	12.11	0.00	47.25	0.00	572.30
4.04	Gang foreman	1	h	121.12	6.60	0.00	799.40	0.00
4.05	Concrete pump, operator	1	h	121.12	5.82	0.00	704.92	0.00
4.06	Concrete pump, helper	1	h	121.12	2.38	0.00	288.27	0.00
4.07	Skilled	1	h	121.12	2.99	0.00	362.15	0.00
4.08	Semiskilled	2	h	242.24	2.38	0.00	576.53	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	445.27	38,719.29
Sub-total							31,126.20	308,922.32
Missing items and construction contingencies		%		1.50%			466.89	4,633.83
Total Direct Costs							31,593.10	313,556.16
Overheads, risks and profit on cement and admixtures		%		25.00%			84.55	760.96
Overhead, risks & profit on other costs		%		52.00%			17,771.90	159,947.06
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m3	3,262			15.16	145.39
AGGREGATE UNIT PRICE			m3					160.55

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - CABLE TUNNEL 1, ARCH AND SIDEWALLS**

**SEC 4-06
ANA 003
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	199.49	3.62	19.94	722.99	3,977.53
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,246.82	0.00	0.89	0.00	1,112.66
	b) Grouted anchor bars	---	kg	1,558.53	0.00	0.84	0.00	1,309.16
	c) Formwork bond breaking compound	---	kg	24.94	0.00	3.23	0.00	80.54
	d) Motorcompressor, 5 m ³ /min.	Op.	h	9.97	0.08	11.32	0.80	112.91
		s.b.	h	1.99	0.00	2.99	0.00	5.96
	e) Immersion type vibrator, 77 mm dia.	Op.	h	29.92	0.01	1.46	0.30	43.69
		s.b.	h	5.98	0.00	0.42	0.00	2.51
	f) General foreman	---	h	1.48	0.00	47.25	0.00	69.99
	g) Gang foreman	---	h	14.81	6.60	0.00	97.76	0.00
	h) Skilled	---	h	148.12	2.77	0.00	410.30	0.00
	i) Semiskilled	---	h	336.14	2.77	0.00	931.12	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	8,742.10	1.33	10.22	11,635.73	89,370.45
	b) Portland cement, normal type	50%	t	1,573.58	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,573.58	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	6,294.31	0.00	1.44	0.00	9,063.81
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	2,706.15	0.28	25.38	757.72	68,682.01
		s.b.	h	541.23	0.00	10.68	0.00	5,780.33
	b) General foreman	----	h	29.77	0.00	47.25	0.00	1,406.52
	c) Gang foreman	----	h	297.68	6.60	0.00	1,964.66	0.00
	d) Transit mixer, operator	1	h	2,976.76	5.82	0.00	17,324.75	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	27.4%	----	----	8,691.88	47,818.31
3	Formworks							
3.01	Steel formworks	---	m ³	8,742.10	0.00	13.00	0.00	113,647.25
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.83	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	23,145.36	0.00	0.24	0.00	5,554.89
		s.b.	h	4,629.07	0.00	0.17	0.00	786.94
3.04	Truck for shifting the forms, 15 t pay load	Op.	h	317.48	0.13	11.37	41.27	3,609.72
		s.b.	h	63.50	0.00	7.32	0.00	464.79
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	5.04	0.00	350.00	0.00	1,763.68
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	1,007.82	0.00	3.58	0.00	3,607.98
3.07	Formwork bond breaking compound	---	kg	697.60	0.00	3.23	0.00	2,253.23
3.08	General foreman	---	h	59.43	0.00	47.25	0.00	2,808.22
3.09	Gang foreman	1	h	594.33	6.60	0.00	3,922.60	0.00
3.10	Specialist	2	h	1,188.67	3.69	0.00	4,386.18	0.00
03:11	Skilled	2	h	1,188.67	2.99	0.00	3,554.11	0.00
03:12	Semiskilled	1	h	594.33	2.38	0.00	1,414.51	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	507.32	0.45	30.85	228.30	15,650.95
		s.b.	h	101.46	0.00	13.69	0.00	1,389.05
4.02	Motorcompressors, 30 m ³ /min (40.6 m ³ /min. consumption)	Op.	h	507.32	0.45	134.53	226.57	68,252.78
		s.b.	h	101.46	0.00	16.21	0.00	1,645.04
4.03	General foreman	---	h	55.81	0.00	47.25	0.00	2,636.82
4.04	Gang foreman	1	h	558.06	6.60	0.00	3,683.17	0.00
4.05	Concrete pump, operator	1	h	558.06	5.82	0.00	3,247.89	0.00
4.06	Concrete pump, helper	1	h	558.06	2.38	0.00	1,328.17	0.00
4.07	Skilled	1	h	558.06	2.99	0.00	1,668.59	0.00
4.08	Semiskilled	2	h	1,116.11	2.38	0.00	2,656.35	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	1,057.63	89,225.68
Sub-total							69,953.34	542,133.41
Missing items and construction contingencies							% 1.50%	1,049.30 8,132.00
Total Direct Costs							71,002.64	550,265.41
Overheads, risks and profit on cement and admixtures							% 25.00%	231.77 2,085.89
Overhead, risks & profit on other costs							% 52.00%	31,823.87 286,414.79
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m3 8,941.59	11.53 93.81
AGGREGATE UNIT PRICE							m3	105.33

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - CABLE TUNNEL 2, ARCH AND SIDEWALLS

SEC 4-06
 ANA 004
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	129.44	3.71	20.25	479.89	2,621.60
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	809.00	0.00	0.89	0.00	721.95
	b) Grouted anchor bars	---	kg	1,011.25	0.00	0.84	0.00	849.45
	c) Formwork bond breaking compound	---	kg	16.18	0.00	3.23	0.00	52.26
	d) Motorcompressor, 5 m ³ /min.	Op.	h	6.47	0.08	11.32	0.52	73.26
		s.b.	h	1.29	0.00	2.99	0.00	3.87
	e) Immersion type vibrator, 77 mm dia.	Op.	h	19.42	0.01	1.46	0.19	28.35
		s.b.	h	3.88	0.00	0.42	0.00	1.63
	f) General foreman	---	h	0.96	0.00	47.25	0.00	45.41
	g) Gang foreman	---	h	9.61	6.60	0.00	63.43	0.00
	h) Skilled	---	h	96.11	2.77	0.00	266.22	0.00
	i) Semiskilled	---	h	218.11	2.77	0.00	604.15	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	5,480.27	1.33	10.22	7,294.24	56,024.80
	b) Portland cement, normal type	50%	t	986.45	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	986.45	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	3,945.79	0.00	1.44	0.00	5,681.94
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	1,758.02	0.28	25.38	492.24	44,618.43
		s.b.	h	351.60	0.00	10.68	0.00	3,755.12
	b) General foreman	----	h	19.34	0.00	47.25	0.00	913.73
	c) Gang foreman	----	h	193.38	6.60	0.00	1,276.32	0.00
	d) Transit mixer, operator	1	h	1,933.82	5.82	0.00	11,254.81	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	32.0%	----	----	6,492.80	35,469.80
3	Formworks							
3.01	Steel formworks	---	m ³	5,480.27	0.00	13.00	0.00	71,243.51
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.96	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	15,256.57	0.00	0.24	0.00	3,661.58
		s.b.	h	3,051.31	0.00	0.17	0.00	518.72
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	206.00	0.09	7.91	18.54	1,629.42
		s.b.	h	41.20	0.00	5.13	0.00	211.35
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	3.27	0.00	350.00	0.00	1,145.75
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	654.72	0.00	3.58	0.00	2,343.88
3.07	Formwork bond breaking compound	---	kg	459.31	0.00	3.23	0.00	1,483.57
3.08	General foreman	---	h	41.75	0.00	47.25	0.00	1,972.46
3.09	Gang foreman	1	h	417.45	6.60	0.00	2,755.18	0.00
3.10	Specialist	2	h	834.90	3.69	0.00	3,080.80	0.00
03:11	Skilled	2	h	834.90	2.99	0.00	2,496.36	0.00
03:12	Semiskilled	1	h	417.45	2.38	0.00	993.54	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	318.28	0.45	30.85	143.23	9,818.98
		s.b.	h	63.66	0.00	13.69	0.00	871.45
4.02	Motorcompressors, 30 m ³ /min (41.2 m ³ /min. consumption)	Op.	h	318.28	0.45	136.52	144.25	43,452.76
		s.b.	h	63.66	0.00	16.45	0.00	1,047.31
4.03	General foreman	---	h	35.01	0.00	47.25	0.00	1,654.27
4.04	Gang foreman	1	h	350.11	6.60	0.00	2,310.72	0.00
4.05	Concrete pump, operator	1	h	350.11	5.82	0.00	2,037.64	0.00
4.06	Concrete pump, helper	1	h	350.11	2.38	0.00	833.26	0.00
4.07	Skilled	1	h	350.11	2.99	0.00	1,046.83	0.00
4.08	Semiskilled	2	h	700.22	2.38	0.00	1,666.52	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	714.79	60,233.24
Sub-total							46,466.48	352,149.87
Missing items and construction contingencies							% 1.50% 697.00	5,282.25
Total Direct Costs							47,163.47	357,432.11
Overheads, risks and profit on cement and admixtures							% 25.00% 145.40	1,308.63
Overhead, risks & profit on other costs							% 52.00% 20,736.53	186,628.78
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m³ 5,610	12.13 97.22
AGGREGATE UNIT PRICE							m³	109.35

UNDERGROUND CONCRETE - CABLE TUNNEL 1&2 (COMMON STRETCH), ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	35.20	3.28	20.56	115.44	723.60
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	220.00	0.00	0.89	0.00	196.33
	b) Grouted anchor bars	---	kg	275.00	0.00	0.84	0.00	231.00
	c) Formwork bond breaking compound	---	kg	4.40	0.00	3.23	0.00	14.21
	d) Motorcompressor, 5 m ³ /min.	Op.	h	1.76	0.08	11.32	0.14	19.92
		s.b.	h	0.35	0.00	2.99	0.00	1.05
	e) Immersion type vibrator, 77 mm dia.	Op.	h	5.28	0.01	1.46	0.05	7.71
		s.b.	h	1.06	0.00	0.42	0.00	0.44
	f) General foreman	---	h	0.26	0.00	47.25	0.00	12.35
	g) Gang foreman	---	h	2.61	6.60	0.00	17.25	0.00
	h) Skilled	---	h	26.14	2.77	0.00	72.40	0.00
	i) Semiskilled	---	h	59.31	2.77	0.00	164.29	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,999.31	1.33	10.22	2,661.08	20,438.95
	b) Portland cement, normal type	50%	t	259.87	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	259.87	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,439.50	0.00	1.44	0.00	2,072.88
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	0.00	0.28	25.38	0.00	0.00
		s.b.	h	0.00	0.00	10.68	0.00	0.00
	b) General foreman	----	h	5.79	0.00	47.25	0.00	273.68
	c) Gang foreman	----	h	57.92	6.60	0.00	382.29	0.00
	d) Transit mixer, operator	1	h	579.22	5.82	0.00	3,371.07	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	2,668.54	16,727.47
3	Formworks							
3.01	Steel formworks	---	m ³	1,999.31	0.00	12.13	0.00	24,258.29
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.77	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	5,405.84	0.00	0.24	0.00	1,297.40
		s.b.	h	1,081.17	0.00	0.17	0.00	183.80
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	56.02	0.09	7.91	5.04	443.11
		s.b.	h	11.20	0.00	5.13	0.00	57.48
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.27	0.00	350.00	0.00	443.07
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	253.18	0.00	3.58	0.00	906.40
3.07	Formwork bond breaking compound	---	kg	116.77	0.00	3.23	0.00	377.15
3.08	General foreman	---	h	10.28	0.00	47.25	0.00	485.86
3.09	Gang foreman	1	h	102.83	6.60	0.00	678.66	0.00
3.10	Specialist	2	h	205.65	3.69	0.00	758.86	0.00
03:11	Skilled	2	h	205.65	2.99	0.00	614.90	0.00
03:12	Semiskilled	1	h	102.83	2.38	0.00	244.73	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	115.43	0.45	30.85	51.94	3,561.11
		s.b.	h	23.09	0.00	13.69	0.00	316.06
4.02	Motorcompressors, 30 m ³ /min (38.5 m ³ /min. consumption)	Op.	h	115.43	0.42	127.58	48.89	14,726.52
		s.b.	h	23.09	0.00	15.37	0.00	354.94
4.03	General foreman	---	h	12.70	0.00	47.25	0.00	599.96
4.04	Gang foreman	1	h	126.98	6.60	0.00	838.04	0.00
4.05	Concrete pump, operator	1	h	126.98	5.82	0.00	739.00	0.00
5.06	Concrete pump, helper	1	h	126.98	2.38	0.00	302.20	0.00
5.07	Skilled	1	h	126.98	2.99	0.00	379.66	0.00
5.08	Semiskilled	2	h	253.95	2.38	0.00	604.41	0.00
5	General Services							
5.01	Ventilation, lighting & other general services (from excav.)	---	day	12.72	18.12	1,528.67	230.40	19,437.46
Sub-total							15,091.46	126,482.14
Missing items and construction contingencies		%		1.50%			226.37	1,897.23
Total Direct Costs							15,317.84	128,379.37
Overheads, risks and profit on cement and admixtures		%		25.00%			52.73	474.61
Overhead, risks & profit on other costs		%		52.00%			7,362.57	66,263.10
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m³	2,034.51			11.17	95.90
AGGREGATE UNIT PRICE			m³					107.08

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - DAM CURTAIN GALLERY 1, ARCH AND SIDEWALLS

SEC 4-07
 ANA 001
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	75.06	3.58	19.78	268.85	1,484.50
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	469.10	0.00	0.89	0.00	418.62
	b) Grouted anchor bars	---	kg	586.38	0.00	0.84	0.00	492.56
	c) Formwork bond breaking compound	---	kg	9.38	0.00	3.23	0.00	30.30
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.75	0.08	11.32	0.30	42.48
		s.b.	h	0.75	0.00	2.99	0.00	2.24
	e) Immersion type vibrator, 77 mm dia.	Op.	h	11.26	0.01	1.46	0.11	16.44
		s.b.	h	2.25	0.00	0.42	0.00	0.95
	f) General foreman	---	h	0.56	0.00	47.25	0.00	26.33
	g) Gang foreman	---	h	5.57	6.60	0.00	36.78	0.00
	h) Skilled	---	h	55.73	2.77	0.00	154.37	0.00
	i) Semiskilled	---	h	126.47	2.77	0.00	350.32	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,104.17	1.33	10.22	1,469.66	11,287.97
	b) Portland cement, normal type	50%	t	198.75	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	198.75	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	795.01	0.00	1.44	0.00	1,144.81
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	335.51	0.28	25.38	93.94	8,515.18
		s.b.	h	67.10	0.00	10.68	0.00	716.64
	b) General foreman	----	h	3.69	0.00	47.25	0.00	174.38
	dc Gang foreman	----	h	36.91	6.60	0.00	243.58	0.00
	d) Transit mixer, operator	1	h	369.06	5.82	0.00	2,147.92	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	1,609.72	8,888.47
3	Formworks							
3.01	Steel formworks	---	m ³	1,104.17	0.00	13.00	0.00	14,354.26
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.96	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,508.47	0.00	0.24	0.00	602.03
		s.b.	h	501.69	0.00	0.17	0.00	85.29
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	119.45	0.09	7.91	10.75	944.82
		s.b.	h	23.89	0.00	5.13	0.00	122.55
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.73	0.00	350.00	0.00	256.81
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	146.75	0.00	3.58	0.00	525.36
3.07	Formwork bond breaking compound	---	kg	176.62	0.00	3.23	0.00	570.47
3.08	General foreman	---	h	20.73	0.00	47.25	0.00	979.47
3.09	Gang foreman	1	h	207.30	6.60	0.00	1,368.15	0.00
3.10	Specialist	2	h	414.59	3.69	0.00	1,529.84	0.00
03:11	Skilled	2	h	414.59	2.99	0.00	1,239.63	0.00
03:12	Semiskilled	1	h	207.30	2.38	0.00	493.36	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	66.91	0.45	30.85	30.11	2,064.07
		s.b.	h	13.38	0.00	13.69	0.00	183.19
4.02	Motorcompressors, 30 m ³ /min (27.3 m ³ /min. consumption)	Op.	h	66.91	0.30	90.46	20.09	6,052.58
		s.b.	h	13.38	0.00	10.90	0.00	145.88
4.03	General foreman	---	h	7.36	0.00	47.25	0.00	347.75
4.04	Gang foreman	1	h	73.60	6.60	0.00	485.74	0.00
4.05	Concrete pump, operator	1	h	73.60	5.82	0.00	428.34	0.00
5.06	Concrete pump, helper	1	h	73.60	2.38	0.00	175.16	0.00
5.07	Skilled	1	h	73.60	2.99	0.00	220.06	0.00
5.08	Semiskilled	2	h	147.19	2.38	0.00	350.32	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	207.25	16,939.74
Sub-total							12,934.35	77,416.16
Missing items and construction contingencies							194.02	1,161.24
Total Direct Costs							13,128.37	78,577.40
Overheads, risks and profit on cement and admixtures							30.57	275.09
Overhead, risks & profit on other costs							4,705.12	42,346.11
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							15.15	102.78
AGGREGATE UNIT PRICE							117.93	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - DAM CURTAIN GALLERY 2, ARCH AND SIDEWALLS

SEC 4-07
 ANA 002
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	61.43	3.54	19.62	217.38	1,204.91
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	383.92	0.00	0.89	0.00	342.61
	b) Grouted anchor bars	---	kg	479.90	0.00	0.84	0.00	403.12
	c) Formwork bond breaking compound	---	kg	7.68	0.00	3.23	0.00	24.80
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.07	0.08	11.32	0.25	34.77
		s.b.	h	0.61	0.00	2.99	0.00	1.84
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.21	0.01	1.46	0.09	13.45
		s.b.	h	1.84	0.00	0.42	0.00	0.77
	f) General foreman	---	h	0.46	0.00	47.25	0.00	21.55
	g) Gang foreman	---	h	4.56	6.60	0.00	30.10	0.00
	h) Skilled	---	h	45.61	2.77	0.00	126.34	0.00
	i) Semiskilled	---	h	103.50	2.77	0.00	286.71	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,228.54	1.33	10.22	1,635.19	12,559.39
	b) Portland cement, normal type	50%	t	221.14	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	221.14	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	884.55	0.00	1.44	0.00	1,273.75
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	366.14	0.28	25.38	102.52	9,292.72
		s.b.	h	73.23	0.00	10.68	0.00	782.08
	b) General foreman	---	h	4.03	0.00	47.25	0.00	190.30
	c) Gang foreman	---	h	40.28	6.60	0.00	265.82	0.00
	d) Transit mixer, operator	1	h	402.76	5.82	0.00	2,344.05	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	---	---	1,769.47	9,807.99
3	Formworks							
3.01	Steel formworks	---	m ³	1,228.54	0.00	13.28	0.00	16,310.87
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.98	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,635.91	0.00	0.24	0.00	632.62
		s.b.	h	527.18	0.00	0.17	0.00	89.62
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	97.76	0.09	7.91	8.80	773.26
		s.b.	h	19.55	0.00	5.13	0.00	100.30
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.80	0.00	350.00	0.00	280.93
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	160.53	0.00	3.58	0.00	574.70
3.07	Formwork bond breaking compound	---	kg	144.55	0.00	3.23	0.00	466.88
3.08	General foreman	---	h	16.97	0.00	47.25	0.00	801.62
3.09	Gang foreman	1	h	169.65	6.60	0.00	1,119.72	0.00
3.10	Specialist	2	h	339.31	3.69	0.00	1,252.05	0.00
03:11	Skilled	2	h	339.31	2.99	0.00	1,014.53	0.00
03:12	Semiskilled	1	h	169.65	2.38	0.00	403.78	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	73.19	0.45	30.85	32.94	2,257.90
		s.b.	h	14.64	0.00	13.69	0.00	200.39
4.02	Motorcompressors, 30 m ³ /min (27.3 m ³ /min. consumption)	Op.	h	73.19	0.30	90.46	21.98	6,620.98
		s.b.	h	14.64	0.00	10.90	0.00	159.58
4.03	General foreman	---	h	8.05	0.00	47.25	0.00	380.40
4.04	Gang foreman	1	h	80.51	6.60	0.00	531.36	0.00
4.05	Concrete pump, operator	1	h	80.51	5.82	0.00	468.56	0.00
4.06	Concrete pump, helper	1	h	80.51	2.38	0.00	191.61	0.00
4.07	Skilled	1	h	80.51	2.99	0.00	240.72	0.00
4.08	Semiskilled	2	h	161.02	2.38	0.00	383.22	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	184.37	15,120.70
Sub-total							12,631.55	80,724.81
Missing items and construction contingencies		%		1.50%			189.47	1,210.87
Total Direct Costs							12,821.03	81,935.69
Overheads, risks and profit on cement and admixtures		%		25.00%			33.44	300.92
Overhead, risks & profit on other costs		%		52.00%			4,857.80	43,720.22
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m³	1,290			13.73	97.64
AGGREGATE UNIT PRICE			m³					111.37

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - DAM CURTAIN GALLERY, JOINT LEFT-RIGHT BANKS (FULL RING)

SEC 4-07
 ANA 004
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	44.50	0.06	7.75	2.67	344.87	
		s.b.	h	11.12	0.00	5.08	0.00	56.51	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	11.70	0.27	23.93	3.16	280.08	
		s.b.	h	2.34	0.00	12.03	0.00	28.16	
1.03	Hand-held breaker, medium weight type	Op.	h	54.42	0.04	2.03	2.18	110.48	
		s.b.	h	10.88	0.00	1.21	0.00	13.17	
1.04	Hand held breaker tool,moil point type	----	ea.	0.54	0.00	32.37	0.00	17.62	
1.05	Breaker tool resharpeners	----	h	1.63	0.01	1.57	0.02	2.56	
1.06	General foreman	----	h	1.36	0.00	47.25	0.00	64.29	
1.07	Gang foreman	1	h	13.61	6.60	0.00	89.80	0.00	
1.08	Dumper driver and backhoe operator	1	h	61.82	5.82	0.00	359.82	0.00	
1.09	Skilled	2	h	27.21	2.99	0.00	81.36	0.00	
1.10	Semiskilled	2	h	27.21	2.38	0.00	64.76	0.00	
1.11	Unskilled	4	h	54.42	1.77	0.00	96.33	0.00	
2	Concrete Class B2-25/37 (Supply and Transport)								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	12,048.81	1.33	10.22	16,036.97	123,174.98	
	b) Portland cement, normal type	50%	t	2,168.79	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	50%	t	2,168.79	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	0	kg	0.00	0.00	1.44	0.00	0.00	
	e) Concrete admixture, superplasticizer	1	kg	17,350.29	0.00	1.97	0.00	34,180.06	
2.02	Concrete transport:								
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	1,761.49	0.33	41.12	581.29	72,432.50	
		s.b.	h	352.30	0.00	13.62	0.00	4,798.30	
	b) General foreman	----	h	19.38	0.00	47.25	0.00	915.53	
	c) Gang foreman	----	h	193.76	6.60	0.00	1,278.84	0.00	
	d) Transit mixer, operator	1	h	1,937.64	5.82	0.00	11,277.06	0.00	
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
2.03	Concrete for overbreaks and losses	---	%	14.7%	----	----	4,291.77	34,644.26	
3	Formworks								
3.01	Steel formworks excluding side closure	---	m2	18.66	0.00	644.80	0.00	12,031.54	
3.02	Side closure of formworks	0	m2	0.00	0.00	416.00	0.00	0.00	
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	73.88	0.00	0.24	0.00	17.73	
		s.b.	h	14.78	0.00	0.17	0.00	2.51	
3.04	Traveller on rail for shifting the forms	---	ea.	0.39	0.00	43,600	0.00	17,200.20	
3.05	Traveller on rail for shifting the forms from Ø 5 to 8 m	---	ea.	0.00	0.00	0.00	0.00	0.00	
3.06	Timber for side closure of formwork (construction joint)	1	m3	30.56	0.00	350.00	0.00	10,695.05	
3.07	Ribbed sheet for side closure of formwork (const. joint)	0	m2	0.00	0.00	3.58	0.00	0.00	
3.08	Formwork bond breaking compound	---	kg	146.23	0.00	3.23	0.00	472.33	
3.09	General foreman	---	h	38.32	0.00	47.25	0.00	1,810.41	
3.10	Gang foreman	1	h	383.16	6.60	0.00	2,528.82	0.00	
03:11	Specialist	3	h	1,149.47	3.69	0.00	4,241.53	0.00	
03:12	Skilled	4	h	1,532.62	2.99	0.00	4,582.54	0.00	
03:13	Semiskilled	4	h	1,532.62	2.38	0.00	3,647.64	0.00	
4	Concrete Placing								
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	406.71	0.61	44.83	248.09	18,232.85	
		s.b.	h	81.34	0.00	13.85	0.00	1,126.59	
4.02	Motorcompressors, 20 m3/min (19.5 m3/min. consumption)	Op.	h	406.71	0.24	56.41	99.14	22,943.98	
		s.b.	h	81.34	0.00	9.03	0.00	734.40	
4.03	General foreman	---	h	44.74	0.00	47.25	0.00	2,113.88	
4.04	Gang foreman	1	h	447.38	6.60	0.00	2,952.72	0.00	
4.05	Concrete pump, operator	1	h	447.38	5.82	0.00	2,603.76	0.00	
4.06	Concrete pump, helper	1	h	447.38	2.38	0.00	1,064.77	0.00	
4.07	Skilled	1	h	447.38	2.99	0.00	1,337.67	0.00	
4.08	Semiskilled	2	h	894.76	2.38	0.00	2,129.54	0.00	
5	General Services								
5.01	Ventilation, lighting & other general services	---	---	---	---	---	184.26	16,669.53	
Sub-total							59,786.51	375,114.40	
Missing items and construction contingencies			%	1.50%	----->>		896.80	5,626.72	
Total Direct Costs							60,683.31	380,741.12	
Overheads, risks and profit on cement and admixtures			%	25.00%	----->>		857.66	7,718.92	
Overhead, risks & profit on other costs			%	52.00%	----->>		21,170.14	190,531.28	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	12,048.81	----->>		6.86	48.05
AGGREGATE UNIT PRICE				m3	----->>			54.92	

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - COMBINED SALINE AND DAM CURTAIN GROUTING (FULL RING)

SEC 4-07
 ANA 005
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	44.50	0.06	7.75	2.67	344.87
		s.b.	h	11.12	0.00	5.08	0.00	56.51
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	11.70	0.27	23.93	3.16	280.08
		s.b.	h	2.34	0.00	12.03	0.00	28.16
1.03	Hand-held breaker, medium weight type	Op.	h	54.42	0.04	2.03	2.18	110.48
		s.b.	h	10.88	0.00	1.21	0.00	13.17
1.04	Hand held breaker tool,moil point type	----	ea.	0.54	0.00	32.37	0.00	17.62
1.05	Breaker tool resharpeners	----	h	1.63	0.01	1.57	0.02	2.56
1.06	General foreman	----	h	1.36	0.00	47.25	0.00	64.29
1.07	Gang foreman	1	h	13.61	6.60	0.00	89.80	0.00
1.08	Dumper driver and backhoe operator	1	h	61.82	5.82	0.00	359.82	0.00
1.09	Skilled	2	h	27.21	2.99	0.00	81.36	0.00
1.10	Semiskilled	2	h	27.21	2.38	0.00	64.76	0.00
1.11	Unskilled	4	h	54.42	1.77	0.00	96.33	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	16,690.62	1.33	10.22	22,215.22	170,628.21
	b) Portland cement, normal type	50%	t	3,004.31	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	3,004.31	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	0	kg	0.00	0.00	1.44	0.00	0.00
	e) Concrete admixture, superplasticizer	1	kg	24,034.49	0.00	1.97	0.00	47,347.95
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	2,210.26	0.33	41.12	729.39	90,885.84
		s.b.	h	442.05	0.00	13.62	0.00	6,020.74
	b) General foreman	----	h	24.31	0.00	47.25	0.00	1,148.78
	c) Gang foreman	----	h	243.13	6.60	0.00	1,604.65	0.00
	d) Transit mixer, operator	1	h	2,431.28	5.82	0.00	14,150.08	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	10.8%	----	----	4,163.54	34,000.84
3	Formworks							
3.01	Steel formworks excluding side closure	---	m2	39.83	0.00	644.80	0.00	25,679.16
3.02	Side closure of formworks	0	m2	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	157.77	0.00	0.24	0.00	37.86
		s.b.	h	31.55	0.00	0.17	0.00	5.36
3.04	Traveller on rail for shifting the forms	---	ea.	0.39	0.00	43,600	0.00	17,200.20
3.05	Traveller on rail for shifting the forms from Ø 5 to 8 m	---	ea.	0.00	0.00	0.00	0.00	0.00
3.06	Timber for side closure of formwork (construction joint)	1	m3	65.25	0.00	350.00	0.00	22,839.02
3.07	Ribbed sheet for side closure of formwork (const. joint)	0	m2	0.00	0.00	3.58	0.00	0.00
3.08	Formwork bond breaking compound	---	kg	312.28	0.00	3.23	0.00	1,008.65
3.09	General foreman	---	h	81.82	0.00	47.25	0.00	3,866.09
3.10	Gang foreman	1	h	818.22	6.60	0.00	5,400.25	0.00
03:11	Specialist	3	h	2,454.66	3.69	0.00	9,057.69	0.00
03:12	Skilled	4	h	3,272.88	2.99	0.00	9,785.90	0.00
03:13	Semiskilled	4	h	3,272.88	2.38	0.00	7,789.45	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	563.40	0.61	44.83	343.67	25,257.06
		s.b.	h	112.68	0.00	13.85	0.00	1,560.61
4.02	Motorcompressors, 20 m3/min (19.5 m3/min. consumption)	Op.	h	563.40	0.24	56.41	137.33	31,783.17
		s.b.	h	112.68	0.00	9.03	0.00	1,017.32
4.03	General foreman	---	h	61.97	0.00	47.25	0.00	2,928.25
4.04	Gang foreman	1	h	619.74	6.60	0.00	4,090.26	0.00
4.05	Concrete pump, operator	1	h	619.74	5.82	0.00	3,606.86	0.00
4.06	Concrete pump, helper	1	h	619.74	2.38	0.00	1,474.97	0.00
4.07	Skilled	1	h	619.74	2.99	0.00	1,853.01	0.00
4.08	Semiskilled	2	h	1,239.47	2.38	0.00	2,949.94	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	579.78	49,752.69
Sub-total							90,632.07	533,885.56
Missing items and construction contingencies							1,359.48	8,008.28
Total Direct Costs							91,991.55	541,893.84
Overheads, risks and profit on cement and admixtures							1,186.85	10,681.69
Overhead, risks & profit on other costs							30,493.38	274,440.44
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							7.41	49.55
AGGREGATE UNIT PRICE								56.96

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - DAM CURTAIN GROUTING, ACTIVE STRETCH (FULL RING LINING)

SEC 4-07
 ANA 006
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	58.61	0.06	7.75	3.52	454.20
		s.b.	h	14.65	0.00	5.08	0.00	74.43
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	15.35	0.27	23.93	4.14	367.35
		s.b.	h	3.07	0.00	12.03	0.00	36.93
1.03	Hand-held breaker, medium weight type	Op.	h	71.38	0.04	2.03	2.86	144.90
		s.b.	h	14.28	0.00	1.21	0.00	17.27
1.04	Hand held breaker tool,moil point type	----	ea.	0.71	0.00	32.37	0.00	23.11
1.05	Breaker tool resharpeners	----	h	2.14	0.01	1.57	0.02	3.36
1.06	General foreman	----	h	1.78	0.00	47.25	0.00	84.32
1.07	Gang foreman	1	h	17.85	6.60	0.00	117.78	0.00
1.08	Dumper driver and backhoe operator	1	h	81.35	5.82	0.00	473.48	0.00
1.09	Skilled	2	h	35.69	2.99	0.00	106.72	0.00
1.10	Semiskilled	2	h	35.69	2.38	0.00	84.94	0.00
1.11	Unskilled	4	h	71.38	1.77	0.00	126.35	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	10,085.73	1.33	10.22	13,424.11	103,106.42
	b) Portland cement, normal type	50%	t	1,815.44	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,815.44	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	0	kg	0.00	0.00	1.44	0.00	0.00
	e) Concrete admixture, superplasticizer	1	kg	14,523.45	0.00	1.97	0.00	28,611.20
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	1,291.06	0.33	41.12	426.05	53,088.19
		s.b.	h	258.21	0.00	13.62	0.00	3,516.83
	b) General foreman	----	h	14.20	0.00	47.25	0.00	671.03
	c) Gang foreman	----	h	142.02	6.60	0.00	937.31	0.00
	d) Transit mixer, operator	1	h	1,420.16	5.82	0.00	8,265.34	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	20.2%	----	----	4,646.94	38,096.97
3	Formworks							
3.01	Steel formworks excluding side closure	---	m2	23.71	0.00	644.80	0.00	15,286.36
3.02	Side closure of formworks	0	m2	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	58.24	0.00	0.24	0.00	13.98
		s.b.	h	11.65	0.00	0.17	0.00	1.98
3.04	Traveller on rail for shifting the forms	---	ea.	0.36	0.00	43,600	0.00	15,617.52
3.05	Timber for side closure of formwork (construction joint)	1	m3	22.91	0.00	350.00	0.00	8,019.31
3.06	Ribbed sheet for side closure of formwork (const. joint)	0	m2	0.00	0.00	3.58	0.00	0.00
3.07	Formwork bond breaking compound	---	kg	186.32	0.00	3.23	0.00	601.80
3.08	General foreman	---	h	43.01	0.00	47.25	0.00	2,032.34
3.09	Gang foreman	1	h	430.13	6.60	0.00	2,838.83	0.00
3.10	Specialist	3	h	1,290.38	3.69	0.00	4,761.49	0.00
03:11	Skilled	4	h	1,720.50	2.99	0.00	5,144.30	0.00
03:12	Semiskilled	4	h	1,720.50	2.38	0.00	4,094.80	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	340.45	0.61	44.83	207.67	15,262.22
		s.b.	h	68.09	0.00	13.85	0.00	943.04
4.02	Motorcompressors, 20 m3/min (19.5 m3/min. consumption)	Op.	h	340.45	0.24	56.41	82.98	19,205.78
		s.b.	h	68.09	0.00	9.03	0.00	614.74
4.03	General foreman	---	h	37.45	0.00	47.25	0.00	1,769.47
4.04	Gang foreman	1	h	374.49	6.60	0.00	2,471.64	0.00
4.05	Concrete pump, operator	1	h	374.49	5.82	0.00	2,179.54	0.00
4.06	Concrete pump, helper	1	h	374.49	2.38	0.00	891.29	0.00
4.07	Skilled	1	h	374.49	2.99	0.00	1,119.73	0.00
4.08	Semiskilled	2	h	748.98	2.38	0.00	1,782.58	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	184.98	16,645.54
Sub-total							54,379.37	324,310.61
Missing items and construction contingencies							815.69	4,864.66
Total Direct Costs							55,195.07	329,175.27
Overheads, risks and profit on cement and admixtures							719.44	6,474.93
Overhead, risks & profit on other costs							18,490.83	166,417.47
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							7.38	49.78
AGGREGATE UNIT PRICE								57.16

UNDERGROUND CONCRETE - LOW LEVEL DRAINAGE GALLERY OF POWERHOUSE, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	253.97	4.11	21.77	1,043.23	5,528.45
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	1,587.30	0.00	0.89	0.00	1,416.51
	b) Grouted anchor bars	---	kg	1,984.13	0.00	0.84	0.00	1,666.67
	c) Formwork bond breaking compound	---	kg	31.75	0.00	3.23	0.00	102.54
	d) Motorcompressor, 5 m ³ /min.	Op.	h	12.70	0.08	11.32	1.02	143.75
		s.b.	h	2.54	0.00	2.99	0.00	7.59
	e) Immersion type vibrator, 77 mm dia.	Op.	h	38.10	0.01	1.46	0.38	55.62
		s.b.	h	7.62	0.00	0.42	0.00	3.20
	f) General foreman	---	h	1.89	0.00	47.25	0.00	89.10
	g) Gang foreman	---	h	18.86	6.60	0.00	124.46	0.00
	h) Skilled	---	h	188.57	2.77	0.00	522.34	0.00
	i) Semiskilled	---	h	427.94	2.77	0.00	1,185.38	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,580.80	1.33	10.22	3,435.05	26,383.54
	b) Portland cement, normal type	50%	t	464.55	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	464.55	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,858.18	0.00	1.44	0.00	2,675.78
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	967.35	0.28	25.38	270.86	24,551.33
		s.b.	h	193.47	0.00	10.68	0.00	2,066.26
	b) General foreman	----	h	10.64	0.00	47.25	0.00	502.78
	c) Gang foreman	----	h	106.41	6.60	0.00	702.30	0.00
	d) Transit mixer, operator	1	h	1,064.08	5.82	0.00	6,192.97	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	4,314.68	22,865.13
3	Formworks							
3.01	Steel formworks	---	m ³	2,580.80	0.00	13.00	0.00	33,550.43
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.96	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	5,000.57	0.00	0.24	0.00	1,200.14
		s.b.	h	1,000.11	0.00	0.17	0.00	170.02
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	404.17	0.09	7.91	36.38	3,197.01
		s.b.	h	80.83	0.00	5.13	0.00	414.68
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.76	0.00	350.00	0.00	617.35
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	352.77	0.00	3.58	0.00	1,262.92
3.07	Formwork bond breaking compound	---	kg	465.87	0.00	3.23	0.00	1,504.77
3.08	General foreman	---	h	65.04	0.00	47.25	0.00	3,073.03
3.09	Gang foreman	1	h	650.38	6.60	0.00	4,292.49	0.00
3.10	Specialist	2	h	1,300.75	3.69	0.00	4,799.79	0.00
03:11	Skilled	2	h	1,300.75	2.99	0.00	3,889.26	0.00
03:12	Semiskilled	1	h	650.38	2.38	0.00	1,547.90	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	160.84	0.45	30.85	72.38	4,961.85
		s.b.	h	32.17	0.00	13.69	0.00	440.37
4.02	Motorcompressors, 20 m ³ /min (21.3 m ³ /min. consumption)	Op.	h	160.84	0.27	61.62	42.82	9,910.98
		s.b.	h	32.17	0.00	197.28	0.00	6,346.04
4.03	General foreman	---	h	17.69	0.00	47.25	0.00	835.96
4.04	Gang foreman	1	h	176.92	6.60	0.00	1,167.68	0.00
4.05	Concrete pump, operator	1	h	176.92	5.82	0.00	1,029.68	0.00
4.06	Concrete pump, helper	1	h	176.92	2.38	0.00	421.07	0.00
4.07	Skilled	1	h	176.92	2.99	0.00	529.00	0.00
4.08	Semiskilled	2	h	353.84	2.38	0.00	842.15	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	475.09	39,437.81
Sub-total							36,938.33	194,981.61
Missing items and construction contingencies							554.07	2,924.72
Total Direct Costs							37,492.41	197,906.33
Overheads, risks and profit on cement and admixtures							73.48	661.30
Overhead, risks & profit on other costs							12,087.90	108,791.12
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							17.52	108.42
AGGREGATE UNIT PRICE								125.94

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	276.73	3.93	21.11	1,088.29	5,840.63
1.02	Formworks and concrete placing:							
	a) Formwork	---	m2	1,729.56	0.00	0.89	0.00	1,543.46
	b) Grouted anchor bars	---	kg	2,161.95	0.00	0.84	0.00	1,816.04
	c) Formwork bond breaking compound	---	kg	34.59	0.00	3.23	0.00	111.73
	d) Motorcompressor, 5 m3/min.	Op.	h	13.84	0.08	11.32	1.11	156.63
		s.b.	h	2.77	0.00	2.99	0.00	8.27
	e) Immersion type vibrator, 77 mm dia.	Op.	h	41.51	0.01	1.46	0.42	60.60
		s.b.	h	8.30	0.00	0.42	0.00	3.49
	f) General foreman	---	h	2.05	0.00	47.25	0.00	97.09
	g) Gang foreman	---	h	20.55	6.60	0.00	135.61	0.00
	h) Skilled	---	h	205.47	2.77	0.00	569.16	0.00
	i) Semiskilled	---	h	466.29	2.77	0.00	1,291.62	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m3	4,730.61	1.33	10.22	6,296.44	48,361.03
	b) Portland cement, normal type	50%	t	851.51	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	851.51	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	3,406.04	0.00	1.44	0.00	4,904.70
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	1,661.38	0.28	25.38	465.19	42,165.88
		s.b.	h	332.28	0.00	10.68	0.00	3,548.71
	b) General foreman	---	h	18.28	0.00	47.25	0.00	863.50
	c) Gang foreman	---	h	182.75	6.60	0.00	1,206.16	0.00
	d) Transit mixer, operator	1	h	1,827.52	5.82	0.00	10,636.17	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	7,571.81	40,636.44
3	Formworks							
3.01	Steel formworks	---	m3	4,730.61	0.00	13.00	0.00	61,497.94
3.02	Side closure of formworks (construction joints)	0	m3	0.00	0.00	0.96	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	8,922.05	0.00	0.24	0.00	2,141.29
		s.b.	h	1,784.41	0.00	0.17	0.00	303.35
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	440.40	0.09	7.91	39.64	3,483.54
		s.b.	h	88.08	0.00	5.13	0.00	451.85
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	3.12	0.00	350.00	0.00	1,090.49
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	623.14	0.00	3.58	0.00	2,230.83
3.07	Formwork bond breaking compound	---	kg	556.92	0.00	3.23	0.00	1,798.85
3.08	General foreman	---	h	72.78	0.00	47.25	0.00	3,438.70
3.09	Gang foreman	1	h	727.77	6.60	0.00	4,803.27	0.00
3.10	Specialist	2	h	1,455.54	3.69	0.00	5,370.93	0.00
03:11	Skilled	2	h	1,455.54	2.99	0.00	4,352.05	0.00
03:12	Semiskilled	1	h	727.77	2.38	0.00	1,732.09	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m3/h max. capacity	Op.	h	284.10	0.45	30.85	127.85	8,764.62
		s.b.	h	56.82	0.00	13.69	0.00	777.88
4.02	Motorcompressors, 25 m3/min (23.4 m3/min. consumption)	Op.	h	284.10	0.27	73.00	77.12	20,739.23
		s.b.	h	56.82	0.00	10.04	0.00	570.67
4.03	General foreman	---	h	31.25	0.00	47.25	0.00	1,476.63
4.04	Gang foreman	1	h	312.51	6.60	0.00	2,062.60	0.00
4.05	Concrete pump, operator	1	h	312.51	5.82	0.00	1,818.84	0.00
4.06	Concrete pump, helper	1	h	312.51	2.38	0.00	743.79	0.00
4.07	Skilled	1	h	312.51	2.99	0.00	934.42	0.00
4.08	Semiskilled	2	h	625.03	2.38	0.00	1,487.57	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	562.33	52,511.26
Sub-total							53,374.44	311,395.32
Missing items and construction contingencies							800.62	4,670.93
Total Direct Costs							54,175.06	316,066.25
Overheads, risks and profit on cement and admixtures							129.79	1,168.11
Overhead, risks & profit on other costs							18,982.58	170,843.26
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							14.64	97.47
AGGREGATE UNIT PRICE								112.11

UNDERGROUND CONCRETE - DRAINAGE GALLERIES OF STAGE 1 POWER TUNNEL GATE CHAMBER, ARCH & SIDEWALL Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	55.62	3.99	21.33	221.97	1,186.16
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	347.62	0.00	0.89	0.00	310.22
	b) Grouted anchor bars	---	kg	434.53	0.00	0.84	0.00	365.00
	c) Formwork bond breaking compound	---	kg	6.95	0.00	3.23	0.00	22.46
	d) Motorcompressor, 5 m ³ /min.	Op.	h	2.78	0.08	11.32	0.22	31.48
		s.b.	h	0.56	0.00	2.99	0.00	1.66
	e) Immersion type vibrator, 77 mm dia.	Op.	h	8.34	0.01	1.46	0.08	12.18
		s.b.	h	1.67	0.00	0.42	0.00	0.70
	f) General foreman	---	h	0.41	0.00	47.25	0.00	19.51
	g) Gang foreman	---	h	4.13	6.60	0.00	27.26	0.00
	h) Skilled	---	h	41.30	2.77	0.00	114.39	0.00
	i) Semiskilled	---	h	93.72	2.77	0.00	259.60	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	757.00	1.33	10.22	1,007.57	7,738.82
	b) Portland cement, normal type	50%	t	136.26	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	136.26	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	545.04	0.00	1.44	0.00	784.86
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	271.81	0.28	25.38	76.11	6,898.64
		s.b.	h	54.36	0.00	10.68	0.00	580.59
	b) General foreman	---	h	2.99	0.00	47.25	0.00	141.28
	c) Gang foreman	---	h	29.90	6.60	0.00	197.34	0.00
	d) Transit mixer, operator	1	h	299.00	5.82	0.00	1,740.15	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	---	---	1,229.61	6,570.68
3	Formworks							
3.01	Steel formworks	---	m ³	757.00	0.00	13.00	0.00	9,841.01
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.05	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,378.52	0.00	0.24	0.00	330.85
		s.b.	h	275.70	0.00	0.17	0.00	46.87
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	88.51	0.09	7.91	7.97	700.15
		s.b.	h	17.70	0.00	5.13	0.00	90.82
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.51	0.00	350.00	0.00	176.97
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	101.13	0.00	3.58	0.00	362.03
3.07	Formwork bond breaking compound	---	kg	103.16	0.00	3.23	0.00	333.19
3.08	General foreman	---	h	15.29	0.00	47.25	0.00	722.28
3.09	Gang foreman	1	h	152.86	6.60	0.00	1,008.90	0.00
3.10	Specialist	2	h	305.73	3.69	0.00	1,128.14	0.00
03:11	Skilled	2	h	305.73	2.99	0.00	914.13	0.00
03:12	Semiskilled	1	h	152.86	2.38	0.00	363.82	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	46.11	0.45	30.85	20.75	1,422.37
		s.b.	h	9.22	0.00	13.69	0.00	126.24
4.02	Motorcompressors, 20 m ³ /min (21.5 m ³ /min. consumption)	Op.	h	46.11	0.27	62.20	12.39	2,867.78
		s.b.	h	9.22	0.00	9.95	0.00	91.79
4.03	General foreman	---	h	5.07	0.00	47.25	0.00	239.64
4.04	Gang foreman	1	h	50.72	6.60	0.00	334.73	0.00
4.05	Concrete pump, operator	1	h	50.72	5.82	0.00	295.17	0.00
4.06	Concrete pump, helper	1	h	50.72	2.38	0.00	120.71	0.00
4.07	Skilled	1	h	50.72	2.99	0.00	151.64	0.00
4.08	Semiskilled	2	h	101.43	2.38	0.00	241.41	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	80.25	6,938.57
Sub-total							9,554.31	48,954.80
Missing items and construction contingencies				%	1.50%		143.31	734.32
Total Direct Costs							9,697.63	49,689.12
Overheads, risks and profit on cement and admixtures				%	25.00%		21.06	189.57
Overhead, risks & profit on other costs				%	52.00%		3,044.30	27,398.70
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	813		15.71	95.10
AGGREGATE UNIT PRICE				m³				110.80

UNDERGROUND CONCRETE - DRAINAGE GALLERY OF DIVERSION TUNNEL GATE CHAMBERS, ARCH & SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	149.28	3.96	21.22	591.53	3,167.56
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	933.00	0.00	0.89	0.00	832.61
	b) Grouted anchor bars	---	kg	1,166.25	0.00	0.84	0.00	979.65
	c) Formwork bond breaking compound	---	kg	18.66	0.00	3.23	0.00	60.27
	d) Motorcompressor, 5 m ³ /min.	Op.	h	7.46	0.08	11.32	0.60	84.49
		s.b.	h	1.49	0.00	2.99	0.00	4.46
	e) Immersion type vibrator, 77 mm dia.	Op.	h	22.39	0.01	1.46	0.22	32.69
		s.b.	h	4.48	0.00	0.42	0.00	1.88
	f) General foreman	---	h	1.11	0.00	47.25	0.00	52.37
	g) Gang foreman	---	h	11.08	6.60	0.00	73.15	0.00
	h) Skilled	---	h	110.84	2.77	0.00	307.03	0.00
	i) Semiskilled	---	h	251.54	2.77	0.00	696.76	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,905.86	1.33	10.22	2,536.70	19,483.61
	b) Portland cement, normal type	50%	t	343.06	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	343.06	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,372.22	0.00	1.44	0.00	1,976.00
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	677.02	0.28	25.38	189.56	17,182.66
		s.b.	h	135.40	0.00	10.68	0.00	1,446.11
	b) General foreman	---	h	7.45	0.00	47.25	0.00	351.88
	c) Gang foreman	---	h	74.47	6.60	0.00	491.51	0.00
	d) Transit mixer, operator	1	h	744.72	5.82	0.00	4,334.25	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	---	---	3,073.68	16,459.18
3	Formworks							
3.01	Steel formworks	---	m ³	1,905.86	0.00	13.00	0.00	24,776.18
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.96	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	4,201.29	0.00	0.24	0.00	1,008.31
		s.b.	h	840.26	0.00	0.17	0.00	142.84
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	237.57	0.09	7.91	21.38	1,879.17
		s.b.	h	47.51	0.00	5.13	0.00	243.75
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.28	0.00	350.00	0.00	447.56
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	255.75	0.00	3.58	0.00	915.59
3.07	Formwork bond breaking compound	---	kg	330.28	0.00	3.23	0.00	1,066.81
3.08	General foreman	---	h	40.42	0.00	47.25	0.00	1,909.65
3.09	Gang foreman	1	h	404.16	6.60	0.00	2,667.45	0.00
3.10	Specialist	2	h	808.32	3.69	0.00	2,982.69	0.00
03:11	Skilled	2	h	808.32	2.99	0.00	2,416.87	0.00
03:12	Semiskilled	1	h	404.16	2.38	0.00	961.90	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	116.60	0.45	30.85	52.47	3,597.22
		s.b.	h	23.32	0.00	13.69	0.00	319.26
4.02	Motorcompressors, 25 m ³ /min (25.7 m ³ /min. consumption)	Op.	h	116.60	0.30	80.17	34.76	9,348.55
		s.b.	h	23.32	0.00	11.03	0.00	257.24
4.03	General foreman	---	h	12.83	0.00	47.25	0.00	606.05
4.04	Gang foreman	1	h	128.26	6.60	0.00	846.54	0.00
4.05	Concrete pump, operator	1	h	128.26	5.82	0.00	746.50	0.00
4.06	Concrete pump, helper	1	h	128.26	2.38	0.00	305.27	0.00
4.07	Skilled	1	h	128.26	2.99	0.00	383.51	0.00
4.08	Semiskilled	2	h	256.53	2.38	0.00	610.54	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	262.83	21,936.11
Sub-total							24,587.70	130,569.72
Missing items and construction contingencies				%	1.50%		368.82	1,958.55
Total Direct Costs							24,956.52	132,528.26
Overheads, risks and profit on cement and admixtures				%	25.00%		53.27	479.42
Overhead, risks & profit on other costs				%	52.00%		8,078.41	72,705.68
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	2,055		16.10	100.10
AGGREGATE UNIT PRICE				m³				116.20

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - MID LEVEL DRAINAGE GALLERY OF POWERHOUSE, NVERT

SEC 4-08
 ANA 006
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)		
1 Preparation of Invert Surface										
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	160.13	0.06	7.75	9.61	1,241.02		
		s.b.	h	40.03	0.00	5.08	0.00	203.37		
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	50.70	0.27	23.93	13.69	1,213.20		
		s.b.	h	10.14	0.00	12.03	0.00	121.98		
1.03	Hand-held breaker, medium weight type	Op.	h	235.74	0.04	2.03	9.43	478.56		
		s.b.	h	47.15	0.00	1.21	0.00	57.05		
1.04	Hand held breaker tool,moil point type	----	ea.	2.36	0.00	32.37	0.00	76.31		
1.05	Breaker tool resharpen	----	h	7.07	0.01	1.57	0.07	11.10		
1.06	General foreman	----	h	5.89	0.00	47.25	0.00	278.47		
1.07	Gang foreman	1	h	58.94	6.60	0.00	388.98	0.00		
1.08	Dumper driver and backhoe operator	1	h	231.91	5.82	0.00	1,349.73	0.00		
1.09	Skilled	2	h	117.87	2.99	0.00	352.44	0.00		
1.10	Semiskilled	2	h	117.87	2.38	0.00	280.54	0.00		
1.11	Unskilled	4	h	235.74	1.77	0.00	417.27	0.00		
2 Concrete Class B2-25/37										
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	1,672.96	1.33	10.22	2,226.71	17,102.67		
	b) Portland cement, normal type	0.5	t	301.14	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	0.5	t	301.14	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	1,806.80	0.00	1.44	0.00	2,601.79		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
3 Concrete Transport										
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	534.85	0.28	25.38	149.76	13,574.49		
		s.b.	hr	106.97	0.00	10.68	0.00	1,142.44		
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00		
		s.b.	h	0.00	0.00	11.20	0.00	0.00		
3.03	General foreman	----	h	5.88	0.00	47.25	0.00	277.99		
3.04	Gang foreman	----	h	58.83	6.60	0.00	388.30	0.00		
3.05	Transit mixer operator	1	h	588.33	5.82	0.00	3,424.11	0.00		
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
4 Concrete for Overbreaks and Losses										
		---	%	35.6%	----	----	2,201.66	12,344.13		
5 Formworks and Concrete Placing										
5.01	Formworks	---	m ²	173.81	5.34	10.23	928.15	1,778.08		
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	80.03	0.45	30.85	36.01	2,468.90		
		s.b.	h	16.01	0.00	13.69	0.00	219.12		
5.03	Sliding vibrating bar	Op.	h	80.03	0.02	1.77	1.60	141.65		
		s.b.	h	16.01	0.00	0.60	0.00	9.60		
5.04	General foreman	1	h	20.94	0.00	47.25	0.00	989.61		
5.05	Gang foreman	1	h	104.72	6.60	0.00	691.15	0.00		
5.06	Concrete pump, operator	1	h	88.03	5.82	0.00	512.35	0.00		
5.07	Concrete pump, helper	1	h	88.03	2.38	0.00	209.52	0.00		
5.08	Skilled	2	h	209.44	2.99	0.00	626.23	0.00		
5.09	Semiskilled	4	h	418.88	2.38	0.00	996.94	0.00		
6 General Services										
6.01	Ventilation, lighting & other general services	---	---	---	---	---	75.90	6,357.16		
Sub-total										
				----->>			15,290.13	62,688.68		
Missing items and construction contingencies			%	1.50%	----->>			229.35	940.33	
Total Direct Costs				----->>			15,519.48	63,629.02		
Overheads, risks and profit on cement and admixtures			%	25.00%	----->>			65.04	585.40	
Overhead, risks & profit on other costs			%	52.00%	----->>			3,980.43	35,823.86	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	1,672.96	----->>			11.69	59.80
AGGREGATE UNIT PRICE				m3	----->>			71.49		

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - DRAINAGE AGLLERY OF STAGE 1 POWER TUNNEL, INVERT

SEC 4-08
 ANA 007
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)		
1 Preparation of Invert Surface										
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	25.48	0.06	7.75	1.53	197.47		
		s.b.	h	6.37	0.00	5.08	0.00	32.36		
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	11.87	0.27	23.93	3.20	284.00		
		s.b.	h	2.37	0.00	12.03	0.00	28.55		
1.03	Hand-held breaker, medium weight type	Op.	h	55.19	0.04	2.03	2.21	112.03		
		s.b.	h	11.04	0.00	1.21	0.00	13.36		
1.04	Hand held breaker tool,moil point type	----	ea.	0.55	0.00	32.37	0.00	17.86		
1.05	Breaker tool resharpeners	----	h	1.66	0.01	1.57	0.02	2.60		
1.06	General foreman	----	h	1.38	0.00	47.25	0.00	65.19		
1.07	Gang foreman	1	h	13.80	6.60	0.00	91.06	0.00		
1.08	Dumper driver and backhoe operator	1	h	41.08	5.82	0.00	239.10	0.00		
1.09	Skilled	2	h	27.59	2.99	0.00	82.50	0.00		
1.10	Semiskilled	2	h	27.59	2.38	0.00	65.67	0.00		
1.11	Unskilled	4	h	55.19	1.77	0.00	97.68	0.00		
2 Concrete Class B2-25/37										
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	240.12	1.33	10.22	319.60	2,454.75		
	b) Portland cement, normal type	0.5	t	43.22	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	0.5	t	43.22	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	259.33	0.00	1.44	0.00	373.43		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
3 Concrete Transport										
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	79.17	0.28	25.38	22.17	2,009.35		
		s.b.	hr	15.83	0.00	10.68	0.00	169.11		
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00		
		s.b.	h	0.00	0.00	11.20	0.00	0.00		
3.03	General foreman	----	h	0.87	0.00	47.25	0.00	41.15		
3.04	Gang foreman	----	h	8.71	6.60	0.00	57.48	0.00		
3.05	Transit mixer operator	1	h	87.09	5.82	0.00	506.85	0.00		
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
4 Concrete for Overbreaks and Losses										
		---	%	38.7%	----	----	350.57	1,952.99		
5 Formworks and Concrete Placing										
5.01	Formworks	---	m ²	173.81	5.34	10.23	928.15	1,778.08		
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	11.75	0.45	30.85	5.29	362.50		
		s.b.	h	2.35	0.00	13.69	0.00	32.17		
5.03	Sliding vibrating bar	Op.	h	11.75	0.02	1.77	0.24	20.80		
		s.b.	h	2.35	0.00	0.60	0.00	1.41		
5.04	General foreman	1	h	3.26	0.00	47.25	0.00	154.19		
5.05	Gang foreman	1	h	16.32	6.60	0.00	107.69	0.00		
5.06	Concrete pump, operator	1	h	12.93	5.82	0.00	75.23	0.00		
5.07	Concrete pump, helper	1	h	12.93	2.38	0.00	30.76	0.00		
5.08	Skilled	2	h	32.63	2.99	0.00	97.57	0.00		
5.09	Semiskilled	4	h	65.26	2.38	0.00	155.33	0.00		
6 General Services										
6.01	Ventilation, lighting & other general services	---	---	---	---	---	11.37	982.91		
Sub-total										
				----->>			3,251.24	11,086.25		
Missing items and construction contingencies			%	1.50%	----->>			48.77	166.29	
Total Direct Costs				----->>			3,300.01	11,252.54		
Overheads, risks and profit on cement and admixtures			%	25.00%	----->>			9.34	84.02	
Overhead, risks & profit on other costs			%	52.00%	----->>			737.31	6,635.83	
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	240.12	----->>			16.85	74.85
AGGREGATE UNIT PRICE				m3	----->>			91.70		

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - STAGE 1 POWER TUNNEL, FULL RING LINING**

**SEC 4-09
ANA 001
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	44.50	0.06	7.75	2.67	344.87
		s.b.	h	11.12	0.00	5.08	0.00	56.51
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	11.70	0.27	23.93	3.16	280.08
		s.b.	h	2.34	0.00	12.03	0.00	28.16
1.03	Hand-held breaker, medium weight type	Op.	h	54.42	0.04	2.03	2.18	110.48
		s.b.	h	10.88	0.00	1.21	0.00	13.17
1.04	Hand held breaker tool,moil point type	----	ea.	0.54	0.00	32.37	0.00	17.62
1.05	Breaker tool resharpenner	----	h	1.63	0.01	1.57	0.02	2.56
1.06	General foreman	----	h	1.36	0.00	47.25	0.00	64.29
1.07	Gang foreman	1	h	13.61	6.60	0.00	89.80	0.00
1.08	Dumper driver and backhoe operator	1	h	61.82	5.82	0.00	359.82	0.00
1.09	Skilled	2	h	27.21	2.99	0.00	81.36	0.00
1.10	Semiskilled	2	h	27.21	2.38	0.00	64.76	0.00
1.11	Unskilled	4	h	54.42	1.77	0.00	96.33	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	7,095.40	1.33	10.22	9,443.98	72,536.27
	b) Portland cement, normal type	50%	t	1,277.17	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	1,277.17	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	0	kg	0.00	0.00	1.44	0.00	0.00
	e) Concrete admixture, superplasticizer	1	kg	10,217.38	0.00	1.97	0.00	20,128.23
2.02	Concrete transport:							
	a) Transit mixer, 8 m3 nominal capacity	Op.	h	1,127.03	0.33	41.12	371.92	46,343.64
		s.b.	h	225.41	0.00	13.62	0.00	3,070.04
	b) General foreman	----	h	12.40	0.00	47.25	0.00	585.78
	c) Gang foreman	----	h	123.97	6.60	0.00	818.23	0.00
	d) Transit mixer, operator	1	h	1,239.74	5.82	0.00	7,215.27	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	24.6%	----	----	4,396.60	35,140.52
3	Formworks							
3.01	Steel formworks excluding side closure	---	m2	75.36	0.00	729.80	0.00	54,997.73
3.02	Side closure of formworks	0	m2	0.00	0.00	416.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	131.53	0.00	0.24	0.00	31.57
		s.b.	h	26.31	0.00	0.17	0.00	4.47
3.04	Traveller on rail for shifting the forms	---	ea.	0.50	0.00	60,000	0.00	30,000.00
3.05	Timber for side closure of formwork (construction joint)	1	m3	55.47	0.00	350.00	0.00	19,412.82
3.06	Ribbed sheet for side closure of formwork (const. joint)	0	m2	0.00	0.00	3.58	0.00	0.00
3.07	Formwork bond breaking compound	---	kg	376.70	0.00	3.23	0.00	1,216.74
3.08	General foreman	---	h	71.43	0.00	47.25	0.00	3,374.89
3.09	Gang foreman	1	h	714.26	6.60	0.00	4,714.13	0.00
3.10	Specialist	3	h	2,142.79	3.69	0.00	7,906.89	0.00
03:11	Skilled	4	h	2,857.05	2.99	0.00	8,542.58	0.00
03:12	Semiskilled	4	h	2,857.05	2.38	0.00	6,799.78	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m3/h max. capacity	Op.	h	239.51	0.61	44.83	146.10	10,737.11
		s.b.	h	47.90	0.00	13.85	0.00	663.43
4.02	Motorcompressors, 30 m3/min (27.6 m3/min. consumption)	Op.	h	239.51	0.30	91.46	72.71	21,904.66
		s.b.	h	47.90	0.00	11.02	0.00	527.95
4.03	General foreman	---	h	26.35	0.00	47.25	0.00	1,244.84
4.04	Gang foreman	1	h	263.46	6.60	0.00	1,738.82	0.00
4.05	Concrete pump, operator	1	h	263.46	5.82	0.00	1,533.32	0.00
4.06	Concrete pump, helper	1	h	263.46	2.38	0.00	627.03	0.00
4.07	Skilled	1	h	263.46	2.99	0.00	787.74	0.00
4.08	Semiskilled	2	h	526.92	2.38	0.00	1,254.06	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	489.37	42,447.24
Sub-total							57,558.64	365,285.67
Missing items and construction contingencies		%		1.50%			863.38	5,479.29
Total Direct Costs							58,422.02	370,764.96
Overheads, risks and profit on cement and admixtures		%		25.00%			506.36	4,557.26
Overhead, risks & profit on other costs		%		52.00%			21,264.49	191,380.41
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m3	7,095.40			11.30	79.87
AGGREGATE UNIT PRICE			m3					91.17

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - DRAFT TUBE OF POWERHOUSE**

**SEC 4-09
ANA 002
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	29.44	2.58	19.80	76.03	582.92
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	184.00	0.00	1.34	0.00	246.19
	b) Grouted anchor bars	---	kg	230.00	0.00	0.84	0.00	193.20
	c) Formwork bond breaking compound	---	kg	3.68	0.00	3.23	0.00	11.89
	d) Motorcompressor, 5 m ³ /min.	Op.	h	1.47	0.08	11.32	0.12	16.66
		s.b.	h	0.29	0.00	2.99	0.00	0.88
	e) Immersion type vibrator, 77 mm dia.	Op.	h	4.42	0.01	1.46	0.04	6.45
		s.b.	h	0.88	0.00	0.42	0.00	0.37
	f) General foreman	---	h	0.27	0.00	47.25	0.00	12.91
	g) Gang foreman	---	h	2.73	6.60	0.00	18.03	0.00
	h) Skilled	---	h	27.32	2.77	0.00	75.69	0.00
	i) Semiskilled	---	h	59.06	2.77	0.00	163.61	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,883.07	1.33	10.22	3,837.37	29,473.62
	b) Portland cement, normal type	50%	t	518.95	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	518.95	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,075.81	0.00	1.44	0.00	2,989.17
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 10 m ³ nominal capacity	Op.	h	479.28	0.40	47.95	191.71	22,981.38
		s.b.	h	95.86	0.00	14.53	0.00	1,392.78
	b) General foreman	----	h	5.27	0.00	47.25	0.00	249.10
	c) Gang foreman	----	h	52.72	6.60	0.00	347.96	0.00
	d) Transit mixer, operator	1	h	527.21	5.82	0.00	3,068.34	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	42.4%	----	----	3,154.98	24,190.22
3	Formworks							
3.01	Formworks	---	m ²	2,664.39	10.98	16.47	29,254.98	43,882.47
3.02	Side closure of formworks	0	m ²	0.00	0.00	0.00	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	7,224.93	0.00	0.24	0.00	1,733.98
		s.b.	h	1,444.99	0.00	0.17	0.00	245.65
3.04	Truck for shifting the forms, 30 t pay load	Op.	h	28.11	0.20	18.17	5.62	510.78
		s.b.	h	5.62	0.00	12.41	0.00	69.77
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	2.75	0.00	350.00	0.00	962.75
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	550.14	0.00	3.58	0.00	1,969.50
3.07	Formwork bond breaking compound	---	kg	151.66	0.00	3.23	0.00	489.87
3.08	General foreman	---	h	10.84	0.00	47.25	0.00	512.15
3.09	Gang foreman	1	h	108.39	6.60	0.00	715.38	0.00
3.10	Specialist	3	h	325.17	3.69	0.00	1,199.89	0.00
03:11	Skilled	2	h	216.78	2.99	0.00	648.18	0.00
03:12	Semiskilled	1	h	108.39	2.38	0.00	257.97	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	147.47	0.61	44.83	89.96	6,611.03
		s.b.	h	29.49	0.00	13.85	0.00	408.49
4.02	Motorcompressors, 25 m ³ /min (23.5 m ³ /min. consumption)	Op.	h	147.47	0.27	73.31	40.20	10,811.03
		s.b.	h	29.49	0.00	10.09	0.00	297.48
4.03	General foreman	---	h	16.22	0.00	47.25	0.00	766.47
4.04	Gang foreman	1	h	162.22	6.60	0.00	1,070.62	0.00
4.05	Concrete pump, operator	1	h	162.22	5.82	0.00	944.10	0.00
4.06	Concrete pump, helper	1	h	162.22	2.38	0.00	386.07	0.00
4.07	Skilled	1	h	162.22	2.99	0.00	485.03	0.00
4.08	Semiskilled	2	h	324.43	2.38	0.00	772.15	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	322.12	27,610.27
Sub-total							47,126.12	179,229.44
Missing items and construction contingencies							942.52	3,584.59
Total Direct Costs							48,068.65	182,814.02
Overheads, risks and profit on cement and admixtures							75.49	679.43
Overhead, risks & profit on other costs							11,848.87	106,639.87
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							20.60	99.62
AGGREGATE UNIT PRICE							120.21	

UNDERGROUND CONCRETE - VENTILATION GALLERY PARALLEL TO T3, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	175.65	3.68	20.14	646.02	3,537.88
1.02	Formworks and concrete placing:							
	a) Formwork	---	m2	1,097.80	0.00	0.89	0.00	979.68
	b) Grouted anchor bars	---	kg	1,372.25	0.00	0.84	0.00	1,152.69
	c) Formwork bond breaking compound	---	kg	21.96	0.00	3.23	0.00	70.92
	d) Motorcompressor, 5 m3/min.	Op.	h	8.78	0.08	11.32	0.70	99.42
		s.b.	h	1.76	0.00	2.99	0.00	5.25
	e) Immersion type vibrator, 77 mm dia.	Op.	h	26.35	0.01	1.46	0.26	38.47
		s.b.	h	5.27	0.00	0.42	0.00	2.21
	f) General foreman	---	h	1.30	0.00	47.25	0.00	61.62
	g) Gang foreman	---	h	13.04	6.60	0.00	86.08	0.00
	h) Skilled	---	h	130.42	2.77	0.00	361.26	0.00
	i) Semiskilled	---	h	295.97	2.77	0.00	819.83	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m3	5,290.96	1.33	10.22	7,042.27	54,089.50
	b) Portland cement, normal type	50%	t	952.38	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	952.38	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	3,809.49	0.00	1.44	0.00	5,485.67
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	1,676.24	0.28	25.38	469.35	42,542.94
		s.b.	h	335.25	0.00	10.68	0.00	3,580.45
	b) General foreman	----	h	18.44	0.00	47.25	0.00	871.23
	c) Gang foreman	----	h	184.39	6.60	0.00	1,216.95	0.00
	d) Transit mixer, operator	1	h	1,843.86	5.82	0.00	10,731.28	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	7,920.16	43,373.90
3	Formworks							
3.01	Steel formworks	---	m3	5,290.96	0.00	14.86	0.00	78,608.58
3.02	Side closure of formworks (construction joints)	0	m3	0.00	0.00	1.10	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	7,408.23	0.00	0.24	0.00	1,777.97
		s.b.	h	1,481.65	0.00	0.17	0.00	251.88
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	279.53	0.09	7.91	25.16	2,211.10
		s.b.	h	55.91	0.00	5.13	0.00	286.80
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	3.40	0.00	350.00	0.00	1,190.51
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	680.29	0.00	3.58	0.00	2,435.44
3.07	Formwork bond breaking compound	---	kg	285.43	0.00	3.23	0.00	921.93
3.08	General foreman	---	h	43.56	0.00	47.25	0.00	2,058.02
3.09	Gang foreman	1	h	435.56	6.60	0.00	2,874.69	0.00
3.10	Specialist	2	h	871.12	3.69	0.00	3,214.43	0.00
03:11	Skilled	2	h	871.12	2.99	0.00	2,604.65	0.00
03:12	Semiskilled	1	h	435.56	2.38	0.00	1,036.63	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m3/h max. capacity	Op.	h	310.16	0.45	30.85	139.57	9,568.51
		s.b.	h	62.03	0.00	13.69	0.00	849.22
4.02	Motorcompressors, 20 m3/min (18.9 m3/min. consumption)	Op.	h	310.16	0.24	54.68	73.28	16,958.96
		s.b.	h	62.03	0.00	8.75	0.00	542.83
4.03	General foreman	---	h	34.12	0.00	47.25	0.00	1,612.07
4.04	Gang foreman	1	h	341.18	6.60	0.00	2,251.78	0.00
4.05	Concrete pump, operator	1	h	341.18	5.82	0.00	1,985.66	0.00
4.06	Concrete pump, helper	1	h	341.18	2.38	0.00	812.00	0.00
4.07	Skilled	1	h	341.18	2.99	0.00	1,020.12	0.00
4.08	Semiskilled	2	h	682.36	2.38	0.00	1,624.01	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	293.24	25,634.70
Sub-total							47,249.38	300,800.33
Missing items and construction contingencies							708.74	4,512.00
Total Direct Costs							47,958.12	305,312.34
Overheads, risks and profit on cement and admixtures							141.69	1,275.25
Overhead, risks & profit on other costs							18,075.34	162,678.05
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							12.11	85.84
AGGREGATE UNIT PRICE							m3	97.95

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - CROSS SLIT 1, ARCH AND SIDEWALLS

SEC 4-09
 ANA 004
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)		
1	Side Curbs for Formwork Anchoring									
1.01	Concrete, supply and transport (see n. 2 below):									
	a) Concrete Class B2-25/37	---	m ³	14.88	2.41	18.59	35.80	276.68		
1.02	Formworks and concrete placing:									
	a) Formwork	---	m ²	93.00	0.00	1.34	0.00	124.43		
	b) Grouted anchor bars	---	kg	116.25	0.00	0.84	0.00	97.65		
	c) Formwork bond breaking compound	---	kg	1.86	0.00	3.23	0.00	6.01		
	d) Motorcompressor, 5 m ³ /min.	Op.	h	0.74	0.08	11.32	0.06	8.42		
		s.b.	h	0.15	0.00	2.99	0.00	0.44		
	e) Immersion type vibrator, 77 mm dia.	Op.	h	2.23	0.01	1.46	0.02	3.26		
		s.b.	h	0.45	0.00	0.42	0.00	0.19		
	f) General foreman	---	h	0.14	0.00	47.25	0.00	6.53		
	g) Gang foreman	---	h	1.38	6.60	0.00	9.11	0.00		
	h) Skilled	---	h	13.81	2.77	0.00	38.26	0.00		
	i) Semiskilled	---	h	29.85	2.77	0.00	82.69	0.00		
2	Concrete Class B2-25/37 (Supply and Transport)									
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	637.62	1.33	10.22	848.67	6,518.39		
	b) Portland cement, normal type	50%	t	114.77	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	50%	t	114.77	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	459.09	0.00	1.44	0.00	661.08		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
2.02	Concrete transport:									
	a) Transit mixer, 10 m ³ nominal capacity	Op.	h	91.03	0.40	47.95	36.41	4,364.74		
		s.b.	h	18.21	0.00	14.53	0.00	264.52		
	b) General foreman	----	h	1.00	0.00	47.25	0.00	47.31		
	c) Gang foreman	----	h	10.01	6.60	0.00	66.09	0.00		
	d) Transit mixer, operator	1	h	100.13	5.82	0.00	582.75	0.00		
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
2.03	Concrete for overbreaks and losses	---	%	31.5%	----	----	483.47	3,736.85		
3	Formworks									
3.01	Steel formworks excluding side closure	---	m ³	637.62	0.00	12.20	0.00	7,777.39		
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.57	0.00	0.00		
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,160.19	0.00	0.24	0.00	278.44		
		s.b.	h	232.04	0.00	0.17	0.00	39.45		
3.04	Truck for shifting the forms, 30 t pay load	Op.	h	17.22	0.20	18.17	3.44	312.93		
		s.b.	h	3.44	0.00	12.41	0.00	42.75		
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.38	0.00	350.00	0.00	132.83		
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	75.90	0.00	3.58	0.00	271.73		
3.07	Formwork bond breaking compound	---	kg	55.73	0.00	3.23	0.00	180.01		
3.08	General foreman	---	h	5.42	0.00	47.25	0.00	256.09		
3.09	Gang foreman	1	h	54.20	6.60	0.00	357.71	0.00		
3.10	Specialist	3	h	162.59	3.69	0.00	599.97	0.00		
03:11	Skilled	2	h	108.40	2.99	0.00	324.10	0.00		
03:12	Semiskilled	1	h	54.20	2.38	0.00	128.99	0.00		
4	Concrete Placing									
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	22.03	0.61	44.83	13.44	987.39		
		s.b.	h	4.41	0.00	13.85	0.00	61.01		
4.02	Motorcompressors, 30 m ³ /min (39.60 m ³ /min. consumptio	Op.	h	22.03	0.44	131.22	9.59	2,890.19		
		s.b.	h	4.41	0.00	15.81	0.00	69.66		
4.03	General foreman	---	h	2.42	0.00	47.25	0.00	114.48		
4.04	Gang foreman	1	h	24.23	6.60	0.00	159.90	0.00		
4.05	Concrete pump, operator	1	h	24.23	5.82	0.00	141.01	0.00		
4.06	Concrete pump, helper	1	h	24.23	2.38	0.00	57.66	0.00		
4.07	Skilled	1	h	24.23	2.99	0.00	72.44	0.00		
4.08	Semiskilled	2	h	48.46	2.38	0.00	115.32	0.00		
5	General Services									
5.01	Ventilation, lighting & other general services	---	---	---	---	---	37.68	3,316.08		
Sub-total								4,204.60	32,846.93	
Missing items and construction contingencies							%	1.50%	63.07	492.70
Total Direct Costs								4,267.67	33,339.63	
Overheads, risks and profit on cement and admixtures							%	25.00%	16.91	152.22
Overhead, risks & profit on other costs							%	52.00%	1,920.40	17,283.61
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m ³	652.50	9.51	77.82
AGGREGATE UNIT PRICE							m ³			87.33

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - CONVEYOR LINE 7A, ARCH AND SIDEWALLS**

**SEC 4-09
ANA 006
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)		
1	Side Curbs for Formwork Anchoring									
1.01	Concrete, supply and transport (see n. 2 below):									
	a) Concrete Class B2-25/37	---	m ³	138.01	4.50	26.36	620.58	3,638.63		
1.02	Formworks and concrete placing:									
	a) Formwork	---	m ²	862.58	0.00	0.89	0.00	769.77		
	b) Grouted anchor bars	---	kg	1,078.23	0.00	0.84	0.00	905.71		
	c) Formwork bond breaking compound	---	kg	17.25	0.00	3.23	0.00	55.72		
	d) Motorcompressor, 5 m ³ /min.	Op.	h	6.90	0.08	11.32	0.55	78.12		
		s.b.	h	1.38	0.00	2.99	0.00	4.13		
	e) Immersion type vibrator, 77 mm dia.	Op.	h	20.70	0.01	1.46	0.21	30.22		
		s.b.	h	4.14	0.00	0.42	0.00	1.74		
	f) General foreman	---	h	1.02	0.00	47.25	0.00	48.42		
	g) Gang foreman	---	h	10.25	6.60	0.00	67.63	0.00		
	h) Skilled	---	h	102.47	2.77	0.00	283.85	0.00		
	i) Semiskilled	---	h	232.55	2.77	0.00	644.17	0.00		
2	Concrete Class B2-25/37 (Supply and Transport)									
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	3,503.34	1.33	10.22	4,662.94	35,814.62		
	b) Portland cement, normal type	50%	t	630.60	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	50%	t	630.60	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	2,522.40	0.00	1.44	0.00	3,632.26		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
2.02	Concrete transport:									
	a) Transit mixer, 6 m ³ nominal capacity	Op.	h	1,499.06	0.27	32.54	404.75	48,779.51		
		s.b.	h	299.81	0.00	11.20	0.00	3,357.90		
	b) General foreman	----	h	16.49	0.00	47.25	0.00	779.14		
	c) Gang foreman	----	h	164.90	6.60	0.00	1,088.32	0.00		
	d) Transit mixer, operator	1	h	1,648.97	5.82	0.00	9,597.00	0.00		
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	6,411.47	37,591.91		
3	Formworks									
3.01	Steel formworks	---	m ³	3,503.34	0.00	11.77	0.00	41,246.84		
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.87	0.00	0.00		
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	8,763.65	0.00	0.24	0.00	2,103.28		
		s.b.	h	1,752.73	0.00	0.17	0.00	297.96		
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	219.64	0.09	7.91	19.77	1,737.34		
		s.b.	h	43.93	0.00	5.13	0.00	225.35		
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	2.27	0.00	350.00	0.00	793.01		
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	453.15	0.00	3.58	0.00	1,622.26		
3.07	Formwork bond breaking compound	---	kg	392.26	0.00	3.23	0.00	1,266.99		
3.08	General foreman	---	h	40.73	0.00	47.25	0.00	1,924.63		
3.09	Gang foreman	1	h	407.33	6.60	0.00	2,688.38	0.00		
3.10	Specialist	2	h	814.66	3.69	0.00	3,006.09	0.00		
03:11	Skilled	2	h	814.66	2.99	0.00	2,435.83	0.00		
03:12	Semiskilled	1	h	407.33	2.38	0.00	969.44	0.00		
4	Concrete Placing									
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	206.60	0.45	30.85	92.97	6,373.65		
		s.b.	h	41.32	0.00	13.69	0.00	565.67		
4.02	Motorcompressors, 30 m ³ /min (33.0 m ³ /min. consumption)	Op.	h	206.60	0.36	109.35	75.00	22,592.07		
		s.b.	h	41.32	0.00	11.98	0.00	495.02		
4.03	General foreman	---	h	22.73	0.00	47.25	0.00	1,073.81		
4.04	Gang foreman	1	h	227.26	6.60	0.00	1,499.93	0.00		
4.05	Concrete pump, operator	1	h	227.26	5.82	0.00	1,322.66	0.00		
4.06	Concrete pump, helper	1	h	227.26	2.38	0.00	540.88	0.00		
4.07	Skilled	1	h	227.26	2.99	0.00	679.51	0.00		
4.08	Semiskilled	2	h	454.52	2.38	0.00	1,081.77	0.00		
5	General Services									
5.01	Ventilation, lighting & other general services	---	---	---	---	---	195.12	17,996.42		
Sub-total								38,388.83	235,802.09	
Missing items and construction contingencies							%	1.50%	575.83	3,537.03
Total Direct Costs								38,964.66	239,339.12	
Overheads, risks and profit on cement and admixtures							%	25.00%	94.38	849.45
Overhead, risks & profit on other costs							%	52.00%	14,275.48	128,479.31
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m³	3,641	14.65	101.24
AGGREGATE UNIT PRICE							m³			115.89

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - EXPLOSIVE WAREHOUSE, ARCH AND SIDEWALLS**

**SEC 4-09
ANA 008
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)		
1	Side Curbs for Formwork Anchoring									
1.01	Concrete, supply and transport (see n. 2 below):									
	a) Concrete Class B2-25/37	---	m ³	39.92	4.24	22.26	169.17	888.62		
1.02	Formworks and concrete placing:									
	a) Formwork	---	m ²	249.50	0.00	0.89	0.00	222.65		
	b) Grouted anchor bars	---	kg	311.88	0.00	0.84	0.00	261.98		
	c) Formwork bond breaking compound	---	kg	4.99	0.00	3.23	0.00	16.12		
	d) Motorcompressor, 5 m ³ /min.	Op.	h	2.00	0.08	11.32	0.16	22.59		
		s.b.	h	0.40	0.00	2.99	0.00	1.19		
	e) Immersion type vibrator, 77 mm dia.	Op.	h	5.99	0.01	1.46	0.06	8.74		
		s.b.	h	1.20	0.00	0.42	0.00	0.50		
	f) General foreman	---	h	0.30	0.00	47.25	0.00	14.01		
	g) Gang foreman	---	h	2.96	6.60	0.00	19.56	0.00		
	h) Skilled	---	h	29.64	2.77	0.00	82.10	0.00		
	i) Semiskilled	---	h	67.27	2.77	0.00	186.32	0.00		
2	Concrete Class B2-25/37 (Supply and Transport)									
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	235.56	1.33	10.22	313.53	2,408.13		
	b) Portland cement, normal type	50%	t	42.40	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	50%	t	42.40	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	169.60	0.00	1.44	0.00	244.23		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
2.02	Concrete transport:									
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	92.42	0.28	25.38	25.88	2,345.74		
		s.b.	h	18.48	0.00	10.68	0.00	197.42		
	b) General foreman	----	h	1.02	0.00	47.25	0.00	48.04		
	c) Gang foreman	----	h	10.17	6.60	0.00	67.10	0.00		
	d) Transit mixer, operator	1	h	101.67	5.82	0.00	591.70	0.00		
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	406.27	2,134.13		
3	Formworks									
3.01	Steel formworks	---	m ³	235.56	0.00	15.05	0.00	3,545.80		
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.22	0.00	0.00		
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	372.07	0.00	0.24	0.00	89.30		
		s.b.	h	74.41	0.00	0.17	0.00	12.65		
3.04	Truck for shifting the forms, 5 t pay load	Op.	h	63.53	0.05	3.96	2.86	251.26		
		s.b.	h	12.71	0.00	2.57	0.00	32.59		
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.17	0.00	350.00	0.00	59.99		
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	34.28	0.00	3.58	0.00	122.73		
3.07	Formwork bond breaking compound	---	kg	49.71	0.00	3.23	0.00	160.57		
3.08	General foreman	---	h	9.31	0.00	47.25	0.00	439.98		
3.09	Gang foreman	1	h	93.12	6.60	0.00	614.58	0.00		
3.10	Specialist	2	h	186.23	3.69	0.00	687.21	0.00		
03:11	Skilled	2	h	186.23	2.99	0.00	556.84	0.00		
03:12	Semiskilled	1	h	93.12	2.38	0.00	221.62	0.00		
4	Concrete Placing									
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	15.63	0.45	30.85	7.03	482.19		
		s.b.	h	3.13	0.00	13.69	0.00	42.80		
4.02	Motorcompressors, 15 m ³ /min (14.5 m ³ /min. consumption)	Op.	h	15.63	0.19	38.74	3.02	605.57		
		s.b.	h	3.13	0.00	7.25	0.00	22.66		
4.03	General foreman	---	h	1.72	0.00	47.25	0.00	81.24		
4.04	Gang foreman	1	h	17.19	6.60	0.00	113.47	0.00		
4.05	Concrete pump, operator	1	h	17.19	5.82	0.00	100.06	0.00		
4.06	Concrete pump, helper	1	h	17.19	2.38	0.00	40.92	0.00		
4.07	Skilled	1	h	17.19	2.99	0.00	51.41	0.00		
4.08	Semiskilled	2	h	34.39	2.38	0.00	81.84	0.00		
5	General Services									
5.01	Ventilation, lighting & other general services	---	---	---	---	---	34.69	3,104.01		
Sub-total								4,377.42	17,867.42	
Missing items and construction contingencies							%	3.00%	131.32	536.02
Total Direct Costs								4,508.74	18,403.44	
Overheads, risks and profit on cement and admixtures							%	25.00%	7.14	64.26
Overhead, risks & profit on other costs							%	52.00%	1,176.58	10,589.23
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m³	275	20.66	105.48
AGGREGATE UNIT PRICE							m³			126.14

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
UNDERGROUND CONCRETE - EXPLOSIVE WAREHOUSE, ARCH AND SIDEWALLS**

**SEC 4-09
ANA 010
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	39.92	3.69	20.18	147.21	805.53
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	249.50	0.00	0.89	0.00	222.65
	b) Grouted anchor bars	---	kg	311.88	0.00	0.84	0.00	261.98
	c) Formwork bond breaking compound	---	kg	4.99	0.00	3.23	0.00	16.12
	d) Motorcompressor, 5 m ³ /min.	Op.	h	2.00	0.08	11.32	0.16	22.59
		s.b.	h	0.40	0.00	2.99	0.00	1.19
	e) Immersion type vibrator, 77 mm dia.	Op.	h	5.99	0.01	1.46	0.06	8.74
		s.b.	h	1.20	0.00	0.42	0.00	0.50
	f) General foreman	---	h	0.30	0.00	47.25	0.00	14.01
	g) Gang foreman	---	h	2.96	6.60	0.00	19.56	0.00
	h) Skilled	---	h	29.64	2.77	0.00	82.10	0.00
	i) Semiskilled	---	h	67.27	2.77	0.00	186.32	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	235.56	1.33	10.22	313.53	2,408.13
	b) Portland cement, normal type	50%	t	42.40	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	42.40	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	169.60	0.00	1.44	0.00	244.23
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	74.94	0.28	25.38	20.98	1,901.88
		s.b.	h	14.99	0.00	10.68	0.00	160.06
	b) General foreman	----	h	0.82	0.00	47.25	0.00	38.95
	c) Gang foreman	----	h	8.24	6.60	0.00	54.40	0.00
	d) Transit mixer, operator	1	h	82.43	5.82	0.00	479.74	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	----	----	353.54	1,934.57
3	Formworks							
3.01	Steel formworks	---	m ³	235.56	0.00	15.05	0.00	3,545.80
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.22	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	372.07	0.00	0.24	0.00	89.30
		s.b.	h	74.41	0.00	0.17	0.00	12.65
3.04	Truck for shifting the forms, 5 t pay load	Op.	h	63.53	0.05	3.96	2.86	251.26
		s.b.	h	12.71	0.00	2.57	0.00	32.59
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.17	0.00	350.00	0.00	59.99
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	34.28	0.00	3.58	0.00	122.73
3.07	Formwork bond breaking compound	---	kg	49.71	0.00	3.23	0.00	160.57
3.08	General foreman	---	h	9.31	0.00	47.25	0.00	439.98
3.09	Gang foreman	1	h	93.12	6.60	0.00	614.58	0.00
3.10	Specialist	2	h	186.23	3.69	0.00	687.21	0.00
03:11	Skilled	2	h	186.23	2.99	0.00	556.84	0.00
03:12	Semiskilled	1	h	93.12	2.38	0.00	221.62	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	15.63	0.45	30.85	7.03	482.19
		s.b.	h	3.13	0.00	13.69	0.00	42.80
4.02	Motorcompressors, 15 m ³ /min (14.5 m ³ /min. consumption)	Op.	h	15.63	0.19	38.74	3.02	605.57
		s.b.	h	3.13	0.00	7.25	0.00	22.66
4.03	General foreman	---	h	1.72	0.00	47.25	0.00	81.24
4.04	Gang foreman	1	h	17.19	6.60	0.00	113.47	0.00
4.05	Concrete pump, operator	1	h	17.19	5.82	0.00	100.06	0.00
4.06	Concrete pump, helper	1	h	17.19	2.38	0.00	40.92	0.00
4.07	Skilled	1	h	17.19	2.99	0.00	51.41	0.00
4.08	Semiskilled	2	h	34.39	2.38	0.00	81.84	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	34.69	3,104.01
Sub-total							4,173.18	17,094.47
Missing items and construction contingencies				%	3.00%		125.20	512.83
Total Direct Costs							4,298.37	17,607.31
Overheads, risks and profit on cement and admixtures				%	25.00%		7.14	64.26
Overhead, risks & profit on other costs				%	52.00%		1,124.24	10,118.19
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	275		19.71	100.88
AGGREGATE UNIT PRICE				m³				120.59

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	64.00	4.16	21.97	266.29	1,406.02
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	400.00	0.00	0.89	0.00	356.96
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.48	0.00	47.25	0.00	22.45
	g) Gang foreman	---	h	4.75	6.60	0.00	31.36	0.00
	h) Skilled	---	h	47.52	2.77	0.00	131.63	0.00
	i) Semiskilled	---	h	107.84	2.77	0.00	298.72	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	817.30	1.33	10.22	1,087.83	8,355.26
	b) Portland cement, normal type	50%	t	147.12	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	147.12	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	588.46	0.00	1.44	0.00	847.38
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	312.20	0.28	25.38	87.42	7,923.60
		s.b.	h	62.44	0.00	10.68	0.00	666.86
	b) General foreman	----	h	3.43	0.00	47.25	0.00	162.27
	c) Gang foreman	----	h	34.34	6.60	0.00	226.66	0.00
	d) Transit mixer, operator	1	h	343.42	5.82	0.00	1,998.70	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	54.5%	----	----	1,852.25	9,780.01
3	Formworks							
3.01	Steel formworks	---	m ³	817.30	0.00	13.95	0.00	11,402.33
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.13	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	1,743.55	0.00	0.24	0.00	418.45
		s.b.	h	348.71	0.00	0.17	0.00	59.28
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	101.85	0.09	7.91	9.17	805.65
		s.b.	h	20.37	0.00	5.13	0.00	104.50
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.60	0.00	350.00	0.00	210.71
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	120.41	0.00	3.58	0.00	431.05
3.07	Formwork bond breaking compound	---	kg	126.80	0.00	3.23	0.00	409.56
3.08	General foreman	---	h	22.00	0.00	47.25	0.00	1,039.63
3.09	Gang foreman	1	h	220.03	6.60	0.00	1,452.18	0.00
3.10	Specialist	2	h	440.05	3.69	0.00	1,623.80	0.00
03:11	Skilled	2	h	440.05	2.99	0.00	1,315.76	0.00
03:12	Semiskilled	1	h	220.03	2.38	0.00	523.66	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	50.00	0.45	30.85	22.50	1,542.59
		s.b.	h	10.00	0.00	13.69	0.00	136.91
4.02	Motorcompressors, 25 m ³ /min (23.0 m ³ /min. consumption)	Op.	h	50.00	0.27	71.75	13.34	3,587.74
		s.b.	h	10.00	0.00	9.87	0.00	98.72
4.03	General foreman	---	h	5.50	0.00	47.25	0.00	259.89
4.04	Gang foreman	1	h	55.00	6.60	0.00	363.02	0.00
4.05	Concrete pump, operator	1	h	55.00	5.82	0.00	320.12	0.00
4.06	Concrete pump, helper	1	h	55.00	2.38	0.00	130.91	0.00
4.07	Skilled	1	h	55.00	2.99	0.00	164.46	0.00
4.08	Semiskilled	2	h	110.01	2.38	0.00	261.81	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	99.48	8,190.33
Sub-total							12,281.40	58,716.95
Missing items and construction contingencies				%	1.50%		184.22	880.75
Total Direct Costs							12,465.63	59,597.70
Overheads, risks and profit on cement and admixtures				%	25.00%		22.84	205.59
Overhead, risks & profit on other costs				%	52.00%		3,699.78	33,298.01
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m³	881.30		18.37	105.64
AGGREGATE UNIT PRICE				m³				124.01

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	64.00	4.04	21.50	258.30	1,375.78
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	400.00	0.00	0.89	0.00	356.96
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.48	0.00	47.25	0.00	22.45
	g) Gang foreman	---	h	4.75	6.60	0.00	31.36	0.00
	h) Skilled	---	h	47.52	2.77	0.00	131.63	0.00
	h) Semiskilled	---	h	107.84	2.77	0.00	298.72	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,125.81	1.33	10.22	1,498.45	11,509.16
	b) Portland cement, normal type	50%	t	202.65	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	202.65	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	810.58	0.00	1.44	0.00	1,167.24
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	411.07	0.28	25.38	115.10	10,432.88
		s.b.	h	82.21	0.00	10.68	0.00	878.04
	b) General foreman	----	h	4.52	0.00	47.25	0.00	213.65
	c) Gang foreman	----	h	45.22	6.60	0.00	298.43	0.00
	d) Transit mixer, operator	1	h	452.17	5.82	0.00	2,631.65	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	50.6%	----	----	2,301.33	12,257.67
3	Formworks							
3.01	Steel formworks	---	m ³	1,125.81	0.00	13.87	0.00	15,611.23
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	1.03	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	2,669.34	0.00	0.24	0.00	640.64
		s.b.	h	533.87	0.00	0.17	0.00	90.76
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	101.85	0.09	7.91	9.17	805.65
		s.b.	h	20.37	0.00	5.13	0.00	104.50
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.79	0.00	350.00	0.00	277.44
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	158.54	0.00	3.58	0.00	567.56
3.07	Formwork bond breaking compound	---	kg	153.40	0.00	3.23	0.00	495.48
3.08	General foreman	---	h	26.42	0.00	47.25	0.00	1,248.51
3.09	Gang foreman	1	h	264.23	6.60	0.00	1,743.95	0.00
3.10	Specialist	2	h	528.47	3.69	0.00	1,950.05	0.00
03:11	Skilled	2	h	528.47	2.99	0.00	1,580.12	0.00
03:12	Semiskilled	1	h	264.23	2.38	0.00	628.88	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	67.51	0.45	30.85	30.38	2,082.59
		s.b.	h	13.50	0.00	13.69	0.00	184.83
4.02	Motorcompressors, 30 m ³ /min (27.8 m ³ /min. consumption)	Op.	h	67.51	0.31	92.12	20.64	6,218.74
		s.b.	h	13.50	0.00	11.10	0.00	149.89
4.03	General foreman	---	h	7.43	0.00	47.25	0.00	350.87
4.04	Gang foreman	1	h	74.26	6.60	0.00	490.10	0.00
4.05	Concrete pump, operator	1	h	74.26	5.82	0.00	432.18	0.00
4.06	Concrete pump, helper	1	h	74.26	2.38	0.00	176.73	0.00
4.07	Skilled	1	h	74.26	2.99	0.00	222.03	0.00
4.08	Semiskilled	2	h	148.52	2.38	0.00	353.47	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	139.41	11,478.28
Sub-total							15,342.44	79,019.58
Missing items and construction contingencies							230.14	1,185.29
Total Direct Costs							15,572.58	80,204.87
Overheads, risks and profit on cement and admixtures							30.84	277.56
Overhead, risks & profit on other costs							4,916.28	44,246.52
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							17.25	104.83
AGGREGATE UNIT PRICE								122.08

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 30-40 M2, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	64.00	3.91	21.03	250.43	1,346.02
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	400.00	0.00	0.89	0.00	356.96
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.48	0.00	47.25	0.00	22.45
	g) Gang foreman	---	h	4.75	6.60	0.00	31.36	0.00
	h) Skilled	---	h	47.52	2.77	0.00	131.63	0.00
	h) Semiskilled	---	h	107.84	2.77	0.00	298.72	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,465.72	1.33	10.22	1,950.87	14,984.06
	b) Portland cement, normal type	50%	t	263.83	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	263.83	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,055.32	0.00	1.44	0.00	1,519.66
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	510.87	0.28	25.38	143.04	12,965.98
		s.b.	h	102.17	0.00	10.68	0.00	1,091.23
	b) General foreman	----	h	5.62	0.00	47.25	0.00	265.53
	c) Gang foreman	----	h	56.20	6.60	0.00	370.89	0.00
	d) Transit mixer, operator	1	h	561.96	5.82	0.00	3,270.61	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	45.6%	----	----	2,616.76	14,064.41
3	Formworks							
3.01	Steel formworks	---	m ³	1,465.72	0.00	12.73	0.00	18,665.50
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.94	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	3,776.61	0.00	0.24	0.00	906.39
		s.b.	h	755.32	0.00	0.17	0.00	128.40
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	101.85	0.09	7.91	9.17	805.65
		s.b.	h	20.37	0.00	5.13	0.00	104.50
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	0.99	0.00	350.00	0.00	344.80
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	197.03	0.00	3.58	0.00	705.36
3.07	Formwork bond breaking compound	---	kg	179.10	0.00	3.23	0.00	578.49
3.08	General foreman	---	h	27.37	0.00	47.25	0.00	1,293.21
3.09	Gang foreman	1	h	273.70	6.60	0.00	1,806.39	0.00
3.10	Specialist	2	h	547.39	3.69	0.00	2,019.88	0.00
03:11	Skilled	2	h	547.39	2.99	0.00	1,636.70	0.00
03:12	Semiskilled	1	h	273.70	2.38	0.00	651.40	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	86.79	0.45	30.85	39.06	2,677.55
		s.b.	h	17.36	0.00	13.69	0.00	237.64
4.02	Motorcompressors, 30 m ³ /min (32.5 m ³ /min. consumption)	Op.	h	86.79	0.36	107.69	31.03	9,347.06
		s.b.	h	17.36	0.00	12.98	0.00	225.28
4.03	General foreman	---	h	9.55	0.00	47.25	0.00	451.10
4.04	Gang foreman	1	h	95.47	6.60	0.00	630.11	0.00
4.05	Concrete pump, operator	1	h	95.47	5.82	0.00	555.65	0.00
4.06	Concrete pump, helper	1	h	95.47	2.38	0.00	227.22	0.00
4.07	Skilled	1	h	95.47	2.99	0.00	285.46	0.00
4.08	Semiskilled	2	h	190.94	2.38	0.00	454.45	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	172.43	14,196.38
Sub-total							17,583.62	97,782.41
Missing items and construction contingencies			%	1.50%	----->>		263.75	1,466.74
Total Direct Costs							17,847.37	99,249.14
Overheads, risks and profit on cement and admixtures			%	25.00%	----->>		39.65	356.85
Overhead, risks & profit on other costs			%	52.00%	----->>		6,006.55	54,058.91
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m ³	1,530	----->>		15.62	100.45
AGGREGATE UNIT PRICE			m ³		----->>			116.07

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 40-50 M2, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	64.00	3.86	20.84	247.15	1,333.60
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	400.00	0.00	0.89	0.00	356.96
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.48	0.00	47.25	0.00	22.45
	g) Gang foreman	---	h	4.75	6.60	0.00	31.36	0.00
	h) Skilled	---	h	47.52	2.77	0.00	131.63	0.00
	h) Semiskilled	---	h	107.84	2.77	0.00	298.72	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	1,787.31	1.33	10.22	2,378.91	18,271.67
	b) Portland cement, normal type	50%	t	321.72	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	321.72	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,286.86	0.00	1.44	0.00	1,853.08
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	h	610.59	0.28	25.38	170.97	15,496.86
		s.b.	h	122.12	0.00	10.68	0.00	1,304.23
	b) General foreman	----	h	6.72	0.00	47.25	0.00	317.36
	c) Gang foreman	----	h	67.17	6.60	0.00	443.29	0.00
	d) Transit mixer, operator	1	h	671.65	5.82	0.00	3,909.02	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	43.8%	----	----	3,024.23	16,318.29
3	Formworks							
3.01	Steel formworks	---	m ³	1,787.31	0.00	12.24	0.00	21,868.26
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.91	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	5,089.99	0.00	0.24	0.00	1,221.60
		s.b.	h	1,018.00	0.00	0.17	0.00	173.06
3.04	Truck for shifting the forms, 10 t pay load	Op.	h	101.85	0.09	7.91	9.17	805.65
		s.b.	h	20.37	0.00	5.13	0.00	104.50
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.18	0.00	350.00	0.00	412.10
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	235.49	0.00	3.58	0.00	843.04
3.07	Formwork bond breaking compound	---	kg	205.50	0.00	3.23	0.00	663.77
3.08	General foreman	---	h	30.07	0.00	47.25	0.00	1,420.77
3.09	Gang foreman	1	h	300.69	6.60	0.00	1,984.56	0.00
3.10	Specialist	2	h	601.38	3.69	0.00	2,219.10	0.00
03:11	Skilled	2	h	601.38	2.99	0.00	1,798.14	0.00
03:12	Semiskilled	1	h	300.69	2.38	0.00	715.65	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	105.04	0.45	30.85	47.27	3,240.45
		s.b.	h	21.01	0.00	13.69	0.00	287.60
4.02	Motorcompressors, 30 m ³ /min (37.3 m ³ /min. consumption)	Op.	h	105.04	0.41	123.60	43.10	12,982.78
		s.b.	h	21.01	0.00	14.90	0.00	312.91
4.03	General foreman	---	h	11.55	0.00	47.25	0.00	545.94
4.04	Gang foreman	1	h	115.54	6.60	0.00	762.58	0.00
4.05	Concrete pump, operator	1	h	115.54	5.82	0.00	672.46	0.00
4.06	Concrete pump, helper	1	h	115.54	2.38	0.00	274.99	0.00
4.07	Skilled	1	h	115.54	2.99	0.00	345.47	0.00
4.08	Semiskilled	2	h	231.09	2.38	0.00	549.98	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	216.48	17,823.33
Sub-total							20,274.57	118,479.05
Missing items and construction contingencies							304.12	1,777.19
Total Direct Costs							20,578.69	120,256.24
Overheads, risks and profit on cement and admixtures							47.99	431.87
Overhead, risks & profit on other costs							7,223.61	65,012.45
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							15.04	100.31
AGGREGATE UNIT PRICE								115.35

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 50-60 M2, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST			
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)		
1	Side Curbs for Formwork Anchoring									
1.01	Concrete, supply and transport (see n. 2 below):									
	a) Concrete Class B2-25/37	---	m ³	64.00	3.20	20.16	204.57	1,290.30		
1.02	Formworks and concrete placing:									
	a) Formwork	---	m ²	400.00	0.00	0.89	0.00	356.96		
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00		
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84		
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22		
		s.b.	h	0.64	0.00	2.99	0.00	1.91		
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02		
		s.b.	h	1.92	0.00	0.42	0.00	0.81		
	f) General foreman	---	h	0.48	0.00	47.25	0.00	22.45		
	g) Gang foreman	---	h	4.75	6.60	0.00	31.36	0.00		
	h) Skilled	---	h	47.52	2.77	0.00	131.63	0.00		
	h) Semiskilled	---	h	107.84	2.77	0.00	298.72	0.00		
2	Concrete Class B2-25/37 (Supply and Transport)									
2.01	Concrete at the batching plant:									
	a) Concrete at the batching and mixing plant	---	m ³	2,096.23	1.33	10.22	2,790.08	21,429.76		
	b) Portland cement, normal type	50%	t	377.32	0.00	0.00	0.00	0.00		
	c) Portland cement, sulfate resistant type	50%	t	377.32	0.00	0.00	0.00	0.00		
	d) Concrete admixture, water reducing	1	kg	1,509.29	0.00	1.44	0.00	2,173.37		
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00		
2.02	Concrete transport:									
	a) Transit mixer, 6 m ³ nominal capacity	Op.	h	528.58	0.27	32.54	142.72	17,200.01		
		s.b.	h	105.72	0.00	11.20	0.00	1,184.02		
	b) General foreman	---	h	5.81	0.00	47.25	0.00	274.73		
	c) Gang foreman	---	h	58.14	6.60	0.00	383.75	0.00		
	d) Transit mixer, operator	1	h	581.44	5.82	0.00	3,383.97	0.00		
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00		
2.03	Concrete for overbreaks and losses	---	%	42.2%	---	---	2,828.12	17,837.69		
3	Formworks									
3.01	Steel formworks	---	m ³	2,096.23	0.00	11.77	0.00	24,680.14		
3.02	Side closure of formworks (construction joints)	0	m ³	0.00	0.00	0.87	0.00	0.00		
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	6,457.78	0.00	0.24	0.00	1,549.87		
		s.b.	h	1,291.56	0.00	0.17	0.00	219.56		
3.04	Truck for shifting the forms, 15 t pay load	Op.	h	101.85	0.13	11.37	13.24	1,158.06		
		s.b.	h	20.37	0.00	7.32	0.00	149.11		
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.36	0.00	350.00	0.00	475.49		
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	271.71	0.00	3.58	0.00	972.72		
3.07	Formwork bond breaking compound	---	kg	228.70	0.00	3.23	0.00	738.70		
3.08	General foreman	---	h	32.55	0.00	47.25	0.00	1,537.86		
3.09	Gang foreman	1	h	325.47	6.60	0.00	2,148.12	0.00		
3.10	Specialist	2	h	650.94	3.69	0.00	2,401.98	0.00		
03:11	Skilled	2	h	650.94	2.99	0.00	1,946.32	0.00		
03:12	Semiskilled	1	h	325.47	2.38	0.00	774.62	0.00		
4	Concrete Placing									
4.01	Electric powered concrete pump, 47 m ³ /h max. capacity	Op.	h	122.57	0.45	30.85	55.15	3,781.17		
		s.b.	h	24.51	0.00	13.69	0.00	335.59		
4.02	Motorcompressors, 30 m ³ /min (41.5 m ³ /min. consumption)	Op.	h	122.57	0.46	137.52	55.95	16,854.96		
		s.b.	h	24.51	0.00	16.57	0.00	406.24		
4.03	General foreman	---	h	13.48	0.00	47.25	0.00	637.04		
4.04	Gang foreman	1	h	134.82	6.60	0.00	889.83	0.00		
4.05	Concrete pump, operator	1	h	134.82	5.82	0.00	784.67	0.00		
4.06	Concrete pump, helper	1	h	134.82	2.38	0.00	320.88	0.00		
4.07	Skilled	1	h	134.82	2.99	0.00	403.12	0.00		
4.08	Semiskilled	2	h	269.65	2.38	0.00	641.76	0.00		
5	General Services									
5.01	Ventilation, lighting & other general services	---	---	---	---	---	263.67	21,708.66		
Sub-total								20,894.60	137,473.26	
Missing items and construction contingencies							%	1.50%	313.42	2,062.10
Total Direct Costs								21,208.02	139,535.35	
Overheads, risks and profit on cement and admixtures							%	25.00%	55.99	503.94
Overhead, risks & profit on other costs							%	52.00%	8,242.19	74,179.71
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							m ³	2,160.23	13.66	99.16
AGGREGATE UNIT PRICE							m ³			112.82

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 60-70 M2, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m³	64.00	3.17	20.03	202.87	1,282.17
1.02	Formworks and concrete placing:							
	a) Formwork	---	m2	400.00	0.00	0.89	0.00	356.96
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m3/min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.48	0.00	47.25	0.00	22.45
	g) Gang foreman	---	h	4.75	6.60	0.00	31.36	0.00
	h) Skilled	---	h	47.52	2.77	0.00	131.63	0.00
	h) Semiskilled	---	h	107.84	2.77	0.00	298.72	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m³	2,395.59	1.33	10.22	3,188.53	24,490.12
	b) Portland cement, normal type	50%	t	431.21	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	431.21	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,724.82	0.00	1.44	0.00	2,483.75
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 6 m3 nominal capacity	Op.	h	595.45	0.27	32.54	160.77	19,375.95
		s.b.	h	119.09	0.00	11.20	0.00	1,333.81
	b) General foreman	---	h	6.55	0.00	47.25	0.00	309.49
	c) Gang foreman	---	h	65.50	6.60	0.00	432.30	0.00
	d) Transit mixer, operator	1	h	655.00	5.82	0.00	3,812.07	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	40.7%	---	---	3,090.62	19,533.20
3	Formworks							
3.01	Steel formworks	---	m3	2,395.59	0.00	13.24	0.00	31,708.90
3.02	Side closure of formworks (construction joints)	0	m3	0.00	0.00	0.84	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	7,863.08	0.00	0.24	0.00	1,887.14
		s.b.	h	1,572.62	0.00	0.17	0.00	267.34
3.04	Truck for shifting the forms, 15 t pay load	Op.	h	101.85	0.13	11.37	13.24	1,158.06
		s.b.	h	20.37	0.00	7.32	0.00	149.11
3.05	Timber for side closure of formwork (construction joint)	0.2	m3	1.53	0.00	350.00	0.00	535.64
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m2	306.08	0.00	3.58	0.00	1,095.77
3.07	Formwork bond breaking compound	---	kg	249.40	0.00	3.23	0.00	805.56
3.08	General foreman	---	h	19.89	0.00	47.25	0.00	939.98
3.09	Gang foreman	1	h	198.94	6.60	0.00	1,312.99	0.00
3.10	Specialist	2	h	397.88	3.69	0.00	1,468.16	0.00
03:11	Skilled	2	h	397.88	2.99	0.00	1,189.65	0.00
03:12	Semiskilled	1	h	198.94	2.38	0.00	473.47	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 47 m3/h max. capacity	Op.	h	139.55	0.45	30.85	62.80	4,305.15
		s.b.	h	27.91	0.00	13.69	0.00	382.09
4.02	Motorcompressors, 30 m3/min (45.3 m3/min. consumption)	Op.	h	139.55	0.50	150.11	69.54	20,947.91
		s.b.	h	27.91	0.00	18.09	0.00	504.89
4.03	General foreman	---	h	15.35	0.00	47.25	0.00	725.32
4.04	Gang foreman	1	h	153.51	6.60	0.00	1,013.14	0.00
4.05	Concrete pump, operator	1	h	153.51	5.82	0.00	893.41	0.00
4.06	Concrete pump, helper	1	h	153.51	2.38	0.00	365.35	0.00
4.07	Skilled	1	h	153.51	2.99	0.00	458.98	0.00
4.08	Semiskilled	2	h	307.01	2.38	0.00	730.69	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	235.35	19,376.90
Sub-total							19,636.00	154,476.47
Missing items and construction contingencies			%	1.50%	----->>		294.54	2,317.15
Total Direct Costs							19,930.54	156,793.62
Overheads, risks and profit on cement and admixtures			%	25.00%	----->>		63.75	573.77
Overhead, risks & profit on other costs			%	52.00%	----->>		9,057.05	81,513.46
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m3	2,460	----->>		11.81	97.12
AGGREGATE UNIT PRICE			m3		----->>			108.93

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 70-80 M2, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	64.00	2.71	19.44	173.17	1,244.01
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	400.00	0.00	1.34	0.00	535.20
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.59	0.00	47.25	0.00	28.07
	g) Gang foreman	---	h	5.94	6.60	0.00	39.20	0.00
	h) Skilled	---	h	59.40	2.77	0.00	164.54	0.00
	h) Semiskilled	---	h	128.40	2.77	0.00	355.67	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,507.71	1.33	10.22	3,337.76	25,636.32
	b) Portland cement, normal type	50%	t	451.39	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	451.39	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	1,805.55	0.00	1.44	0.00	2,599.99
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	462.26	0.33	41.12	152.55	19,008.31
		s.b.	h	92.45	0.00	13.62	0.00	1,259.21
	b) General foreman	---	h	5.08	0.00	47.25	0.00	240.26
	c) Gang foreman	---	h	50.85	6.60	0.00	335.60	0.00
	d) Transit mixer, operator	1	h	508.49	5.82	0.00	2,959.42	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	39.3%	---	---	2,665.92	19,151.30
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	2,507.71	0.00	12.77	0.00	32,028.30
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.81	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	5,436.23	0.00	0.24	0.00	1,304.69
		s.b.	h	1,087.25	0.00	0.17	0.00	184.83
3.04	Truck for shifting the forms, 25 t pay load	Op.	h	74.07	0.17	15.78	12.59	1,168.89
		s.b.	h	14.81	0.00	10.59	0.00	156.89
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.58	0.00	350.00	0.00	554.45
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	316.83	0.00	3.58	0.00	1,134.24
3.07	Formwork bond breaking compound	---	kg	268.20	0.00	3.23	0.00	866.29
3.08	General foreman	---	h	28.78	0.00	47.25	0.00	1,359.92
3.09	Gang foreman	1	h	287.81	6.60	0.00	1,899.58	0.00
3.10	Specialist	3	h	863.44	3.69	0.00	3,186.11	0.00
03:11	Skilled	2	h	575.63	2.99	0.00	1,721.13	0.00
03:12	Semiskilled	1	h	287.81	2.38	0.00	685.00	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	86.81	0.61	44.83	52.95	3,891.64
		s.b.	h	17.36	0.00	13.85	0.00	240.46
4.02	Motorcompressors, 30 m ³ /min (44.3 m ³ /min. consumption)	Op.	h	86.81	0.49	146.80	42.30	12,743.13
		s.b.	h	17.36	0.00	17.69	0.00	307.14
4.03	General foreman	---	h	9.55	0.00	47.25	0.00	451.19
4.04	Gang foreman	1	h	95.49	6.60	0.00	630.23	0.00
4.05	Concrete pump, operator	1	h	95.49	5.82	0.00	555.75	0.00
4.06	Concrete pump, helper	1	h	95.49	2.38	0.00	227.27	0.00
4.07	Skilled	1	h	95.49	2.99	0.00	285.51	0.00
4.08	Semiskilled	2	h	190.98	2.38	0.00	454.53	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	256.44	21,113.89
Sub-total							20,193.58	147,707.40
Missing items and construction contingencies							302.90	2,215.61
Total Direct Costs							20,496.48	149,923.01
Overheads, risks and profit on cement and admixtures							66.66	599.93
Overhead, risks & profit on other costs							8,723.16	78,508.47
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							11.39	89.06
AGGREGATE UNIT PRICE								100.45

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 80-90 M2, ARCH AND SIDEWALLS

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1	Side Curbs for Formwork Anchoring							
1.01	Concrete, supply and transport (see n. 2 below):							
	a) Concrete Class B2-25/37	---	m ³	64.00	2.68	19.26	171.22	1,232.41
1.02	Formworks and concrete placing:							
	a) Formwork	---	m ²	400.00	0.00	1.34	0.00	535.20
	b) Grouted anchor bars	---	kg	500.00	0.00	0.84	0.00	420.00
	c) Formwork bond breaking compound	---	kg	8.00	0.00	3.23	0.00	25.84
	d) Motorcompressor, 5 m ³ /min.	Op.	h	3.20	0.08	11.32	0.26	36.22
		s.b.	h	0.64	0.00	2.99	0.00	1.91
	e) Immersion type vibrator, 77 mm dia.	Op.	h	9.60	0.01	1.46	0.10	14.02
		s.b.	h	1.92	0.00	0.42	0.00	0.81
	f) General foreman	---	h	0.59	0.00	47.25	0.00	28.07
	g) Gang foreman	---	h	5.94	6.60	0.00	39.20	0.00
	h) Skilled	---	h	59.40	2.77	0.00	164.54	0.00
	h) Semiskilled	---	h	128.40	2.77	0.00	355.67	0.00
2	Concrete Class B2-25/37 (Supply and Transport)							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	2,985.91	1.33	10.22	3,974.25	30,524.96
	b) Portland cement, normal type	50%	t	537.46	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	50%	t	537.46	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	2,149.86	0.00	1.44	0.00	3,095.79
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2.02	Concrete transport:							
	a) Transit mixer, 8 m ³ nominal capacity	Op.	h	538.21	0.33	41.12	177.61	22,131.17
		s.b.	h	107.64	0.00	13.62	0.00	1,466.08
	b) General foreman	---	h	5.92	0.00	47.25	0.00	279.73
	c) Gang foreman	---	h	59.20	6.60	0.00	390.74	0.00
	d) Transit mixer, operator	1	h	592.03	5.82	0.00	3,445.62	0.00
	e) Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
2.03	Concrete for overbreaks and losses	---	%	36.7%	---	---	2,935.34	21,128.06
3	Formworks							
3.01	Steel formworks excluding side closure	---	m ³	2,985.91	0.00	11.93	0.00	35,635.12
3.02	Side closure of formworks	0	m ³	0.00	0.00	0.76	0.00	0.00
3.03	Pneumatic external vibrators, 11000 N type	Op.	h	6,463.77	0.00	0.24	0.00	1,551.31
		s.b.	h	1,292.75	0.00	0.17	0.00	219.77
3.04	Truck for shifting the forms, 20 t pay load	Op.	h	101.85	0.15	13.48	15.28	1,372.96
		s.b.	h	20.37	0.00	8.88	0.00	180.89
3.05	Timber for side closure of formwork (construction joint)	0.2	m ³	1.84	0.00	350.00	0.00	645.54
3.06	Ribbed sheet for side closure of formwork (const. joint)	0.8	m ²	368.88	0.00	3.58	0.00	1,320.58
3.07	Formwork bond breaking compound	---	kg	278.20	0.00	3.23	0.00	898.59
3.08	General foreman	---	h	34.22	0.00	47.25	0.00	1,617.11
3.09	Gang foreman	1	h	342.24	6.60	0.00	2,258.81	0.00
3.10	Specialist	3	h	1,026.73	3.69	0.00	3,788.65	0.00
03:11	Skilled	2	h	684.49	2.99	0.00	2,046.62	0.00
03:12	Semiskilled	1	h	342.24	2.38	0.00	814.54	0.00
4	Concrete Placing							
4.01	Electric powered concrete pump, 79 m ³ /h max. capacity	Op.	h	102.95	0.61	44.83	62.80	4,615.27
		s.b.	h	20.59	0.00	13.85	0.00	285.17
4.02	Motorcompressors, 30 m ³ /min (45.9 m ³ /min. consumption)	Op.	h	102.95	0.50	152.10	51.98	15,658.50
		s.b.	h	20.59	0.00	18.33	0.00	377.40
4.03	General foreman	---	h	11.32	0.00	47.25	0.00	535.09
4.04	Gang foreman	1	h	113.25	6.60	0.00	747.42	0.00
4.05	Concrete pump, operator	1	h	113.25	5.82	0.00	659.09	0.00
4.06	Concrete pump, helper	1	h	113.25	2.38	0.00	269.52	0.00
4.07	Skilled	1	h	113.25	2.99	0.00	338.60	0.00
4.08	Semiskilled	2	h	226.49	2.38	0.00	539.05	0.00
5	General Services							
5.01	Ventilation, lighting & other general services	---	---	---	---	---	324.30	26,700.35
Sub-total							23,571.20	172,533.92
Missing items and construction contingencies			%	1.50%			353.57	2,588.01
Total Direct Costs							23,924.77	175,121.93
Overheads, risks and profit on cement and admixtures			%	25.00%			79.05	711.48
Overhead, risks & profit on other costs			%	52.00%			10,186.00	91,673.97
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY			m³	3,049.91			11.21	87.71
AGGREGATE UNIT PRICE			m³					98.92

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 4-10
ANA 008

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 15-20 M2, INVERT

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	25.38	0.06	7.75	1.52	196.70
		s.b.	h	6.35	0.00	5.08	0.00	32.23
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	10.71	0.27	23.93	2.89	256.20
		s.b.	h	2.14	0.00	12.03	0.00	25.76
1.03	Hand-held breaker, medium weight type	Op.	h	49.78	0.04	2.03	1.99	101.06
		s.b.	h	9.96	0.00	1.21	0.00	12.05
1.04	Hand held breaker tool,moil point type	----	ea.	0.50	0.00	32.37	0.00	16.12
1.05	Breaker tool resharpen	----	h	1.49	0.01	1.57	0.01	2.34
1.06	General foreman	----	h	1.24	0.00	47.25	0.00	58.81
1.07	Gang foreman	1	h	12.45	6.60	0.00	82.14	0.00
1.08	Dumper driver and backhoe operator	1	h	39.69	5.82	0.00	231.02	0.00
1.09	Skilled	2	h	24.89	2.99	0.00	74.43	0.00
1.10	Semiskilled	2	h	24.89	2.38	0.00	59.24	0.00
1.11	Unskilled	4	h	49.78	1.77	0.00	88.12	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	190.80	1.33	10.22	253.95	1,950.55
	b) Portland cement, normal type	0.5	t	34.35	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	0.5	t	34.35	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	206.06	0.00	1.44	0.00	296.73
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	61.57	0.28	25.38	17.24	1,562.54
		s.b.	hr	12.31	0.00	10.68	0.00	131.50
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00
		s.b.	h	0.00	0.00	11.20	0.00	0.00
3.03	General foreman	----	h	0.68	0.00	47.25	0.00	32.00
3.04	Gang foreman	----	h	6.77	6.60	0.00	44.70	0.00
3.05	Transit mixer operator	1	h	67.72	5.82	0.00	394.14	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	288.98	1,617.14
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	10.83	0.45	30.85	4.87	333.97
		s.b.	h	2.17	0.00	13.69	0.00	29.64
5.03	Sliding vibrating bar	Op.	h	10.83	0.02	1.77	0.22	19.16
		s.b.	h	2.17	0.00	0.60	0.00	1.30
5.04	General foreman	1	h	3.13	0.00	47.25	0.00	147.87
5.05	Gang foreman	1	h	15.65	6.60	0.00	103.28	0.00
5.06	Concrete pump, operator	1	h	11.91	5.82	0.00	69.31	0.00
5.07	Concrete pump, helper	1	h	11.91	2.38	0.00	28.34	0.00
5.08	Skilled	2	h	31.30	2.99	0.00	93.57	0.00
5.09	Semiskilled	4	h	62.59	2.38	0.00	148.97	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	9.93	817.42
Sub-total							1,998.87	7,641.09
Missing items and construction contingencies							29.98	114.62
Total Direct Costs							2,028.85	7,755.70
Overheads, risks and profit on cement and admixtures							7.42	66.76
Overhead, risks & profit on other costs							493.37	4,440.30
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							13.26	64.27
AGGREGATE UNIT PRICE								77.53

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 4-10
ANA 009

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 20-30 M2, INVERT

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	31.73	0.06	7.75	1.90	245.87	
		s.b.	h	7.93	0.00	5.08	0.00	40.29	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	13.66	0.27	23.93	3.69	326.79	
		s.b.	h	2.73	0.00	12.03	0.00	32.86	
1.03	Hand-held breaker, medium weight type	Op.	h	63.50	0.04	2.03	2.54	128.91	
		s.b.	h	12.70	0.00	1.21	0.00	15.37	
1.04	Hand held breaker tool,moil point type	----	ea.	0.64	0.00	32.37	0.00	20.56	
1.05	Breaker tool resharpen	----	h	1.91	0.01	1.57	0.02	2.99	
1.06	General foreman	----	h	1.59	0.00	47.25	0.00	75.01	
1.07	Gang foreman	1	h	15.88	6.60	0.00	104.78	0.00	
1.08	Dumper driver and backhoe operator	1	h	49.92	5.82	0.00	290.53	0.00	
1.09	Skilled	2	h	31.75	2.99	0.00	94.93	0.00	
1.10	Semiskilled	2	h	31.75	2.38	0.00	75.57	0.00	
1.11	Unskilled	4	h	63.50	1.77	0.00	112.40	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	246.00	1.33	10.22	327.43	2,514.86	
	b) Portland cement, normal type	0.5	t	44.28	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	44.28	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	265.68	0.00	1.44	0.00	382.58	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	79.38	0.28	25.38	22.23	2,014.60	
		s.b.	hr	15.88	0.00	10.68	0.00	169.55	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	0.87	0.00	47.25	0.00	41.26	
3.04	Gang foreman	----	h	8.73	6.60	0.00	57.63	0.00	
3.05	Transit mixer operator	1	h	87.32	5.82	0.00	508.17	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	372.59	2,085.00	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	13.96	0.45	30.85	6.28	430.59	
		s.b.	h	2.79	0.00	13.69	0.00	38.22	
5.03	Sliding vibrating bar	Op.	h	13.96	0.02	1.77	0.28	24.70	
		s.b.	h	2.79	0.00	0.60	0.00	1.67	
5.04	General foreman	1	h	3.84	0.00	47.25	0.00	181.26	
5.05	Gang foreman	1	h	19.18	6.60	0.00	126.59	0.00	
5.06	Concrete pump, operator	1	h	15.35	5.82	0.00	89.36	0.00	
5.07	Concrete pump, helper	1	h	15.35	2.38	0.00	36.54	0.00	
5.08	Skilled	2	h	38.36	2.99	0.00	114.70	0.00	
5.09	Semiskilled	4	h	76.72	2.38	0.00	182.60	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	13.82	1,137.79	
Sub-total							2,544.56	9,910.70	
Missing items and construction contingencies				%	1.50%			38.17	148.66
Total Direct Costs							2,582.73	10,059.36	
Overheads, risks and profit on cement and admixtures				%	25.00%			9.56	86.08
Overhead, risks & profit on other costs				%	52.00%			637.49	5,737.45
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	246.00			13.13	64.56
AGGREGATE UNIT PRICE				m3					77.69

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
1	Preparation of Invert Surface							
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	38.07	0.06	7.75	2.28	295.04
		s.b.	h	9.52	0.00	5.08	0.00	48.35
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	13.29	0.27	23.93	3.59	317.91
		s.b.	h	2.66	0.00	12.03	0.00	31.96
1.03	Hand-held breaker, medium weight type	Op.	h	61.78	0.04	2.03	2.47	125.40
		s.b.	h	12.36	0.00	1.21	0.00	14.95
1.04	Hand held breaker tool,moil point type	----	ea.	0.62	0.00	32.37	0.00	20.00
1.05	Breaker tool resharpeners	----	h	1.85	0.01	1.57	0.02	2.91
1.06	General foreman	----	h	1.54	0.00	47.25	0.00	72.97
1.07	Gang foreman	1	h	15.44	6.60	0.00	101.93	0.00
1.08	Dumper driver and backhoe operator	1	h	56.49	5.82	0.00	328.77	0.00
1.09	Skilled	2	h	30.89	2.99	0.00	92.35	0.00
1.10	Semiskilled	2	h	30.89	2.38	0.00	73.51	0.00
1.11	Unskilled	4	h	61.78	1.77	0.00	109.34	0.00
2	Concrete Class B2-25/37							
2.01	Concrete at the batching plant:							
	a) Concrete at the batching and mixing plant	---	m ³	301.20	1.33	10.22	400.90	3,079.17
	b) Portland cement, normal type	0.5	t	54.22	0.00	0.00	0.00	0.00
	c) Portland cement, sulfate resistant type	0.5	t	54.22	0.00	0.00	0.00	0.00
	d) Concrete admixture, water reducing	1	kg	325.30	0.00	1.44	0.00	468.43
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
3	Concrete Transport							
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	97.19	0.28	25.38	27.21	2,466.65
		s.b.	hr	19.44	0.00	10.68	0.00	207.60
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00
		s.b.	h	0.00	0.00	11.20	0.00	0.00
3.03	General foreman	----	h	1.07	0.00	47.25	0.00	50.51
3.04	Gang foreman	----	h	10.69	6.60	0.00	70.56	0.00
3.05	Transit mixer operator	1	h	106.91	5.82	0.00	622.20	0.00
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	456.19	2,552.85
5	Formworks and Concrete Placing							
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	17.09	0.45	30.85	7.69	527.21
		s.b.	h	3.42	0.00	13.69	0.00	46.79
5.03	Sliding vibrating bar	Op.	h	17.09	0.02	1.77	0.34	30.25
		s.b.	h	3.42	0.00	0.60	0.00	2.05
5.04	General foreman	1	h	4.54	0.00	47.25	0.00	214.64
5.05	Gang foreman	1	h	22.71	6.60	0.00	149.91	0.00
5.06	Concrete pump, operator	1	h	18.80	5.82	0.00	109.41	0.00
5.07	Concrete pump, helper	1	h	18.80	2.38	0.00	44.74	0.00
5.08	Skilled	2	h	45.43	2.99	0.00	135.82	0.00
5.09	Semiskilled	4	h	90.85	2.38	0.00	216.23	0.00
6	General Services							
6.01	Ventilation, lighting & other general services	---	---	---	---	---	16.83	1,385.77
Sub-total							2,972.31	11,961.40
Missing items and construction contingencies							44.58	179.42
Total Direct Costs							3,016.89	12,140.83
Overheads, risks and profit on cement and admixtures							11.71	105.40
Overhead, risks & profit on other costs							763.84	6,874.59
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY							12.59	63.48
AGGREGATE UNIT PRICE								76.07

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 4-10
ANA 011

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 40-50 M2, INVERT

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	41.24	0.06	7.75	2.47	319.63	
		s.b.	h	10.31	0.00	5.08	0.00	52.38	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	12.05	0.27	23.93	3.25	288.46	
		s.b.	h	2.41	0.00	12.03	0.00	29.00	
1.03	Hand-held breaker, medium weight type	Op.	h	56.05	0.04	2.03	2.24	113.79	
		s.b.	h	11.21	0.00	1.21	0.00	13.56	
1.04	Hand held breaker tool,moil point type	----	ea.	0.56	0.00	32.37	0.00	18.14	
1.05	Breaker tool resharpen	----	h	1.68	0.01	1.57	0.02	2.64	
1.06	General foreman	----	h	1.40	0.00	47.25	0.00	66.21	
1.07	Gang foreman	1	h	14.01	6.60	0.00	92.49	0.00	
1.08	Dumper driver and backhoe operator	1	h	58.63	5.82	0.00	341.21	0.00	
1.09	Skilled	2	h	28.03	2.99	0.00	83.80	0.00	
1.10	Semiskilled	2	h	28.03	2.38	0.00	66.70	0.00	
1.11	Unskilled	4	h	56.05	1.77	0.00	99.21	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	328.80	1.33	10.22	437.63	3,361.32	
	b) Portland cement, normal type	0.5	t	59.19	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	59.19	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	355.10	0.00	1.44	0.00	511.35	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5 m ³ nom. capacity	Op.	hr	106.09	0.28	25.38	29.71	2,692.68	
		s.b.	hr	21.22	0.00	10.68	0.00	226.62	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	0.00	0.27	32.54	0.00	0.00	
		s.b.	h	0.00	0.00	11.20	0.00	0.00	
3.03	General foreman	----	h	1.17	0.00	47.25	0.00	55.14	
3.04	Gang foreman	----	h	11.67	6.60	0.00	77.02	0.00	
3.05	Transit mixer operator	1	h	116.70	5.82	0.00	679.22	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	498.00	2,786.77	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	18.66	0.45	30.85	8.39	575.52	
		s.b.	h	3.73	0.00	13.69	0.00	51.08	
5.03	Sliding vibrating bar	Op.	h	18.66	0.02	1.77	0.37	33.02	
		s.b.	h	3.73	0.00	0.60	0.00	2.24	
5.04	General foreman	1	h	4.90	0.00	47.25	0.00	231.33	
5.05	Gang foreman	1	h	24.48	6.60	0.00	161.56	0.00	
5.06	Concrete pump, operator	1	h	20.52	5.82	0.00	119.43	0.00	
5.07	Concrete pump, helper	1	h	20.52	2.38	0.00	48.84	0.00	
5.08	Skilled	2	h	48.96	2.99	0.00	146.39	0.00	
5.09	Semiskilled	4	h	97.92	2.38	0.00	233.04	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	18.92	1,557.68	
Sub-total							3,149.92	12,988.56	
Missing items and construction contingencies				%	1.50%			47.25	194.83
Total Direct Costs							3,197.17	13,183.39	
Overheads, risks and profit on cement and admixtures				%	25.00%			12.78	115.05
Overhead, risks & profit on other costs				%	52.00%			825.20	7,426.79
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	328.80			12.27	63.03
AGGREGATE UNIT PRICE				m3			75.31		

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 50-60 M2, INVERT

SEC 4-10
 ANA 012
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	44.42	0.06	7.75	2.66	344.22	
		s.b.	h	11.10	0.00	5.08	0.00	56.41	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	13.04	0.27	23.93	3.52	311.99	
		s.b.	h	2.61	0.00	12.03	0.00	31.37	
1.03	Hand-held breaker, medium weight type	Op.	h	60.62	0.04	2.03	2.42	123.07	
		s.b.	h	12.12	0.00	1.21	0.00	14.67	
1.04	Hand held breaker tool,moil point type	----	ea.	0.61	0.00	32.37	0.00	19.62	
1.05	Breaker tool resharpeners	----	h	1.82	0.01	1.57	0.02	2.86	
1.06	General foreman	----	h	1.52	0.00	47.25	0.00	71.61	
1.07	Gang foreman	1	h	15.16	6.60	0.00	100.03	0.00	
1.08	Dumper driver and backhoe operator	1	h	63.20	5.82	0.00	367.81	0.00	
1.09	Skilled	2	h	30.31	2.99	0.00	90.63	0.00	
1.10	Semiskilled	2	h	30.31	2.38	0.00	72.14	0.00	
1.11	Unskilled	4	h	60.62	1.77	0.00	107.31	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	356.40	1.33	10.22	474.37	3,643.48	
	b) Portland cement, normal type	0.5	t	64.15	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	64.15	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	384.91	0.00	1.44	0.00	554.27	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	86.28	0.27	32.54	23.30	2,807.62	
		s.b.	h	17.26	0.00	11.20	0.00	193.27	
3.03	General foreman	----	h	0.95	0.00	47.25	0.00	44.85	
3.04	Gang foreman	----	h	9.49	6.60	0.00	62.64	0.00	
3.05	Transit mixer operator	1	h	94.91	5.82	0.00	552.38	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	452.86	2,948.10	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	20.22	0.45	30.85	9.10	623.83	
		s.b.	h	4.04	0.00	13.69	0.00	55.37	
5.03	Sliding vibrating bar	Op.	h	20.22	0.02	1.77	0.40	35.79	
		s.b.	h	4.04	0.00	0.60	0.00	2.43	
5.04	General foreman	1	h	5.25	0.00	47.25	0.00	248.02	
5.05	Gang foreman	1	h	26.25	6.60	0.00	173.22	0.00	
5.06	Concrete pump, operator	1	h	22.24	5.82	0.00	129.46	0.00	
5.07	Concrete pump, helper	1	h	22.24	2.38	0.00	52.94	0.00	
5.08	Skilled	2	h	52.49	2.99	0.00	156.95	0.00	
5.09	Semiskilled	4	h	104.98	2.38	0.00	249.86	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	22.27	1,833.80	
Sub-total							3,106.30	13,966.63	
Missing items and construction contingencies				%	1.50%			46.59	209.50
Total Direct Costs							3,152.90	14,176.13	
Overheads, risks and profit on cement and admixtures				%	25.00%			13.86	124.71
Overhead, risks & profit on other costs				%	52.00%			872.29	7,850.58
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	356.40			11.33	62.15
AGGREGATE UNIT PRICE				m3					73.49

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	47.59	0.06	7.75	2.86	368.80	
		s.b.	h	11.90	0.00	5.08	0.00	60.44	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	10.52	0.27	23.93	2.84	251.64	
		s.b.	h	2.10	0.00	12.03	0.00	25.30	
1.03	Hand-held breaker, medium weight type	Op.	h	48.90	0.04	2.03	1.96	99.26	
		s.b.	h	9.78	0.00	1.21	0.00	11.83	
1.04	Hand held breaker tool,moil point type	----	ea.	0.49	0.00	32.37	0.00	15.83	
1.05	Breaker tool resharpen	----	h	1.47	0.01	1.57	0.01	2.30	
1.06	General foreman	----	h	1.22	0.00	47.25	0.00	57.76	
1.07	Gang foreman	1	h	12.22	6.60	0.00	80.68	0.00	
1.08	Dumper driver and backhoe operator	1	h	63.91	5.82	0.00	371.98	0.00	
1.09	Skilled	2	h	24.45	2.99	0.00	73.10	0.00	
1.10	Semiskilled	2	h	24.45	2.38	0.00	58.19	0.00	
1.11	Unskilled	4	h	48.90	1.77	0.00	86.55	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	384.00	1.33	10.22	511.10	3,925.63	
	b) Portland cement, normal type	0.5	t	69.12	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	69.12	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	414.72	0.00	1.44	0.00	597.20	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	92.96	0.27	32.54	25.10	3,025.04	
		s.b.	h	18.59	0.00	11.20	0.00	208.24	
3.03	General foreman	----	h	1.02	0.00	47.25	0.00	48.32	
3.04	Gang foreman	----	h	10.23	6.60	0.00	67.49	0.00	
3.05	Transit mixer operator	1	h	102.26	5.82	0.00	595.15	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	487.93	3,176.40	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	21.79	0.45	30.85	9.80	672.14	
		s.b.	h	4.36	0.00	13.69	0.00	59.65	
5.03	Sliding vibrating bar	Op.	h	21.79	0.02	1.77	0.44	38.56	
		s.b.	h	4.36	0.00	0.60	0.00	2.61	
5.04	General foreman	1	h	5.60	0.00	47.25	0.00	264.71	
5.05	Gang foreman	1	h	28.01	6.60	0.00	184.88	0.00	
5.06	Concrete pump, operator	1	h	23.97	5.82	0.00	139.48	0.00	
5.07	Concrete pump, helper	1	h	23.97	2.38	0.00	57.04	0.00	
5.08	Skilled	2	h	56.02	2.99	0.00	167.51	0.00	
5.09	Semiskilled	4	h	112.05	2.38	0.00	266.68	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	23.75	1,955.35	
Sub-total							3,214.52	14,867.03	
Missing items and construction contingencies				%	1.50%			48.22	223.01
Total Direct Costs							3,262.74	15,090.03	
Overheads, risks and profit on cement and admixtures				%	25.00%			14.93	134.37
Overhead, risks & profit on other costs				%	52.00%			923.29	8,309.61
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	384.00			10.94	61.29
AGGREGATE UNIT PRICE				m3			72.23		

ROGUN HYDROELECTRIC POWE PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 4-10
ANA 014

UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 70-80 M2, INVERT

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	50.76	0.06	7.75	3.05	393.39	
		s.b.	h	12.69	0.00	5.08	0.00	64.47	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	9.00	0.27	23.93	2.43	215.43	
		s.b.	h	1.80	0.00	12.03	0.00	21.66	
1.03	Hand-held breaker, medium weight type	Op.	h	41.86	0.04	2.03	1.67	84.98	
		s.b.	h	8.37	0.00	1.21	0.00	10.13	
1.04	Hand held breaker tool,moil point type	----	ea.	0.42	0.00	32.37	0.00	13.55	
1.05	Breaker tool resharpen	----	h	1.26	0.01	1.57	0.01	1.97	
1.06	General foreman	----	h	1.05	0.00	47.25	0.00	49.45	
1.07	Gang foreman	1	h	10.47	6.60	0.00	69.07	0.00	
1.08	Dumper driver and backhoe operator	1	h	65.74	5.82	0.00	382.60	0.00	
1.09	Skilled	2	h	20.93	2.99	0.00	62.58	0.00	
1.10	Semiskilled	2	h	20.93	2.38	0.00	49.82	0.00	
1.11	Unskilled	4	h	41.86	1.77	0.00	74.10	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	411.60	1.33	10.22	547.84	4,207.79	
	b) Portland cement, normal type	0.5	t	74.09	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	74.09	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	444.53	0.00	1.44	0.00	640.12	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 6 m ³ nominal capacity	Op.	h	99.65	0.27	32.54	26.90	3,242.47	
		s.b.	h	19.93	0.00	11.20	0.00	223.21	
3.03	General foreman	----	h	1.10	0.00	47.25	0.00	51.79	
3.04	Gang foreman	----	h	10.96	6.60	0.00	72.34	0.00	
3.05	Transit mixer operator	1	h	109.61	5.82	0.00	637.93	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	523.00	3,404.71	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	23.35	0.45	30.85	10.51	720.45	
		s.b.	h	4.67	0.00	13.69	0.00	63.94	
5.03	Sliding vibrating bar	Op.	h	23.35	0.02	1.77	0.47	41.34	
		s.b.	h	4.67	0.00	0.60	0.00	2.80	
5.04	General foreman	1	h	5.96	0.00	47.25	0.00	281.41	
5.05	Gang foreman	1	h	29.78	6.60	0.00	196.54	0.00	
5.06	Concrete pump, operator	1	h	25.69	5.82	0.00	149.51	0.00	
5.07	Concrete pump, helper	1	h	25.69	2.38	0.00	61.14	0.00	
5.08	Skilled	2	h	59.56	2.99	0.00	178.08	0.00	
5.09	Semiskilled	4	h	119.11	2.38	0.00	283.49	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	25.79	2,123.30	
Sub-total							3,358.86	15,858.33	
Missing items and construction contingencies				%	1.50%			50.38	237.87
Total Direct Costs							3,409.25	16,096.21	
Overheads, risks and profit on cement and admixtures				%	25.00%			16.00	144.03
Overhead, risks & profit on other costs				%	52.00%			981.00	8,828.98
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	411.60			10.71	60.91
AGGREGATE UNIT PRICE				m3					71.61

ROGUN HYDROELECTRIC POWE PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 UNDERGROUND CONCRETE - TUNNELS GROUPED IN CROSS SECTION RANGE 80-90 M2, INVERT

SEC 4-10
 ANA 016
 Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)	
1	Preparation of Invert Surface								
1.01	4WD reversible-steer. mini dumper, 4 t pay load	Op.	h	57.11	0.06	7.75	3.43	442.56	
		s.b.	h	14.28	0.00	5.08	0.00	72.52	
1.02	Hydraulic backhoe, 41 kW (0.37 m3 bucket)	Op.	h	12.73	0.27	23.93	3.44	304.58	
		s.b.	h	2.55	0.00	12.03	0.00	30.62	
1.03	Hand-held breaker, medium weight type	Op.	h	59.19	0.04	2.03	2.37	120.15	
		s.b.	h	11.84	0.00	1.21	0.00	14.32	
1.04	Hand held breaker tool,moil point type	----	ea.	0.59	0.00	32.37	0.00	19.16	
1.05	Breaker tool resharpeners	----	h	1.78	0.01	1.57	0.02	2.79	
1.06	General foreman	----	h	1.48	0.00	47.25	0.00	69.91	
1.07	Gang foreman	1	h	14.80	6.60	0.00	97.66	0.00	
1.08	Dumper driver and backhoe operator	1	h	76.82	5.82	0.00	447.07	0.00	
1.09	Skilled	2	h	29.59	2.99	0.00	88.48	0.00	
1.10	Semiskilled	2	h	29.59	2.38	0.00	70.43	0.00	
1.11	Unskilled	4	h	59.19	1.77	0.00	104.76	0.00	
2	Concrete Class B2-25/37								
2.01	Concrete at the batching plant:								
	a) Concrete at the batching and mixing plant	---	m ³	466.80	1.33	10.22	621.31	4,772.10	
	b) Portland cement, normal type	0.5	t	84.02	0.00	0.00	0.00	0.00	
	c) Portland cement, sulfate resistant type	0.5	t	84.02	0.00	0.00	0.00	0.00	
	d) Concrete admixture, water reducing	1	kg	504.14	0.00	1.44	0.00	725.97	
	e) Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00	
3	Concrete Transport								
3.01	Transit mixer with revers. steer, 5m ³ nom. capacity	Op.	hr	0.00	0.28	25.38	0.00	0.00	
		s.b.	hr	0.00	0.00	10.68	0.00	0.00	
3.02	Transit mixer, 8 m ³ nominal capacity	Op.	h	84.76	0.33	41.72	27.97	3,536.06	
		s.b.	h	16.95	0.00	13.62	0.00	230.88	
3.03	General foreman	----	h	0.93	0.00	47.25	0.00	44.05	
3.04	Gang foreman	----	h	9.32	6.60	0.00	61.53	0.00	
3.05	Transit mixer operator	1	h	93.23	5.82	0.00	542.61	0.00	
3.06	Operator's helper	0	h	0.00	2.38	0.00	0.00	0.00	
4	Concrete for Overbreaks and Losses	---	%	40.7%	----	----	510.15	3,788.78	
5	Formworks and Concrete Placing								
5.01	Formworks	---	m ²	0.00	5.34	10.23	0.00	0.00	
5.02	Electric powered concrete pump, 47 m3/h max. c.	Op.	h	26.49	0.45	30.85	11.92	817.07	
		s.b.	h	5.30	0.00	13.69	0.00	72.52	
5.03	Sliding vibrating bar	Op.	h	26.49	0.02	1.77	0.53	46.88	
		s.b.	h	5.30	0.00	0.60	0.00	3.18	
5.04	General foreman	1	h	6.66	0.00	47.25	0.00	314.79	
5.05	Gang foreman	1	h	33.31	6.60	0.00	219.85	0.00	
5.06	Concrete pump, operator	1	h	29.13	5.82	0.00	169.56	0.00	
5.07	Concrete pump, helper	1	h	29.13	2.38	0.00	69.34	0.00	
5.08	Skilled	2	h	66.62	2.99	0.00	199.20	0.00	
5.09	Semiskilled	4	h	133.24	2.38	0.00	317.12	0.00	
6	General Services								
6.01	Ventilation, lighting & other general services	---	---	---	---	---	32.66	2,689.10	
Sub-total							3,601.40	18,117.99	
Missing items and construction contingencies				%	1.50%			54.02	271.77
Total Direct Costs							3,655.42	18,389.76	
Overheads, risks and profit on cement and admixtures				%	25.00%			18.15	163.34
Overhead, risks & profit on other costs				%	52.00%			1,108.60	9,977.39
UNIT PRICE IN LOCAL AND FOREIGN CURRENCY				m3	466.80			10.24	61.12
AGGREGATE UNIT PRICE				m3					71.36

SECTION – 5

STOCKPILING OF DAM FILL MATERIALS

**ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
DAM MATERIAL STOCKPILING - MATERIAL FROM QUARRY26a STOCKPILED IN LR4 AREA**

**SEC 5
ANA 012
Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST		
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)	
1	LABOUR								
1.01	General foreman	----	h	212.09	0.00	43.75	0.00	9,279.07	
1.02	Foreman	----	h	2,120.93	6.11	0.00	12,958.88	0.00	
1.03	Equipment operator	----	h	10,856.75	5.39	0.00	58,517.87	0.00	
1.04	Hand held drill miner	----	h	761.15	2.77	0.00	2,108.37	0.00	
1.04	Operator's helper	----	h	1,422.92	2.20	0.00	3,130.43	0.00	
1.05	Explosive specialist	----	h	4,016.81	3.42	0.00	13,737.50	0.00	
1.06	Explosive specialist's helper	----	h	4,016.81	2.20	0.00	8,836.99	0.00	
1.07	Integral steel and bit grinder	----	h	134.85	3.42	0.00	461.20	0.00	
2	EQUIPMENT								
2.01	Air powered hand-held rock drill, heavy weigh	Op.	h	345.98	0.05	2.71	17.30	937.59	
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51-64 mm	do			0.54	46.87	0.00	0.00	
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	do	h	241.34	0.68	66.30	164.11	16,000.60	
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	do	h	836.86	0.73	77.76	610.91	65,074.22	
2.05	Motorcompressor, 15.0 m3/min	do	h	86.49	0.20	40.08	17.30	3,466.67	
2.06	Flat bed lorry with crane, 10 t pay load	do	h	102.99	0.32	29.23	32.96	3,010.42	
2.07	Integral drill steel grinder	do	h	24.08	0.01	2.29	0.24	55.14	
2.08	Button bits grinder	do	h	88.30	0.04	5.32	3.53	469.75	
2.09	Hydraulic front shovel, 301 kW, 4.10 m ³ heap	do	h	2,202.65	1.37	123.22	3,017.63	271,410.51	
2.10	Hydraulic front shovel, 390 kW, 5.70 m ³ heap	do	h	0.00	1.80	163.89	0.00	0.00	
2.11	Hydraulic backhoe, 130 kW, 1.8 m ³ heaped	do	h	0.00	0.58	56.52	0.00	0.00	
2.12	Bulldozer with blade, 231 kW (in rock loading	do	h	440.53	1.64	121.99	722.47	53,740.25	
2.13	Bulldozer with blade, 153 kW (in disposal area	do	h	812.78	0.96	79.55	780.27	64,656.47	
2.14	Off-highway dup truck, 36.6 ton pay load	do	h	0.00	1.32	30.76	0.00	0.00	
2.15	Off-highway dup truck, 46.2 ton pay load	do	h	5,232.63	1.61	116.24	8,424.53	608,240.56	
2.16	Portable diesel powered floodlight, 6000 W	do	h	881.06	0.01	6.41	6.17	5,647.59	
2.17	Cost of construction equipment standby units	do	%	----	0.0%	7.31%	0.00	79,859.00	
	MATERIALS								
3	Explosive, amonite type	----	kg	47,500.00	2.31	0.00	109,725.00	0.00	
3.01	Explosive, gramonite type	----	kg	131,100.00	2.06	0.00	270,066.00	0.00	
3.02	Explosive, ammonium nitrate	----	kg	0.00	0.74	0.00	0.00	0.00	
3.03	Detonating fuse	----	m	58,401.14	0.00	0.82	0.00	47,888.94	
3.04	Slow burning fuse fuse	----	ea	32.99	0.00	0.51	0.00	16.82	
3.05	Electric detonator, 3.0 m leading wire	----	ea	4,057.31	0.00	1.98	0.00	8,033.48	
3.06	Plain detonator	----	ea	11.00	0.00	0.78	0.00	8.58	
3.07	Copper type shotfiring cable	----	m	34,189.58	0.00	0.13	0.00	4,444.65	
3.08	Crawler drill rod for 76 mm holes, L 3,660 mm	----	ea	13.79	0.00	483.24	0.00	6,663.13	
3.09	Shank adapter for Ø 76 mm holes	----	ea	4.68	0.00	277.11	0.00	1,297.98	
3.10	Coupling for Ø 76 mm holes	----	ea	21.21	0.00	54.15	0.00	1,148.68	
3.11	Crawler drill rod for 89 mm holes, L 3,660 mm	----	ea	49.66	0.00	538.94	0.00	26,761.48	
3.12	Shank adapter for Ø 89 mm holes	----	ea	14.15	0.00	284.67	0.00	4,028.93	
3.13	Coupling for Ø 89 mm dia.	----	ea	76.39	0.00	77.24	0.00	5,900.63	
3.14	Crawler drill bit for Ø 76 mm holes	----	ea	14.64	0.00	394.21	0.00	5,770.22	
3.15	Crawler drill bit for Ø 89 mm holes	----	ea	44.23	0.00	468.06	0.00	20,701.38	
3.16	Integrall drill steel, 800/4000 mm (average)	----	ea	16.05	0.00	180.14	0.00	2,891.77	
3.17	Grease for rods, couplings and shank adapter	----	kg	68.88	0.00	4.80	0.00	330.61	
Sub-total					----->>		493,340	1,317,735	
Missing items and construction contingencies			%	1.50%	----->>		7,400	19,766	
Total direct costs					----->>		500,740	1,337,501	
Overheads, risks and profit			%	52.00%	----->>		95,589	860,297	
UNIT PRICE IN LOCAL & FOREIGN CURRENCY				m3	475,000	----->>		1.26	4.63
AGGREGATE UNIT PRICE					----->>		5.88		

SECTION – 6

ROCK SUPPORTS

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I
WET TYPE SHOTCRETE - SURFACE WORKS

SEC 6
ANA 023
Table A

N°	DESCRIPTION	AUX.	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	CONCRETE							
1.01	Mixed concrete at the batching plant	---	m ³	1,000.00	1.331	10.22	1,331.00	10,223.00
1.02	Portland cement	---	t	450.00	0.00	0.00	0.00	0.00
1.01	Quick set admixture	---	kg	18,000.00	0.00	0.79	0.00	14,220.00
2	TRANSPORT							
2.01	Transit mixer, 6 m3 capacity	Op.	h	194.44	0.27	32.54	52.50	6,327.22
		s.b.	h	38.89	0.38	11.20	14.78	435.56
2.02	General foreman	---	h	2.14	0.00	43.75	0.00	93.58
2.03	Gang foreman	---	h	21.39	6.11	0.00	130.69	0.00
2.04	Truckmixer, operator	---	h	213.89	5.39	0.00	1,152.86	0.00
2.05	Truckmixer, helper	0	h	0.00	2.20	0.00	0.00	0.00
3	PLACING							
3.01	Diesel powered shotcrete pump, 25 m3/h (hand operated nozzle type)	Op.	h	333.33	0.34	26.09	113.33	8,696.67
		s.b.	h	83.33	0.00	14.77	0.00	1,230.83
3.02	General foreman	---	h	16.00	0.00	43.75	0.00	700.00
3.03	Gang foreman	---	h	160.00	6.11	0.00	977.60	0.00
3.04	Pump operator	---	h	400.00	3.42	0.00	1,368.00	0.00
3.05	Helper for ditto	---	h	400.00	2.20	0.00	880.00	0.00
3.06	Skilled	---	h	0.00	2.77	0.00	0.00	0.00
3.07	Semiskilled	---	h	800.00	2.20	0.00	1,760.00	0.00
4	REBOUND							
4.01	Wasted shotcrete due to rebound	---	%	25%	----	----	1,945.19	10,481.71
Sub-total							9,725.95	52,408.57
Missing items and construction contingencies			%	1.50%			145.89	786.13
Total Direct Costs							9,871.84	53,194.70
Overheads, risks and profit on cement and admixture					25.00%		355.50	3,199.50
Overheads, risks and profit on remaining costs				%	52.00%		2,540.02	22,860.18
UNIT PRICE (WITHOUT OVERTHICKNESS)			m3	1,000			12.77	79.25
5	UNIT PRICES WITH OVERTHICKNESS			Estimated Overtickness				
5.01	Specified thickness, 5 cm							
	a) Overtickness		%	40.00%	5.11	31.70		
	b) Unit price		m2				0.89	5.55
5.02	Specified thickness, 10 cm							
	a) Overtickness		%	20.00%	2.55	15.85		
	b) Unit price		m2				1.53	9.51
5.03	Specified thickness, 15 cm							
	a) Overtickness		%	13.33%	1.70	10.57		
	b) Unit price		m2				2.17	13.47
5.04	Specified thickness, 20 cm							
	a) Overtickness		%	10.00%	1.28	7.93		
	b) Unit price		m2				2.81	17.44
5.05	Specified thickness 25 cm							
	a) Overtickness		%	8.00%	1.02	6.34		
	b) Unit price		m2				3.45	21.40
6	UNIT PRICE PER CUBIC METER (AVERAGE)		M3				15.10	93.73

ROGUN HYDROELECTRIC POWER PLANT
 CIVIL WORKS COST ESTIMATE - PHASE I
 WET TYPE SHOTCRETE - UNDERGROUND WORKS

SEC 6
 ANA 024
 Table A

N°	DESCRIPTION	AUX.	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	CONCRETE								
1.01	Mixed concrete at the batching plant	---	m ³	1,000.00	1.331	10.22	1,331.00	10,223.00	
1.02	Portland cement	---	t	450.00	0.00	0.00	0.00	0.00	
1.01	Quick set admixture	---	kg	18,000.00	0.00	0.79	0.00	14,220.00	
2	TRANSPORT								
2.01	Transit mixer, 6 m3 capacity	Op.	h	216.05	0.27	32.54	58.33	7,030.25	
		s.b.	h	43.21	0.38	11.20	16.42	483.95	
2.02	General foreman	---	h	4.75	0.00	47.25	0.00	224.58	
2.03	Gang foreman	---	h	47.53	6.60	0.00	313.70	0.00	
2.04	Truckmixer, operator	---	h	237.65	5.82	0.00	1,383.15	0.00	
2.05	Truckmixer, helper	---	h	237.65	2.38	0.00	565.62	0.00	
3	PLACING								
3.01	Truck mounted e. pow. shotcrete robot	Op.	h	166.67	0.98	66.67	163.33	11,111.67	
		s.b.	h	33.33	0.00	30.85	0.00	1,028.33	
3.02	General foreman	---	h	8.00	0.00	47.25	0.00	378.00	
3.03	Gang foreman	---	h	80.00	6.60	0.00	528.00	0.00	
3.04	Pump operator	---	h	200.00	5.82	0.00	1,164.00	0.00	
3.05	Operator's, helper	---	h	200.00	2.38	0.00	476.00	0.00	
3.06	Skilled	---	h	0.00	2.99	0.00	0.00	0.00	
3.07	Semiskilled	---	h	400.00	2.38	0.00	952.00	0.00	
4	REBOUND								
4.01	Wasted shotcrete due to rebound	---	%	30%	----	----	2,085.47	13,409.93	
Sub-total					----->>		9,037.02	58,109.72	
Missing items and construction contingencies			%	1.50%	----->>		135.56	871.65	
Total Direct Costs					----->>		9,172.58	58,981.36	
Overheads, risks and profit on cement and admixture					25.00%		355.50	3,199.50	
Overheads, risks and profit on remaining costs				%	52.00%	----->>		2,804.56	25,241.08
UNIT PRICE (WITHOUT OVERTHICKNESS)			m3	1,000	----->>		12.33	87.42	
5	UNIT PRICES WITH OVERTHICKNESS			Estimated Overtickness					
5.01	Specified thickness 5 cm								
	a) Overtickness	%		40.00%	4.93	34.97			
	b) Unit price	m ²					0.86	6.12	
5.02	Specified thickness 10 cm								
	a) Overtickness	%		20.00%	2.47	17.48			
	b) Unit price	m ²					1.48	10.49	
5.03	Specified thickness 15 cm								
	a) Overtickness	%		13.33%	1.64	11.66			
	b) Unit price	m ²					2.10	14.86	
5.04	Specified thickness 20 cm								
	a) Overtickness	%		10.00%	1.23	8.74			
	b) Unit price	m ²					2.71	19.23	
5.05	Specified thickness 25 cm								
	a) Overtickness	%		8.00%	0.99	6.99			
	b) Unit price	m ²					3.33	23.60	
6	UNIT PRICE PER CUBIC METER (AVERAGE)		M3				14.59	103.39	

SECTION – 7

DRILLING AND GROUTING WORKS

SECTION – 8

MISCELLANEOUS WORK

ROGUN HYDROELECTRIC POWER PLANT
CIVIL WORKS COST ESTIMATE - PHASE I

SEC 8
ANA 12

SURFACE CONCRETE - PRECAST CONCRETE BLOCKS FOR SLOPE PROTECTION, PRECASTING

Table A

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
1	Concrete Class B2-25/37							
1.01	Concrete at the batching and mixing plant	---	m ³	2,282.00	1.33	10.22	3,037.34	23,328.89
1.02	Portland cement, normal type	1	t	821.52	0.00	0.00	0.00	0.00
1.03	Portland cement, sulfate resistant type	0	t	0.00	0.00	0.00	0.00	0.00
1.04	Concrete admixture, water reducing	1	kg	2,464.56	0.00	1.44	0.00	3,548.97
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
2	Transport							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	173.67	0.40	47.95	69.47	8,327.64
		s.b.	h	34.73	0.00	14.53	0.00	504.70
2.02	Truck.mixer, 12 m3 capacity	Op.	h	0.00	0.46	52.69	0.00	0.00
		s.b.	h	0.00	0.00	16.74	0.00	0.00
2.03	General foreman	---	h	1.91	0.00	43.75	0.00	83.58
2.04	Gang foreman	---	h	19.10	6.11	0.00	116.73	0.00
2.05	Truck-mixer, operator	---	h	191.04	5.39	0.00	1,029.71	0.00
2.06	Operator's helper	---	h	0.00	2.20	0.00	0.00	0.00
3	Pouring and vibration							0.00
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	0.00	0.35	29.66	0.00	0.00
		s.b.	h	0.00	0.00	13.76	0.00	0.00
3.02	Diesel powered concrete pump, max. 71 m3/h	Op.	h	0.00	0.35	37.44	0.00	0.00
		s.b.	h	0.00	0.00	14.10	0.00	0.00
3.03	Truck mounted concrete pump, 21 m boom (max. 110 m3/h)	Op.	h	36.48	0.82	53.49	29.92	1,951.50
		s.b.	h	7.30	0.00	36.46	0.00	266.04
3.04	Truck mounted concrete pump, 36 m boom (max. 140 m3/h)	Op.	h	0.00	1.11	71.37	0.00	0.00
		s.b.	h	0.00	0.00	49.06	0.00	0.00
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	251.02	0.01	1.46	2.51	366.49
		s.b.	h	62.76	0.00	0.42	0.00	26.36
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	239.61	0.02	1.63	4.79	390.56
		s.b.	h	47.92	0.00	0.53	0.00	25.40
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	78.55	0.15	24.64	11.78	1,935.56
		s.b.	h	15.71	0.00	5.46	0.00	85.78
3.08	General foreman	---	h	12.00	0.00	43.75	0.00	524.90
3.09	Gang foreman	---	h	119.98	6.11	0.00	733.07	0.00
3.10	Equipment operator	---	h	40.13	5.39	0.00	216.31	0.00
3.11	Operator's helper	---	h	40.13	2.20	0.00	88.29	0.00
3.12	Vibrator-man	---	h	1,079.39	2.20	0.00	2,374.65	0.00
3.13	Other, semiskilled	---	h	40.13	2.20	0.00	88.29	0.00
4	Curing							
4.01	General foreman	---	h	5.13	0.00	43.75	0.00	224.63
4.02	Gang foreman	---	h	51.35	6.11	0.00	313.72	0.00
4.03	Skilled	---	h	171.15	2.77	0.00	474.09	0.00
4.04	Semiskilled	---	h	342.30	2.20	0.00	753.06	0.00
5	Formworks							
5.01	Steel formworks	---	m2	6,846.00	2.21	6.27	15,095.43	42,890.19
	Sub total (No. 1, 2, 3, 4 & 5) ----->>						24,439.15	84,481.18
6	Additional volume of concrete							
6.01	Overbreak	---	%	0.00%	----	----	0.00	0.00
6.02	Overtickness and losses	---	%	0.50%	----	----	39.01	206.83
	Sub-total						24,478.16	84,688.01
	Missing items and construction contingencies		%	2.00%			489.56	1,693.76
	Total Direct Costs						24,967.73	86,381.77
	Overheads, risks and profit on cement and admixtrures		%	25.00%			88.72	798.52
	Overhead, risks & profit on other costs		%	52.00%			5,605.63	50,450.65
	UNIT PRICE IN LOCAL AND FOREIGN CURRENCY		m3	2,282.00			13.44	60.31
	AGGREGATE UNIT PRICE		m3					73.75

ANNEX 1

CIVIL WORKS COST ESTIMATE - PHASE I

UNDERGROUND EXCAVATIONS WITH DIFFERENT CLASSES OF ROCK - UNIT PRICE FOR BOQ

N°	DESCRIPTION	TUNNEL LENGTH		UNIT PRICE OF ANALYSIS		UNIT PRICE FOR BOQ	
		(m)	(%)	L.C.P.	F.C.P.	L.C.P.	F.C.P.
				(US\$ eq.)	(US\$)	(US\$ eq.)	(US\$)
1	Transportation tunnel T1					9.15	44.87
	Rock Class III	425.54	66.7%	8.99	43.68		
	Rock Class IV	212.74	33.3%	9.47	47.25		
2	Transportation tunnel T2					8.42	43.85
	Rock Class III	637.96	89.9%	8.37	43.49		
	Rock Class IV	71.67	10.1%	8.85	47.02		
3	Transportation tunnel T3					7.62	40.70
	Rock Class III	189.67	12%	7.28	38.02		
	Rock Class IV	1,339.93	88%	7.67	41.08		
4	Transportation tunnel T3'					7.74	37.81
	Rock Class III	543.09	74.60%	7.63	37.02		
	Rock Class IV	184.91	25.40%	8.05	40.12		
5	Transportation tunnel T4					6.60	31.66
	Rock Class II	958.00	97%	6.58	31.50		
	Rock Class III	32.57	3%	7.24	36.52		
6	Transportation tunnel T5A					8.75	41.59
	Rock Class II	38.80	20%	8.07	37.75		
	Rock Class III	75.66	39%	8.70	40.88		
	Rock Class IV	77.60	40%	9.11	44.00		
	Rock Class V	1.94	1%	10.11	49.48		
7	Transportation tunnel T7					6.83	33.50
	Rock Class II	179.24	97%	6.81	33.35		
	Rock Class III	6.31	3%	7.43	37.74		
8	Transportation tunnel T37					8.69	37.52
	Rock Class III	380.37	59.90%	8.51	36.32		
	Rock Class IV	254.64	40.10%	8.95	39.31		
9	Access adit P3					11.16	46.47
	Rock Class III	259.56	86.4%	10.97	45.35		
	Rock Class IV	15.92	5.3%	11.56	49.03		
	Rock Class V	24.93	8.3%	12.94	56.42		
10	Access adit P80					9.33	41.34
	Rock Class IV	92.05	25.6%	8.60	37.67		
	Rock Class V	267.53	74.4%	9.58	42.60		
11	Level 1 diversion tunnel - arch - pressure stretch					8.24	36.67
	Rock Class III	345.66	83.93%	8.16	36.13		
	Rock Class IV	66.18	16.07%	8.67	39.45		
12	Level 1 diversion tunnel - arch- freeflow stretch left bank					7.33	37.14
	Rock Class III	345.06	62.83%	7.17	35.90		
	Rock Class IV	204.13	37.17%	7.59	39.24		
13	Level 1 diversion tunnel - upper bench - pressure stretch					6.46	32.73
	Rock Class III	345.66	83.93%	6.37	32.23		
	Rock Class IV	66.18	16.07%	6.88	35.33		
13	Level 1 diversion tunnel - upper bench - freeflow stretch - left bank					6.18	33.16
	Rock Class III	345.06	62.83%	6.02	32.08		
	Rock Class IV	204.13	37.17%	6.45	35.00		

ROGUN HYDROELECTRIC POWER PLANT

CIVIL WORKS COST ESTIMATE - PHASE I

UNDERGROUND EXCAVATIONS WITH DIFFERENT CLASSES OF ROCK - UNIT PRICE FOR BoQ

14	Level 1 diversion tunnel - lower benching - pressure stretch					5.16	24.95
	Rock Class III	345.66	83.93%	5.14	23.77		
	Rock Class IV	66.18	16.07%	5.27	31.13		
15	Powerhouse, top heading pilot					9.31	37.54
	Rock Class III	152.34	66.67%	9.21	36.75		
	Rock Class IV	76.16	33.33%	9.51	39.11		
16	Powerhouse, top heading reaming					9.45	38.23
	Rock Class III	152.34	66.67%	9.37	37.54		
	Rock Class IV	76.16	33.33%	9.60	39.63		
17	Powerhouse, first horizontal side benching					9.18	40.57
	Rock Class III	152.34	66.67%	9.10	40.57		
	Rock Class IV	76.16	33.33%	9.34	42.86		
18	Powerhouse, first horizontal vertical benching					4.52	23.26
	Rock Class III	152.34	66.67%	4.40	23.12		
	Rock Class IV	76.16	33.33%	4.76	23.53		
19	Powerhouse, vertical benching El. 986.00-974.00					4.42	25.30
	Rock Class III	152.34	66.67%	4.31	25.12		
	Rock Class IV	76.16	33.33%	4.66	25.67		
20	Powerhouse, vertical benching El. 974.00-962.20					3.92	24.87
	Rock Class III	152.34	66.67%	3.85	24.78		
	Rock Class IV	76.16	33.33%	4.07	25.04		
21	Cable tunnel 1					11.18	52.59
	Rock Class III	395.05	63.37%	10.95	51.05		
	Rock Class IV	228.36	36.63%	11.56	55.24		
22	Cable tunnel 2					8.16	40.93
	Rock Class III	354.51	82.60%	8.08	40.34		
	Rock Class IV	74.68	17.40%	8.50	43.77		
23	Ventilation adit parallel to T3					15.84	67.09
	Rock Class III	409.48	74.60%	15.60	65.61		
	Rock Class IV	139.42	25.40%	16.54	71.44		
24	Cross slit 1					7.88	35.33
	Rock Class III	39.03	83.93%	7.83	34.94		
	Rock Class IV	7.47	16.07%	8.17	37.36		
25	Tunnels grouped in range 15-20 m2 cross section					19.22	78.11
	Rock Class II	40.00	20.00%	17.32	67.02		
	Rock Class III	90.00	45.00%	19.05	77.05		
	Rock Class IV	60.00	30.00%	20.14	83.77		
	Rock Class V	10.00	5.00%	22.77	97.92		
26	Tunnels grouped in range 20-30 m2 cross section					15.19	62.57
	Rock Class II	40.00	20.00%	13.74	54.05		
	Rock Class III	90.00	45.00%	15.07	61.83		
	Rock Class IV	60.00	30.00%	15.89	66.95		
	Rock Class V	10.00	5.00%	17.76	77.18		
27	Tunnels grouped in range 30-40 m2 cross section					12.58	55.51
	Rock Class II	40.00	20.00%	11.37	48.11		
	Rock Class III	90.00	45.00%	12.49	54.90		
	Rock Class IV	60.00	30.00%	13.17	59.32		
	Rock Class V	10.00	5.00%	14.62	67.74		

