



OSHPC BARKI TOJIK

## **TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT**



### **COST ESTIMATE – PHASE II**

#### **APPENDICES**

P.002378 RP49\_revB

March 2014



# TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

## VOLUME 4: IMPLEMENTATION STUDIES

### CHAPTER 2: COST ESTIMATE

#### APPENDICES

March 2014

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## Introduction

The Appendix A includes the detailed analyses performed for establishing the unit prices of the civil works cost estimate related to the Phase II of Rogun Hydroelectric Power Plant.

Basic unit rates derived in the Phase I cost estimate have been used and are identical for each alternatives (all underground works, transport unit cost, extraction unit cost from quarries etc.).

A detailed study of unit prices has been performed for Alternative 1 (FSL at 1290 masl) for material extracting unit rates and material processing unit rates. For Alternative 2 and 3, the same extracting rates have been used, as the difference in quantities to be extracted has little influence on the unit price. This was considered as a reasonable assumption at this phase of the studies.

For dam placing unit rates, which is a major component of the works required for completion of the project, the different phases of construction and transport schemes during the project construction period have been taken into consideration, as well as volumes to be put in place in each alternative.

The analyses of unit prices have been grouped in sections and sub-sections as follows:

N°	Description	Section & Sub-Section
1	<u>Dam excavation and concrete</u>	1
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	Dam concrete	1-02
2	<u>Dam fill</u>	2
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	Belt conveyor loading stations	2-02
	Core – loam component	2-03
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	Filters	2-05
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	Rip-rap	2-08
	Summary of dam fill unit prices	-----

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”, and T. means “Table”.

The summary of dam fill unit prices gives the rates that are included in the Bill of Quantities, for each alternative.

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# **APPENDIX A - Section 1: DAM EXCAVATION AND CONCRETE**

## **SEC 1-01: Dam excavation**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EXCAVATION - CORE FOUNDATION - RIVER BED ALLUVIUM**

**SEC 1-01  
 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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	127.91	0.00	43.75	0.00	5,596.27
1.02	Gang foreman	----	h	1,279.15	6.11	0.00	7,815.60	0.00
1.03	Operator, bulldozer with blade	----	h	112.32	5.39	0.00	605.39	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	843.29	5.39	0.00	4,545.32	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	951.93	5.39	0.00	5,130.88	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	9,677.51	5.39	0.00	52,161.80	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	1,206.44	5.39	0.00	6,502.69	0.00
1.14	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</b>							
2.01	Bulldozer 179 kW with univesal blade	Op.	h	102.11	1.29	97.19	131.72	9,923.80

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\$)
		s.b.	h	20.42	0.00	36.66	0.00	748.65
2.02	Bulldozer 231 kW with b. & mono-shank ripper	Op.	h	65.35	3.19	171.52	208.46	11,208.60
		s.b.	h	13.07	0.00	59.83	0.00	781.96
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 <sup>3</sup> heaped buck.	Op.	h	420.23	0.60	54.76	252.14	23,011.92
		s.b.	h	84.05	0.00	21.07	0.00	1,770.86
2.06	Wheel loader, 199 kW, 4.30 m <sup>3</sup> heaped buck.	Op.	h	346.39	0.83	73.62	287.51	25,501.46
		s.b.	h	69.28	0.00	28.96	0.00	2,006.31
2.07	Hydraulic backhoe, 239 kW, 3.50 m <sup>3</sup> h. buck.	Op.	h	417.99	0.95	99.42	397.09	41,556.10
		s.b.	h	83.60	0.00	38.33	0.00	3,204.28
2.08	Hydraulic backhoe, 161 kW, 2.35 m <sup>3</sup> h. b.	Op.	h	0.00	0.63	66.88	0.00	0.00
		s.b.	h	0.00	0.00	25.76	0.00	0.00
2.09	Hydraulic front shovel, 301 kW, 410 m <sup>3</sup> h. b.	Op.	h	447.40	1.37	123.22	612.94	55,128.85
		s.b.	h	89.48	0.00	53.08	0.00	4,749.62
2.10	Off-highway dump truck, 36.60 ton pay load	Op.	h	4,908.88	1.32	98.59	6,479.73	483,966.87
		s.b.	h	981.78	0.00	33.74	0.00	33,125.15
2.11	Off-highway dump truck, 46.20 ton pay load	Op.	h	3,888.86	1.61	116.24	6,261.06	452,040.64
		s.b.	h	777.77	0.00	39.01	0.00	30,340.86
2.12	Bulldozer 72 kW (in disposal area)	Op.	h	1,005.36	0.63	48.81	633.38	49,071.79
		s.b.	h	201.07	0.00	20.84	0.00	4,190.35
2.13	Mobile diesel powered floodlight, 6000 W	Op.	h	326.40	0.07	6.41	22.85	2,092.24



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	65.28	0.00	3.46	0.00	225.87
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total					----->>		92,049	1,240,242
Missing items and construction contingencies			%	1.50%	----->>		1,381	18,604
Total Direct Costs					----->>		93,429	1,258,846
Overheads, risks and profit			%	52.00%	----->>		70,318	632,865
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>				<b>m<sup>3</sup></b>	<b>522,789</b>	----->>	<b>0.31</b>	<b>3.62</b>
<b>AGGREGATE UNIT PRICE</b>				<b>m<sup>3</sup></b>	----->>			<b>3.93</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EXCAVATION - FOUNDATION OF DAM CORE - RIGHT BANK ABUTMENT**

**SEC 1-01  
 ANA 002  
 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\$)
<b>1</b>	<b>LABOUR</b>						
1.01	General foreman	h	1,191.13	0.00	43.75	0.0	52,111.8
1.02	Foreman	h	11,911.27	6.11	0.00	72,777.9	0.0
1.03	Equipment operator	h	84,859.41	5.39	0.00	457,392.2	0.0
1.04	Hand held drill miner	h	5,150.93	2.77	0.00	14,268.1	0.0
1.04	Operator's helper	h	7,492.96	2.20	0.00	16,484.5	0.0
1.05	Explosive specialist	h	10,534.27	3.42	0.00	36,027.2	0.0
1.06	Explosive specialist's helper	h	10,534.27	2.20	0.00	23,175.4	0.0
1.07	Integral steel and bit grinder	h	540.88	3.42	0.00	1,849.8	0.0
<b>2</b>	<b>EQUIPMENT</b>						
2.01	Air powered hand-held rock drill, heavy weight	h	2,341.33	0.05	2.71	117.1	6,345.0
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	1,431.30	0.54	46.87	772.9	67,085.2
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	4,466.05	0.68	66.30	3,036.9	296,099.2
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.0	0.0
2.05	Motorcompressor, 10.0 m3/min	h	780.44	0.15	24.64	117.1	19,230.1
2.06	Flat bed lorry with crane, 10 t pay load	h	463.69	0.32	5.46	148.4	2,531.7
2.07	Integral drill steel grinder	h	140.48	0.01	2.29	1.4	321.7
2.08	Button bits grinder	h	310.26	0.04	5.32	12.4	1,650.6
2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	7,323.91	1.37	123.22	10,033.8	902,451.6
2.10	Bulldozer with blade, 231 kW	h	732.39	1.80	163.89	1,318.3	120,031.5

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\$)
2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	3,047.41	0.58	56.52	1,767.5	172,239.9
2.12	Bulldozer with blade, 179 kW	h	37,699.86	1.61	121.49	60,791.0	4,580,061.2
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	2,779.74	0.63	48.81	1,751.2	135,678.9
2.14	Off-highway dup truck, 36.6 ton pay load	h	0.00	1.32	98.59	0.0	0.0
2.15	Off-highway dup truck, 46.2 ton pay load	h	19,200.58	1.61	116.24	30,912.9	2,231,875.2
2.16	Portable diesel powered floodlight, 6000 W	h	6,190.00	0.01	6.41	43.3	39,677.9
2.17	Cost of construction equipment standby units	%	----	0.0%	7.52%	0.0	644,802.8
<b>3</b>	<b>MATERIALS</b>						
3.01	Explosive, amonite type	kg	140,724.14	2.31	0.00	325,072.8	0.0
3.02	Explosive, gramonite type	kg	356,501.14	2.06	0.00	734,392.4	0.0
3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.0	0.0
3.04	Detonating fuse	m	227,091.11	0.00	0.82	0.0	186,214.7
3.05	Slow burning fuse fuse	ea	190.87	0.00	0.51	0.0	97.3
3.06	Electric detonator, 3.0 m leading wire	ea	21,654.35	0.00	1.98	0.0	42,875.6
3.07	Plain detonator	ea	63.62	0.00	0.78	0.0	49.6
3.08	Copper type shoftfiring cable	m	151,940.95	0.00	0.13	0.0	19,752.3
3.09	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	156.98	0.00	483.24	0.0	75,857.8
3.10	Shank adapter for Ø 76 mm holes	ea	53.59	0.00	277.11	0.0	14,851.0
3.11	Coupling for Ø 76 mm holes	ea	241.50	0.00	54.15	0.0	13,077.4
3.12	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	20.50	0.00	483.24	0.0	9,907.8
3.13	Shank adapter for Ø 51 mm holes	ea	12.60	0.00	277.11	0.0	3,490.3
3.14	Coupling for Ø 51 mm dia.	ea	31.54	0.00	54.15	0.0	1,708.0
3.15	Crawler drill bit for Ø 76 mm holes	ea	167.48	0.00	394.21	0.0	66,021.1
3.16	Crawler drill bit for Ø 51 mm holes	ea	39.36	0.00	164.35	0.0	6,469.0

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\$)
3.17	Integrall drill steel, 800/4000 mm (average)	ea	93.65	0.00	180.14	0.0	16,870.3
3.18	Grease for rods, couplings and shank adapters	kg	5,630.11	0.00	4.80	0.0	27,024.5
Sub-total				----->>		1,792,264	9,756,461.2
Missing items and construction contingencies		%	2.00%	----->>		35,845	195,129.2
Total direct costs				----->>		1,828,110	9,951,590.5
Overheads, risks and profit		%	52.00%	----->>		612,544	5,512,899.7
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>1,042,401</b>	----->>		<b>2.34</b>	<b>14.84</b>
<b>AGGREGATE UNIT PRICE</b>				----->>			<b>17.18</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EXCAVATION - FOUNDATION OF DAM CORE - LEFT BANK ABUTMENT**

**SEC 1-01  
 ANA 003  
 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\$)
<b>1</b>	<b>LABOUR</b>						
1.01	General foreman	h	802.18	0.00	43.75	0.0	35,095.5
1.02	Foreman	h	8,021.83	6.11	0.00	49,013.4	0.0
1.03	Equipment operator	h	55,422.42	5.39	0.00	298,726.8	0.0
1.04	Hand held drill miner	h	3,728.53	2.77	0.00	10,328.0	0.0
1.04	Operator's helper	h	5,423.83	2.20	0.00	11,932.4	0.0
1.05	Explosive specialist	h	7,625.99	3.42	0.00	26,080.9	0.0
1.06	Explosive specialist's helper	h	7,625.99	2.20	0.00	16,777.2	0.0
1.07	Integral steel and bit grinder	h	391.52	3.42	0.00	1,339.0	0.0
<b>2</b>	<b>EQUIPMENT</b>						
2.01	Air powered hand-held rock drill, heavy weight	h	1,694.79	0.05	2.71	84.7	4,592.9
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	1,036.06	0.54	46.87	559.5	48,560.0
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	3,232.78	0.68	66.30	2,198.3	214,333.4
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.0	0.0
2.05	Motorcompressor, 10.0 m3/min	h	564.93	0.15	24.64	84.7	13,919.9
2.06	Flat bed lorry with crane, 10 t pay load	h	335.64	0.32	5.46	107.4	1,832.6
2.07	Integral drill steel grinder	h	101.69	0.01	2.29	1.0	232.9
2.08	Button bits grinder	h	224.58	0.04	5.32	9.0	1,194.8
2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	5,301.46	1.37	123.22	7,263.0	653,245.7
2.10	Bulldozer with blade, 231 kW	h	530.15	1.80	163.89	954.3	86,885.6

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\$)
2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	2,205.89	0.58	56.52	1,279.4	124,677.0
2.12	Bulldozer with blade, 179 kW	h	21,831.44	1.61	121.49	35,203.2	2,652,246.6
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	2,012.13	0.63	48.81	1,267.6	98,212.1
2.14	Off-highway dup truck, 36.6 ton pay load	h	0.00	1.32	98.59	0.0	0.0
2.15	Off-highway dup truck, 46.2 ton pay load	h	13,898.47	1.61	116.24	22,376.5	1,615,557.9
2.16	Portable diesel powered floodlight, 6000 W	h	3,825.73	0.01	6.41	26.8	24,522.9
2.17	Cost of construction equipment standby units	%	----	0.0%	7.53%	0.0	417,321.3
<b>3</b>	<b>MATERIALS</b>						
3.01	Explosive, amonite type	kg	101,864.12	2.31	0.00	235,306.1	0.0
3.02	Explosive, gramonite type	kg	258,055.76	2.06	0.00	531,594.9	0.0
3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.0	0.0
3.04	Detonating fuse	m	164,381.43	0.00	0.82	0.0	134,792.8
3.05	Slow burning fuse fuse	ea	138.16	0.00	0.51	0.0	70.5
3.06	Electric detonator, 3.0 m leading wire	ea	15,674.65	0.00	1.98	0.0	31,035.8
3.07	Plain detonator	ea	46.05	0.00	0.78	0.0	35.9
3.08	Copper type shotfiring cable	m	109,983.48	0.00	0.13	0.0	14,297.9
3.09	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	113.63	0.00	483.24	0.0	54,910.2
3.10	Shank adapter for Ø 76 mm holes	ea	38.79	0.00	277.11	0.0	10,750.0
3.11	Coupling for Ø 76 mm holes	ea	174.81	0.00	54.15	0.0	9,466.2
3.12	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	14.84	0.00	483.24	0.0	7,171.8
3.13	Shank adapter for Ø 51 mm holes	ea	9.12	0.00	277.11	0.0	2,526.5
3.14	Coupling for Ø 51 mm dia.	ea	22.83	0.00	54.15	0.0	1,236.4
3.15	Crawler drill bit for Ø 76 mm holes	ea	121.23	0.00	394.21	0.0	47,789.8
3.16	Crawler drill bit for Ø 51 mm holes	ea	28.49	0.00	164.35	0.0	4,682.6

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\$)
3.17	Integrall drill steel, 800/4000 mm (average)	ea	67.79	0.00	180.14	0.0	12,211.7
3.18	Grease for rods, couplings and shank adapters	kg	4,075.39	0.00	4.80	0.0	19,561.9
Sub-total				----->>		1,252,514	6,342,970.9
Missing items and construction contingencies		%	2.00%	----->>		25,050	126,859.4
Total direct costs				----->>		1,277,564	6,469,830.3
Overheads, risks and profit		%	52.00%	----->>		402,865	3,625,780.7
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>754,549</b>	----->>		<b>2.23</b>	<b>13.38</b>
<b>AGGREGATE UNIT PRICE</b>				----->>			<b>15.61</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EXCAVATION - FOUNDATION OF DAM CORE - ROCK ON RIVER BED**

**SEC 1-01  
 ANA 004  
 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\$)
<b>1</b>	<b>LABOUR</b>						
1.01	General foreman	h	8.72	0.00	43.75	0.000	381.684
1.02	Foreman	h	87.24	6.11	0.00	533.049	0.000
1.03	Equipment operator	h	376.26	5.39	0.00	2,028.063	0.000
1.04	Hand held drill miner	h	154.48	2.77	0.00	427.913	0.000
1.04	Operator's helper	h	120.65	2.20	0.00	265.440	0.000
1.05	Explosive specialist	h	106.90	3.42	0.00	365.598	0.000
1.06	Explosive specialist's helper	h	106.90	2.20	0.00	235.180	0.000
1.07	Integral steel and bit grinder	h	7.22	3.42	0.00	24.694	0.000
<b>2</b>	<b>EQUIPMENT</b>						
2.01	Air powered hand-held rock drill, heavy weight	h	70.22	0.05	2.71	3.511	190.293
2.02	Hydraulic tyred rock drill, 61 kw, Ø 51 mm hole	h	96.09	0.54	46.87	51.891	4,503.917
2.03	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	0.00	0.68	66.30	0.000	0.000
2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm h.	h	0.00	0.73	77.76	0.000	0.000
2.05	Motorcompressor, 10.0 m3/min	h	23.41	0.15	24.64	3.511	576.730
2.06	Flat bed lorry with crane, 10 t pay load	h	7.58	0.32	5.46	2.424	41.360
2.07	Integral drill steel grinder	h	2.05	0.01	2.29	0.021	4.702
2.08	Button bits grinder	h	3.96	0.04	5.32	0.159	21.088
2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	43.25	1.37	123.22	59.255	5,329.515
2.10	Bulldozer with blade, 231 kW	h	6.49	1.80	163.89	11.678	1,063.286



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\$)
2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	5.26	0.58	56.52	3.052	297.421
2.12	Bulldozer with blade, 306 kW	h	0.00	1.64	121.99	0.000	0.000
2.13	Bulldozer with blade, 72 kW (in disposal area)	h	19.20	0.63	48.81	12.096	937.152
2.14	Rear tipper, 24 t pay load	h	0.00	0.44	55.14	0.000	0.000
2.15	Off-highway dup truck, 36.6 ton pay load	h	164.19	1.32	98.59	216.727	16,187.231
2.16	Portable diesel powered floodlight, 6000 W	h	8.90	0.01	6.41	0.062	57.076
2.17	Cost of construction equipment standby units	%	----	0.0%	8.01%	0.000	2,339.311
<b>3</b>	<b>MATERIALS</b>						
3.01	Explosive, amonite type	kg	900.00	2.31	0.00	2,079.000	0.000
3.02	Explosive, gramonite type	kg	1,944.00	2.06	0.00	4,004.640	0.000
3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.000	0.000
3.04	Detonating fuse	m	3,221.25	0.00	0.82	0.000	2,641.426
3.05	Slow burning fuse fuse	ea	164.81	0.00	0.51	0.000	84.054
3.06	Electric detonator, 3.0 m leading wire	ea	453.75	0.00	1.98	0.000	898.425
3.07	Plain detonator	ea	144.94	0.00	0.78	0.000	113.051
3.08	Copper type shotfiring cable	m	2,449.50	0.00	0.13	0.000	318.435
3.09	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	0.00	0.00	483.24	0.000	0.000
3.10	Shank adapter for Ø 76 mm holes	ea	0.00	0.00	277.11	0.000	0.000
3.11	Coupling for Ø 76 mm holes	ea	0.00	0.00	54.15	0.000	0.000
3.12	Crawler drill rod for 51 mm holes, L 3,660 mm	ea	1.38	0.00	483.24	0.000	665.185
3.13	Shank adapter for Ø 51 mm holes	ea	0.85	0.00	277.11	0.000	234.331
3.14	Coupling for Ø 51 mm dia.	ea	2.12	0.00	54.15	0.000	114.674
3.15	Crawler drill bit for Ø 76 mm holes	ea	0.00	0.00	394.21	0.000	0.000
3.16	Crawler drill bit for Ø 51 mm holes	ea	2.64	0.00	164.35	0.000	434.308

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\$)
3.17	Integrall drill steel, 800/4000 mm (average)	ea	2.81	0.00	180.14	0.000	505.957
3.18	Grease for rods, couplings and shank adapters	kg	360.00	0.00	4.80	0.000	1,728.000
Sub-total				----->>		10,328	39,668.613
Missing items and construction contingencies		%	2.00%	----->>		207	793.372
Total direct costs				----->>		10,535	40,461.985
Overheads, risks and profit		%	52.00%	----->>		2,652	23,866.366
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>7,200</b>	----->>		<b>1.83</b>	<b>8.93</b>
<b>AGGREGATE UNIT PRICE</b>				----->>			<b>10.77</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EXCAVATION - DAM CORE FOUNDATION - PRESPLITTING OF ROCK**

**SEC 1-01  
 ANA 005  
 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\$)
<b>1</b>	<b>LABOUR</b>						
1.01	General foreman	hr	454.17	0.00	43.75	0.00	19,870.14
1.02	Gang foreman	hr	4,541.75			0.00	0.00
1.03	Truck drill operator	hr	10,546.67	5.39		56,846.53	0.00
1.04	Helper for ditto	hr	21,093.33	2.20		46,405.33	0.00
1.05	Truck driver	hr	1.80	5.39		9.70	0.00
1.06	Helper for ditto	hr	3.60	2.20		7.92	0.00
1.07	Explosive charging, specialist	hr	347.26	3.42		1,187.63	0.00
1.08	Explosive charging, skilled	hr	351.26	2.77		972.99	0.00
1.09	Bit grinding specialist	hr	1,455.11	3.42		4,976.49	0.00
1.10	General services, skilled	hr	844.98	2.77		2,340.58	0.00
1.11	General services, semiskilled	hr	1,689.95	2.20		3,717.89	0.00
<b>2</b>	<b>EQUIPMENT</b>						
2.01	Crawler rock drill, 116 kw	hr	8,788.89	0.68	66.30	5,976.44	582,703.31
		hr	2,197.22	0.00	34.44	0.00	75,672.33
2.02	Flat bed truck with crane, 10 tons pay load	hr	1.50	0.32	29.23	0.48	43.85

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\$)
		hr	0.38	0.00	12.36	0.00	4.64
2.03	Portable diesel powered floodlight, 10 kW	hr	1,662.99	0.07	6.41	116.41	10,659.75
		hr	415.75	0.00	3.46	0.00	1,438.48
2.04	Button bits grinder	hr	1,212.60	0.04	5.32	48.50	6,451.01
<b>3</b>	<b>MATERIALS</b>					0.00	0.00
						0.00	0.00
3.01	Explosive, gelatin type	kg	122,229.58	2.31		282,350	0.00
3.02	Explosive, semi-gelatin type	kg	0.00			0.00	0.00
3.03	Detonating fuse	m	319,647.60		0.82	0.00	262,111.03
3.04	Plain fuse	m	3.00		0.51	0.00	1.53
3.05	Plain detonator	ea	1.00		0.78	0.00	0.78
3.06	Electric detonators	ea	0.00				
3.07	Copper type shottfiring cable	m	0.00		0.13	0.00	0.00
3.08	Crawler drill rod, 3660 mm	ea	389.13		483.24	0.00	188,042.16
3.09	Crawler drill shank	ea	181.89		277.11	0.00	50,403.33
3.10	Crawler drill coupling	ea	651.05		54.15	0.00	35,254.23
3.11	Crawler drill bits, 76 mm dia.	ea	485.04		394.21	0.00	191,206.83
Sub-total			----->>			404,957	1,423,863.39
Miscellaneous Minor Costs & Construction Contingencies		%	2.00%	----->>		8,099	28,477.27
Total Direct Costs			----->>			413,056	1,452,340.65
Overheads and Profit		%	52.00%	----->>		97,001	873,005.81

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\$)
	Unit Price in Local & Foreign Currency Component	m2	143,126.00	----->>		3.56	16.25
	<b>AGGREGATE UNIT PRICE</b>	m2		----->>			<b>19.81</b>

## **SEC 1-02: Dam concrete**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM CONCRETE - PLINT OF DAM CORE**

**SEC 1-02  
 ANA 001  
 Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ Eq.)	(US\$)	(US\$ Eq.)	(US\$)
<b>1</b>	<b>Concrete Class B2-25/37</b>							
1.01	Concrete at the batching and mixing plant	---	m <sup>3</sup>	354,405.00	1.33	10.22	471,713.06	3,623,082.32
1.02	Portland cement, normal type	1	t	92,145.30	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	276,435.90	0.00	1.44	0.00	398,067.70
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
<b>2</b>	<b>Transport</b>							
2.01	Truck with concrete body, 10.5 m3 capacity	Op.	h	38,697.95	0.38	39.07	14,705.22	1,511,928.92
		s.b.	h	7,739.59	0.00	14.45	0.00	111,837.08
2.02	Truck with concrete body, 10 m3 capacity	Op.	h	38,697.95	0.45	52.53	17,414.08	2,032,803.33
		s.b.	h	7,739.59	0.00	14.67	0.00	113,539.79
2.03	General foreman	---	h	425.68	0.00	43.75	0.00	18,623.39
2.04	Gang foreman	---	h	4,256.77	6.11	0.00	26,008.89	0.00
2.05	Truck-mixer, operator	---	h	42,567.75	5.39	0.00	229,440.15	0.00
2.06	Operator's helper	---	h	0.00	2.20	0.00	0.00	0.00
<b>3</b>	<b>Pouring and vibration</b>							
3.01	Concrete belt conveyor mounted on crane	Op.	h	4,663.22	2.46	224.77	11,471.53	1,048,152.79
		s.b.	h	932.64	0.00	151.76	0.00	141,538.17
3.02	Concrete feeder "Auger Max"	Op.	h	4,663.22	0.38	35.28	1,772.03	164,518.53

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ Eq.)	(US\$)	(US\$ Eq.)	(US\$)
		s.b.	h	932.64	0.00	27.28	0.00	25,442.55
3.03	Hydraulic powered concrete vibrator, n. 4x150	Op.	h	16,109.32	0.45	36.09	7,249.19	581,385.29
		s.b.	h	3,221.86	0.00	20.39	0.00	65,693.80
3.04	Bulldozer with universal blade, 72 kw	Op.	h	4,663.22	0.63	48.81	2,937.83	227,611.95
		s.b.	h	932.64	0.00	20.84	0.00	19,436.32
3.05	Air powered immersion type vibrator, Ø 77 mm	Op.	h	0.00	0.01	1.46	0.00	0.00
		s.b.	h	0.00	0.00	0.42	0.00	0.00
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	7,442.51	0.02	1.63	148.85	12,131.28
		s.b.	h	1,488.50	0.00	0.53	0.00	788.91
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	124.04	0.15	24.64	18.61	3,056.39
		s.b.	h	24.81	0.00	5.46	0.00	135.45
3.08	General foreman	---	h	1,488.09	0.00	43.75	0.00	65,103.97
3.09	Gang foreman	---	h	14,880.91	6.11	0.00	90,922.34	0.00
3.10	Equipment operator	---	h	33,108.89	5.39	0.00	178,456.91	0.00
3.11	Operator's helper	---	h	33,108.89	2.20	0.00	72,839.55	0.00
3.12	Vibrator-man	---	h	16,373.51	2.20	0.00	36,021.72	0.00
3.13	Other, semiskilled	---	h	66,217.78	2.20	0.00	145,679.11	0.00
<b>4</b>	<b>Finishing and curing</b>							
4.01	General foreman	---	h	191.38	0.00	43.75	0.00	8,372.82
4.02	Gang foreman	---	h	1,913.79	6.11	0.00	11,693.24	0.00
4.03	Skilled	---	h	6,379.29	2.77	0.00	17,670.63	0.00
4.04	Semiskilled	---	h	12,758.58	2.20	0.00	28,068.88	0.00
<b>5</b>	<b>Scaffolding</b>							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ Eq.)	(US\$)	(US\$ Eq.)	(US\$)
	Sub total (No. 1, 2, 3, 4 & 5) ----->>			----->	----->	----->	1,364,231.81	10,173,250.71
<b>6</b>	<b>Additional volume of concrete</b>							
6.01	Overbreak	---	%	0.005%	---	---	65.34	508.24
6.02	Overtickness and losses	---	%	1.00%	---	---	13,067.99	101,648.78
	Sub-total			----->>			1,377,365	10,275,408
	Missing items and construction contingencies		%	1.50%	----->>		20,660	154,131
	Total Direct Costs			----->>			1,398,026	10,429,539
	Overheads, risks and profit on cement and admixtrures		%	25.00%	----->>		9,952	89,565
	Overhead, risks & profit on other costs		%	52.00%	----->>		594,334	5,349,004
	<b>UNIT PRICE IN LOCAL AND FOREIGN CURRENCY</b>		<b>m3</b>	<b>354,405</b>	----->>		<b>5.65</b>	<b>44.77</b>
	<b>AGGREGATE UNIT PRICE</b>		<b>m3</b>	----->>>				<b>50.42</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM CONCRETE - BREAKWATER WALL ON DAM CREST**

**SEC 1-02  
 ANA 002  
 Table A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ Eq.)	(US\$)	(US\$ Eq.)	(US\$)
<b>1</b>	<b>Concrete Class B2-25/37</b>							
1.01	Concrete at the batching and mixing plant	---	m <sup>3</sup>	2,200.00	1.33	10.22	2,928.20	22,490.60
1.02	Portland cement, normal type	1	t	792.00	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	2,376.00	0.00	1.44	0.00	3,421.44
1.05	Concrete admixture, superplasticizer	0	kg	0.00	0.00	1.97	0.00	0.00
<b>2</b>	<b>Transport</b>							
2.01	Truck-mixer, 10 m3 capacity	Op.	h	371.56	0.40	47.95	148.62	17,816.09
		s.b.	h	74.31	0.00	14.53	0.00	1,079.74
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	4.09	0.00	43.75	0.00	178.81
2.04	Gang foreman	---	h	40.87	6.11	0.00	249.72	0.00
2.05	Truck-mixer, operator	---	h	408.71	5.39	0.00	2,202.95	0.00
2.06	Operator's helper	---	h	0.00	2.20	0.00	0.00	0.00
<b>3</b>	<b>Pouring and vibration</b>							
3.01	Diesel powered concrete pump,max. 54 m3/h	Op.	h	71.98	0.35	29.66	25.19	2,134.79
		s.b.	h	14.40	0.00	13.76	0.00	198.08
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

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ Eq.)	(US\$)	(US\$ Eq.)	(US\$)
3.03	Truck mounted concrete pump, 21 m boom	Op.	h	0.00	0.82	53.49	0.00	0.00
	(max. 110 m3/h)	s.b.	h	0.00	0.00	36.46	0.00	0.00
3.04	Truck mounted concrete pump, 36 m boom	Op.	h	0.00	1.11	71.37	0.00	0.00
	(max. 140 m3/h)	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	0.00	0.01	1.46	0.00	0.00
		s.b.	h	0.00	0.00	0.42	0.00	0.00
3.06	Air powered immersion type vibrator, Ø 87 mm	Op.	h	462.00	0.02	1.63	9.24	753.06
		s.b.	h	92.40	0.00	0.53	0.00	48.97
3.07	Motorcompressor for vibrators, 10.0 m3/min.	Op.	h	77.00	0.15	24.64	11.55	1,897.28
		s.b.	h	15.40	0.00	5.46	0.00	84.08
3.08	General foreman	---	h	14.12	0.00	43.75	0.00	617.87
3.09	Gang foreman	---	h	141.23	6.11	0.00	862.89	0.00
3.10	Equipment operator	---	h	79.17	5.39	0.00	426.74	0.00
3.11	Operator's helper	---	h	79.17	2.20	0.00	174.18	0.00
3.12	Vibrator-man	---	h	1,016.40	2.20	0.00	2,236.08	0.00
3.13	Other, semiskilled	---	h	237.52	2.20	0.00	522.54	0.00
<b>4</b>	<b>Finishing and curing</b>							
4.01	General foreman	---	h	14.85	0.00	43.75	0.00	649.69
4.02	Gang foreman	---	h	148.50	6.11	0.00	907.34	0.00
4.03	Skilled	---	h	495.00	2.77	0.00	1,371.15	0.00
4.04	Semiskilled	---	h	990.00	2.20	0.00	2,178.00	0.00
<b>5</b>	<b>Scaffolding</b>							
5.01	Wall type scaffolding	---	m2	0.00	2.12	2.68	0.00	0.00
	Sub total (No. 1, 2, 3, 4 & 5) ----->>			----->	----->	----->	14,254.40	51,370.49

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ Eq.)	(US\$)	(US\$ Eq.)	(US\$)
<b>6</b>	<b>Additional volume of concrete</b>							
6.01	Overbreak	---	%	0.0%	----	----	0.00	0.00
6.02	Overtickness and losses	---	%	1.0%	----	----	97.98	507.21
Sub-total		----->>					14,352.38	51,877.70
Missing items and construction contingencies		%		1.50%	----->>		215.29	778.17
Total Direct Costs		----->>					14,567.66	52,655.87
Overheads, risks and profit on cement and admixtrures		%		25.00%	----->>		85.54	769.82
Overhead, risks & profit on other costs		%		52.00%	----->>		3,317.71	29,859.38
<b>UNIT PRICE IN LOCAL AND FOREIGN CURRENCY</b>			<b>m3</b>	<b>2,200</b>	----->>		<b>8.17</b>	<b>37.86</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m3</b>		----->>			<b>46.03</b>

## **APPENDIX A - Section 2: DAM FILLS**

## **SEC 2-01: Belt conveyor flights**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-01**

**DAM EMBANKMENT - BELT CONVEYOR SYSTEM - TRANSPORT OF FILL MATERIAL WITH FLIGHT C1**

**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\$)
<b>1</b>	<b>BELT OPERATION</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	13,017.60	0.00	43.75	0.00	569,520.00
1.1.02	Gang foreman	1	h	65,088.00	6.11	0.00	397,687.68	0.00
1.1.03	Specialist	1	h	32,544.00	0.00	43.75	0.00	1,423,800.00
1.1.04	Skilled	2	h	130,176.00	2.77	0.00	360,587.52	0.00
1.1.05	Semiskilled	2	h	130,176.00	2.20	0.00	286,387.20	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Belt conveyor C1, 2175 t/h capacity (n. 2 units)	2	m.th	271.20	0.00	79,757.65	0.00	21,630,274.68
		---	h	50,368.00	19.03	624.27	958,503.04	31,443,231.36
1.2.02	Transformer cabin, 1000 KVA	2	m.th	271.20	14.00	1,715.00	3,796.80	465,108.00
1.2.03	Control board, 1000 KVA	2	m.th	271.20	8.00	250.00	2,169.60	67,800.00
1.2.04	Control board, 10 KVA	2	m.th	271.20	0.24	27.23	65.09	7,384.78
1.2.05	Ligthing line (L=100 m)	31	m.th	4,203.60	0.00	100.00	0.00	420,360.00
		---	hr	312,281.60	0.01	0.40	3,122.82	124,912.64
1.2.06	Alogen floodligh, 1000 W	4	m.th	542.40	0.00	79.92	0.00	43,348.61
		---	hr	40,294.40	0.01	0.43	402.94	17,326.59

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\$)
<b>2</b>	<b>PLANT INSTALLATION AND REMOVAL</b>							
<b>2.1</b>	<b>Civil Works</b>							
2.1.01	Excavation, foundation	---	m3	347.20	0.40	7.00	138.88	2,430.40
2.1.02	Concrete, foundation	---	m3	520.80	13.50	27.50	7,030.80	14,322.00
2.1.03	Portland cement	---	t	385.56	0.00	206.20	0.00	79,502.47
2.1.04	Reinforcing steel	---	t	465.00	280.00	990.00	130,200.00	460,350.00
2.1.05	Formworks	---	m <sup>2</sup>	1,178.00	5.80	11.85	6,832.40	13,959.30
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Installation	---	l.s.	----	----	----	199,924.80	1,799,323.20
2.2.02	Removal	---	l.s.	----	----	----	53,313.28	479,819.52
Sub-total							2,410,163	59,062,774
Missing items and construction contingencies			%	2.00%			48,203	1,181,255
Total Direct Costs							2,458,366	60,244,029
Overheads, risks and profit			%	52.00%			3,260,525	29,344,721
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			t	<b>59,048,905</b>			<b>0.10</b>	<b>1.52</b>
<b>AGGREGATE UNIT PRICE</b>			t					<b>1.61</b>



**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-01**

**ANA 002**

**DAM EMBANKMENT - BELT CONVEYOR SYSTEM - TRANSPORT OF FILL MATERIAL WITH FLIGHT T1**

**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\$)
<b>1</b>	<b>BELT OPERATION</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	6508.80	0.00	43.75	0.00	284760.00
1.1.02	Gang foreman	1	h	32544.00	6.11	0.00	198843.84	0.00
1.1.03	Specialist	0.5	h	16272.00	0.00	43.75	0.00	711900.00
1.1.04	Skilled	1	h	32544.00	2.77	0.00	90146.88	0.00
1.1.05	Semiskilled	1	h	32544.00	2.20	0.00	71596.80	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Belt conveyor T1, 2175 t/h capacity (n. 2 units)	2	m.th	271.20	0.00	17114.45	0.00	4641438.84
		---	h	16024.00	5.24	245.46	83965.76	3933251.04
1.2.02	Transformer cabin, 800 KVA	1	m.th	135.60	16.80	1830.00	2278.08	248148.00
1.2.03	Control board, 800 KVA	1	m.th	135.60	3.50	272.00	474.60	36883.20
1.2.04	Control board, 10 KVA	1	m.th	135.60	0.24	27.23	32.54	3692.39
1.2.05	Ligthing line (L=100 m)	6	m.th	813.60	0.00	100.00	0.00	81360.00
		---	hr	38457.60	0.01	0.40	384.58	15383.04
1.2.06	Alogen floodligh, 1000 W	2	m.th	271.20	0.00	79.92	0.00	21674.30
		---	hr	12819.20	0.01	0.43	128.19	5512.26

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
<b>2</b>	<b>PLANT INSTALLATION AND REMOVAL</b>							
<b>2.1</b>	<b>Civil Works</b>							
2.1.01	Excavation, foundation	---	m3	20.00	0.40	7.00	8.00	140.00
2.1.02	Concrete, foundation	---	m3	30.00	13.50	27.50	405.00	825.00
2.1.03	Portland cement	---	t	10.50	0.00	206.20	0.00	2165.10
2.1.04	Reinforcing steel	---	t	2.10	280.00	990.00	588.00	2079.00
2.1.05	Formworks	---	m <sup>2</sup>	26.00	5.80	11.85	150.80	308.10
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Installation	---	l.s.	----	----	----	21450.00	193050.00
2.2.02	Removal	---	l.s.	----	----	----	5720.00	51480.00
Sub-total							476,173	10,234,050
Missing items and construction contingencies			%	2.00%			9,523	204,681
Total Direct Costs							485,697	10,438,731
Overheads, risks and profit			%	52.00%			568,070	5,112,632
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			t	<b>29,837,095</b>			<b>0.04</b>	<b>0.52</b>
<b>AGGREGATE UNIT PRICE</b>			t					<b>0.56</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EMBANKMENT - BELT CONVEYOR SYSTEM - TRANSPORT OF FILL MATERIAL WITH FLIGHT T2**

**SEC 2-01  
 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\$)
<b>1</b>	<b>BELT OPERATION</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	13017.60	0.00	43.75	0.00	569520.00
1.1.02	Gang foreman	1	h	65088.00	6.11	0.00	397687.68	0.00
1.1.03	Specialist	1	h	32544.00	0.00	43.75	0.00	1423800.00
1.1.04	Skilled	2	h	130176.00	2.77	0.00	360587.52	0.00
1.1.05	Semiskilled	2	h	130176.00	2.20	0.00	286387.20	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Belt conveyor T2, 2175 t/h capacity (n. 2 units)	2	m.th	271.20	0.00	20238.14	0.00	5488583.57
		---	h	58380.00	3.67	93.12	214254.60	5436345.60
1.2.02	Transformer cabin, 450 KVA	1	m.th	135.60	7.43	911.23	1007.51	123562.79
1.2.03	Control board, 250 KVA	2	m.th	271.20	0.87	97.24	235.94	26371.49
1.2.04	Ligthing line (L=100 m)	7.8	m.th	1057.68	0.00	100.00	0.00	105768.00
1.2.05		---	hr	91072.80	0.01	0.40	910.73	36429.12
	Alogen floodligh, 1000 W	4	m.th	542.40	0.00	79.92	0.00	43348.61
1.2.06		---	hr	46704.00	0.01	0.43	467.04	20082.72

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ Eq.)	F.C.P. (US\$)	L.C.P. (US\$ Eq.)	F.C.P. (US\$)
<b>2</b>	<b>PLANT INSTALLATION AND REMOVAL</b>							
<b>2.1</b>	<b>Civil Works</b>							
2.1.01	Excavation, foundation	---	m3	20.00	0.40	7.00	8.00	140.00
2.1.02	Concrete, foundation	---	m3	30.00	13.50	27.50	405.00	825.00
2.1.03	Portland cement	---	t	10.50	0.00	206.20	0.00	2165.10
2.1.04	Reinforcing steel	---	t	2.10	280.00	990.00	588.00	2079.00
2.1.05	Formworks	---	m <sup>2</sup>	26.00	5.80	11.85	150.80	308.10
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Installation	---	l.s.	----	----	----	50730.00	456570.00
2.2.02	Removal	---	l.s.	----	----	----	13528.00	121752.00
Sub-total							1,326,948	13,857,651
Missing items and construction contingencies			%	2.00%			26,539	277,153
Total Direct Costs							1,353,487	14,134,804
Overheads, risks and profit			%	52.00%			805,391	7,248,520
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>t</b>	<b>88,886,000</b>			<b>0.02</b>	<b>0.24</b>
<b>AGGREGATE UNIT PRICE</b>			<b>t</b>					<b>0.26</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-01**

**DAM EMBANKMENT - BELT CONVEYOR SYSTEM - TRANSPORT OF FILL MATERIAL WITH FLIGHT T3**

**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\$)
<b>1</b>	<b>BELT OPERATION</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	13017.60	0.00	43.75	0.00	569520.00
1.1.02	Gang foreman	1	h	65088.00	6.11	0.00	397687.68	0.00
1.1.03	Specialist	1	h	32544.00	0.00	43.75	0.00	1423800.00
1.1.04	Skilled	2	h	130176.00	2.77	0.00	360587.52	0.00
1.1.05	Semiskilled	2	h	130176.00	2.20	0.00	286387.20	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Belt conveyor T3, 2175 t/h capacity (n. 2 units)	2	m.th	271.20	0.00	50103.96	0.00	13588193.95
		---	h	50368.00	10.68	369.78	537930.24	18625079.04
1.2.02	Transformer cabin, 1400 KVA	1	m.th	135.60	18.60	2290.00	2522.16	310524.00
1.2.03	Control board, 700 KVA	2	m.th	271.20	1.90	182.00	515.28	49358.40
1.2.04	Ligthing line (L=100 m)	25	m.th	3390.00	0.00	100.00	0.00	339000.00
		---	hr	251840.00	0.01	0.40	2518.40	100736.00
1.2.05	Alogen floodligh, 1000 W	4	m.th	542.40	0.00	79.92	0.00	43348.61
		---	hr	40294.40	0.01	0.43	402.94	17326.59

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\$)
<b>2</b>	<b>PLANT INSTALLATION AND REMOVAL</b>							
<b>2.1</b>	<b>Civil Works</b>							
2.1.01	Excavation, foundation	---	m3	20.00	0.40	7.00	8.00	140.00
2.1.02	Concrete, foundation	---	m3	15.00	13.50	27.50	202.50	412.50
2.1.03	Portland cement	---	t	5.25	0.00	206.20	0.00	1082.55
2.1.04	Reinforcing steel	---	t	0.60	280.00	990.00	168.00	594.00
2.1.05	Formworks	---	m <sup>2</sup>	10.00	5.80	11.85	58.00	118.50
2.1.06	Concrete demolition	---	m3	3.00	10.00	60.00	30.00	180.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Installation	---	l.s.	----	----	----	113910.00	1025190.00
2.2.02	Removal	---	l.s.	----	----	----	30376.00	273384.00
Sub-total							1,733,304	36,367,988
Missing items and construction contingencies			%	2.00%			34,666	727,360
Total Direct Costs							1,767,970	37,095,348
Overheads, risks and profit			%	52.00%			2,020,893	18,188,033
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			t	<b>88,886,000</b>			<b>0.04</b>	<b>0.62</b>
<b>AGGREGATE UNIT PRICE</b>			t					<b>0.66</b>

## **SEC 2-02: Belt conveyor loading stations**

**ROGUN HYDROELECTRIC POWER PLANT**  
**CIVIL WORKS COST ESTIMATE - PHASE II**  
**DAM EMBANKMENT - LOADING STATION 1 OF BELT CONVEYOR**

**SEC 2-02**  
**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\$)
<b>1</b>	<b>OPERATION</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	6,508.80	0.00	43.75	0.00	284,760.00
1.1.02	Gang foreman	0.5	h	32,544.00	6.11	0.00	198,843.84	0.00
1.1.03	Specialist	1	h	32,544.00	0.00	43.75	0.00	1,423,800.00
1.1.03	Skilled	1	h	65,088.00	2.77	0.00	180,293.76	0.00
1.1.04	Semiskilled	1	h	65,088.00	2.20	0.00	143,193.60	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Loading station, 2175 t/h capacity (n. 2 units)	2	m.th	271.20	0.00	6,690.27	0.00	1,814,401.22
		---	h	50,368.00	1.97	59.90	99,224.96	3,017,043.20
1.2.02	Transformer cabin, 300 KVA	1	m.th	135.60	5.68	696.82	770.21	94,488.79
1.2.03	Control board, 150 KVA	2	m.th	271.20	0.67	74.68	181.70	20,253.22
1.2.04	Control board, 10 KVA	1	m.th	135.60	0.24	27.23	32.54	3,692.39
1.2.05	Alogen floodligh, 1000 W	4	m.th	542.40	0.00	79.92	0.00	43,348.61
		---	hr	80,588.80	0.01	0.43	805.89	34,653.18
1.2.06	Alogen floodligh, 2000 W	2	m.th	271.20	0.00	92.77	0.00	25,159.22
		---	hr	40,294.40	0.01	0.48	402.94	19,341.31



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
<b>2</b>	<b>PLANT INSTALLATION AND REMOVAL</b>							
<b>2.1</b>	<b>Civil Works</b>							
2.1.01	Excavation	---	m3	220.00	0.15	2.60	33.00	572.00
2.1.02	Concrete, foundation	---	m3	236.00	13.50	27.50	3,186.00	6,490.00
2.1.03	Concrete, structures	---	m3	250.00	16.80	34.30	4,200.00	8,575.00
2.1.04	Portland cement	---	t	141.22	0.00	206.20	0.00	29,119.56
2.1.05	Reinforcing steel	---	t	33.04	280.00	990.00	9,251.20	32,709.60
2.1.06	Formworks	---	m <sup>2</sup>	500.00	5.80	11.85	2,900.00	5,925.00
2.1.07	Random fills and backfills	---	m <sup>3</sup>	35,000.00	0.20	1.50	7,000.00	52,500.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Installation	---	l.s.	----	----	----	18,000.00	162,000.00
2.2.02	Removal	---	l.s.	----	----	----	4,800.00	43,200.00
Sub-total							673,120	7,122,032
Missing items and construction contingencies			%	2.00%			13,462	142,441
Total Direct Costs							686,582	7,264,473
Overheads, risks and profit			%	52.00%			413,455	3,721,094
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			t	<b>59,048,905</b>			<b>0.02</b>	<b>0.19</b>
<b>AGGREGATE UNIT PRICE</b>			t					<b>0.20</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM EMBANKMENT - LOADING STATION 2 OF BELT CONVEYOR**

**SEC 2-02  
 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\$)
<b>1</b>	<b>OPERATION</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	3,254.40	0.00	43.75	0.00	142,380.00
1.1.02	Gang foreman	0.5	h	16,272.00	6.11	0.00	99,421.92	0.00
1.1.03	Specialist	0.5	h	16,272.00	0.00	43.75	0.00	711,900.00
1.1.03	Skilled	1	h	32,544.00	2.77	0.00	90,146.88	0.00
1.1.04	Semiskilled	1	h	32,544.00	2.20	0.00	71,596.80	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Loading station, 2175 t/h capacity (n. 1 units)	1	m.th	135.60	0.00	6,711.11	0.00	910,026.52
		---	h	8,012.00	1.87	57.97	14,982.44	464,455.64
1.2.02	Transformer cabin, 150 KVA	1	m.th	135.60	4.68	574.61	634.61	77,917.12
1.2.03	Control board, 150 KVA	1	m.th	135.60	0.67	74.68	90.85	10,126.61
1.2.04	Control board, 10 KVA	1	m.th	135.60	0.24	27.23	32.54	3,692.39
1.2.05	Alogen floodligh, 1000 W	2	m.th	271.20	0.00	79.92	0.00	21,674.30
		---	hr	6,409.60	0.01	0.43	64.10	2,756.13
1.2.06	Alogen floodligh, 2000 W	2	m.th	271.20	0.00	92.77	0.00	25,159.22
		---	hr	6,409.60	0.01	0.48	64.10	3,076.61

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ Eq.)	F.C.P. (US\$)	L.C.P (US\$ Eq.)	F.C.P. (US\$)
<b>2</b>	<b>PLANT INSTALLATION AND REMOVAL</b>							
<b>2.1</b>	<b>Civil Works</b>							
2.1.01	Excavation	---	m3	220.00	0.15	2.60	33.00	572.00
2.1.02	Concrete, foundation	---	m3	236.00	13.50	27.50	3,186.00	6,490.00
2.1.03	Concrete, structures	---	m3	250.00	16.80	34.30	4,200.00	8,575.00
2.1.04	Portland cement	---	t	141.22	0.00	206.20	0.00	29,119.56
2.1.05	Reinforcing steel	---	t	33.04	280.00	990.00	9,251.20	32,709.60
2.1.06	Formworks	---	m <sup>2</sup>	500.00	5.80	11.85	2,900.00	5,925.00
2.1.07	Random fills and backfills	---	m <sup>3</sup>	35,000.00	0.20	1.50	7,000.00	52,500.00
<b>2.2</b>	<b>Equipment Installation and removal</b>							
2.2.01	Installation	---	l.s.	----	----	----	9,000.00	81,000.00
2.2.02	Removal	---	l.s.	----	----	----	2,400.00	21,600.00
Sub-total							315,004	2,611,656
Missing items and construction contingencies			%	2.00%			6,300	52,233
Total Direct Costs							321,305	2,663,889
Overheads, risks and profit			%	52.00%			155,230	1,397,070
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>t</b>	<b>15,553,173</b>			<b>0.03</b>	<b>0.26</b>
<b>AGGREGATE UNIT PRICE</b>			<b>t</b>					<b>0.29</b>

## **SEC 2-03: Core – Loam component**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I  
 CORE – LOAM COMPONENT - DAM PHASE 3 - LOADING IN STOCKPILE LL3, SCREENING, TRANSPORT AND PLACING**

**SEC 2-03  
 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\$)
<b>1</b>	<b>LOADING, SCREENING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	1,724.82	0.00	43.75	0.00	75,460.87
1.1.02	Gang foreman	----	h	17,248.20	6.11	0.00	105,386.50	0.00
1.1.03	Equipment, operator	----	h	93,525.32	5.39	0.00	504,101.49	0.00
1.1.04	Equipment, helper	----	h	78,956.67	2.20	0.00	173,704.68	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	4,538.02	0.63	48.81	2,858.95	221,500.66
		s.b.	h	907.60	0.00	20.84	0.00	18,914.46
1.2.02	Bulldozer with universal blade, 179 kW	Op.	h	4,192.07	1.29	97.19	5,407.77	407,427.32
		s.b.	h	838.41	0.00	36.66	0.00	30,736.26
1.2.03	Dozer trap/belt loader, 48" x 45' conveyor	Op.	h	9,603.10	0.59	40.27	5,665.83	386,716.72
		s.b.	h	1,920.62	0.00	8.19	0.00	15,729.87
1.2.04	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	1,624.56	0.75	70.52	1,218.42	114,563.84
		s.b.	h	324.91	0.00	26.87	0.00	8,730.38

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1.2.05	Off-highway dump truck, 36.6 ton pay load	Op.	h	62,175.69	1.32	98.59	82,071.92	6,129,901.71
	(transport of loam to dam)	s.b.	h	12,435.14	0.00	33.74	0.00	419,561.59
1.2.06	Off-highway dump truck, 36.60 ton pay load	Op.	h	2,889.58	1.32	98.59	3,814.25	284,883.99
	(transport of boulders to stockpile)	s.b.	h	577.92	0.00	33.74	0.00	19,498.91
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	3,991.55	0.07	6.41	279.41	25,585.83
		s.b.	h	798.31	0.00	3.46	0.00	2,762.15
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	258.11	0.00	43.75	0.00	11,292.43
2.1.02	Gang foreman	---	h	2,581.13	6.11	0.00	15,770.68	0.00
2.1.03	Equipment, operator	---	h	22,071.94	5.39	0.00	118,967.76	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Vibrating rammer, operator	---	h	1,869.66	2.77	0.00	5,178.97	0.00
2.1.06	Vibrating rammer, helper	---	h	1,869.66	2.20	0.00	4,113.26	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	6,432.47	1.29	97.19	8,297.89	625,172.21
		s.b.	h	1,286.49	0.00	36.66	0.00	47,162.90
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	5,801.00	0.79	66.33	4,582.79	384,780.56
		s.b.	h	1,160.20	0.00	32.25	0.00	37,416.47
2.2.03	Soil stabilizer, 245 kW, 2400 mm	Op.	h	2,832.82	0.75	80.64	2,124.62	228,438.87

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	width							
		s.b.	h	566.56	0.00	25.83	0.00	14,634.37
2.2.04	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	4,999.10	0.28	43.95	1,399.75	219,710.45
		s.b.	h	999.82	0.00	10.46	0.00	10,458.12
2.2.05	Tyred roller, 27 t operating weight with ballast	Op.	h	849.85	0.50	49.14	424.92	41,761.48
		s.b.	h	169.97	0.00	17.49	0.00	2,972.76
2.2.06	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	1,699.69	0.00	2.61	5.10	4,436.20
		s.b.	h	339.94	0.00	1.13	0.00	384.13
2.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	3,013.26	0.07	6.41	210.93	19,315.00
		s.b.	h	602.65	0.00	3.46	0.00	2,085.18
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							1,045,586	9,811,996
Missing items and construction contingencies			%	1.50%			15,684	147,180
Total Direct Costs							1,061,270	9,959,176
Overheads, risks and profit			%	52.00%			573,063	5,157,568
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>1,410,534</b>			<b>1.16</b>	<b>10.72</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>11.88</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I  
 CORE - LOAM COMPONENT- DAM PHASE 4 - LOADING IN BORROW AREA 17, SCREENING, TRANSPORT AND PLACING**

**SEC 2-03  
 ANA 002  
 Tabel 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	4,227.21	0.00	43.75	0.00	184,940.51
1.1.02	Gang foreman	----	h	42,272.12	6.11	0.00	258,282.63	0.00
1.1.03	Equipment, operator	----	h	226,275.58	5.39	0.00	1,219,625.38	0.00
1.1.04	Equipment, helper	----	h	196,445.57	2.20	0.00	432,180.26	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	9,291.81	0.63	48.81	5,853.84	453,533.09
		s.b.	h	1,858.36	0.00	20.84	0.00	38,728.25
1.2.02	Bulldozer with universal blade, 179 kW	Op.	h	8,583.46	1.29	97.19	11,072.67	834,226.75
		s.b.	h	1,716.69	0.00	36.66	0.00	62,933.95
1.2.03	Dozer trap/belt loader, 48" x 45' conveyor	Op.	h	19,662.80	0.59	40.27	11,601.05	791,820.82
		s.b.	h	3,932.56	0.00	8.19	0.00	32,207.66
1.2.04	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	3,326.36	0.75	70.52	2,494.77	234,574.90
		s.b.	h	665.27	0.00	26.87	0.00	17,875.86
1.2.05	Off-highway dump truck, 36.6 ton pay load	Op.	h	158,924.09	1.32	98.59	209,779.80	15,668,325.93



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	(transport of loam to dam)	s.b.	h	31,784.82	0.00	33.74	0.00	1,072,419.75
1.2.06	Off-highway dump truck, 36.60 ton pay load	Op.	h	5,916.56	1.32	98.59	7,809.86	583,313.46
	(transport of boulders to stockpile)	s.b.	h	1,183.31	0.00	33.74	0.00	39,924.93
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	8,172.89	0.07	6.41	572.10	52,388.19
		s.b.	h	1,634.58	0.00	3.46	0.00	5,655.64
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	528.50	0.00	43.75	0.00	23,121.79
2.1.02	Gang foreman	---	h	5,284.98	6.11	0.00	32,291.22	0.00
2.1.03	Equipment, operator	---	h	45,193.35	5.39	0.00	243,592.13	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Vibrating rammer, operator	---	h	3,828.22	2.77	0.00	10,604.18	0.00
2.1.06	Vibrating rammer, helper	---	h	3,828.22	2.20	0.00	8,422.09	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	13,170.80	1.29	97.19	16,990.33	1,280,069.71
		s.b.	h	2,634.16	0.00	36.66	0.00	96,568.28
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	11,877.83	0.79	66.33	9,383.49	787,856.42
		s.b.	h	2,375.57	0.00	32.25	0.00	76,612.00
2.2.03	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	5,800.34	0.75	80.64	4,350.26	467,739.42
		s.b.	h	1,160.07	0.00	25.83	0.00	29,964.56

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.2.04	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	10,235.89	0.28	43.95	2,866.05	449,867.55
		s.b.	h	2,047.18	0.00	10.46	0.00	21,413.49
2.2.05	Tyred roller, 27 t operating weight with ballast	Op.	h	1,740.10	0.50	49.14	870.05	85,508.61
		s.b.	h	348.02	0.00	17.49	0.00	6,086.88
2.2.06	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	3,480.20	0.00	2.61	10.44	9,083.33
		s.b.	h	696.04	0.00	1.13	0.00	786.53
2.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	6,169.79	0.07	6.41	431.89	39,548.37
		s.b.	h	1,233.96	0.00	3.46	0.00	4,269.50
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							2,489,084	23,451,366
Missing items and construction contingencies			%	1.50%			37,336	351,770
Total Direct Costs							2,526,421	23,803,137
Overheads, risks and profit			%	52.00%			1,369,137	12,322,233
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			m <sup>3</sup>	<b>2,888,136</b>			<b>1.35</b>	<b>12.51</b>
<b>AGGREGATE UNIT PRICE</b>			m <sup>3</sup>					<b>13.86</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I  
 CORE - LOAM COMPONENT- DAM PHASE 5 - LOADING IN STOCKPILE LL3, SCREENING, TRANSPORT AND PLACING**

**SEC 2-03  
 ANA 003  
 Tabel 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	1,363.81	0.00	43.75	0.00	59,666.66
1.1.02	Gang foreman	----	h	13,638.09	6.11	0.00	83,328.75	0.00
1.1.03	Equipment, operator	----	h	72,820.22	5.39	0.00	392,500.99	0.00
1.1.04	Equipment, helper	----	h	63,560.72	2.20	0.00	139,833.58	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	2,884.26	0.63	48.81	1,817.08	140,780.80
		s.b.	h	576.85	0.00	20.84	0.00	12,021.60
1.2.02	Bulldozer with universal blade, 179 kW	Op.	h	2,664.38	1.29	97.19	3,437.06	258,951.58
		s.b.	h	532.88	0.00	36.66	0.00	19,535.27
1.2.03	Dozer trap/belt loader, 48" x 45' conveyor	Op.	h	6,103.51	0.59	40.27	3,601.07	245,788.39
		s.b.	h	1,220.70	0.00	8.19	0.00	9,997.55
1.2.04	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	1,032.53	0.75	70.52	774.40	72,814.18
		s.b.	h	206.51	0.00	26.87	0.00	5,548.83
1.2.05	Off-highway dump truck, 36.6 ton pay load	Op.	h	51,678.96	1.32	98.59	68,216.22	5,095,028.49
	(transport of loam to dam)	s.b.	h	10,335.79	0.00	33.74	0.00	348,729.61
1.2.06	Off-highway dump truck, 36.60 ton pay load	Op.	h	1,836.55	1.32	98.59	2,424.25	181,065.81

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
	(transport of boulders to stockpile)	s.b.	h	367.31	0.00	33.74	0.00	12,393.06
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	2,536.94	0.07	6.41	177.59	16,261.77
		s.b.	h	507.39	0.00	3.46	0.00	1,755.56
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	164.05	0.00	43.75	0.00	7,177.21
2.1.02	Gang foreman	---	h	1,640.51	6.11	0.00	10,023.49	0.00
2.1.03	Equipment, operator	---	h	14,028.43	5.39	0.00	75,613.22	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Vibrating rammer, operator	---	h	1,188.32	2.77	0.00	3,291.63	0.00
2.1.06	Vibrating rammer, helper	---	h	1,188.32	2.20	0.00	2,614.29	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	4,088.34	1.29	97.19	5,273.95	397,345.29
		s.b.	h	817.67	0.00	36.66	0.00	29,975.67
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	3,686.99	0.79	66.33	2,912.72	244,557.80
		s.b.	h	737.40	0.00	32.25	0.00	23,781.06
2.2.03	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	1,800.48	0.75	80.64	1,350.36	145,190.57
		s.b.	h	360.10	0.00	25.83	0.00	9,301.27
2.2.04	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	3,177.31	0.28	43.95	889.65	139,642.98
		s.b.	h	635.46	0.00	10.46	0.00	6,646.94
2.2.05	Tyred roller, 27 t operating weight with ballast	Op.	h	540.14	0.50	49.14	270.07	26,542.65
		s.b.	h	108.03	0.00	17.49	0.00	1,889.42
2.2.06	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	1,080.29	0.00	2.61	3.24	2,819.55

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	216.06	0.00	1.13	0.00	244.14
2.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	1,915.16	0.07	6.41	134.06	12,276.18
		s.b.	h	383.03	0.00	3.46	0.00	1,325.29
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							798,488	7,529,055
Missing items and construction contingencies			%	1.50%			11,977	112,936
Total Direct Costs							810,465	7,641,991
Overheads, risks and profit			%	52.00%			439,528	3,955,749
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>896,504</b>			<b>1.39</b>	<b>12.94</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>14.33</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I  
 CORE - LOAM COMPONENT- DAM PHASE 6 - LOADING IN BORROW AREA 17, SCREENING, TRANSPORT AND PLACING**

**SEC 2-03  
 ANA 004  
 Tabel 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	1,700.67	0.00	43.75	0.00	74,404.36
1.1.02	Gang foreman	----	h	17,006.71	6.11	0.00	103,911.00	0.00
1.1.03	Equipment, operator	----	h	90,704.23	5.39	0.00	488,895.78	0.00
1.1.04	Equipment, helper	----	h	79,362.88	2.20	0.00	174,598.34	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	3,532.74	0.63	48.81	2,225.63	172,432.95
		s.b.	h	706.55	0.00	20.84	0.00	14,724.45
1.2.02	Bulldozer with universal blade, 179 kW	Op.	h	3,263.43	1.29	97.19	4,209.82	317,172.40
		s.b.	h	652.69	0.00	36.66	0.00	23,927.44
1.2.03	Dozer trap/belt loader, 48" x 45' conveyor	Op.	h	7,475.78	0.59	40.27	4,410.71	301,049.69
		s.b.	h	1,495.16	0.00	8.19	0.00	12,245.33
1.2.04	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	1,264.68	0.75	70.52	948.51	89,185.20
		s.b.	h	252.94	0.00	26.87	0.00	6,796.39
1.2.05	Off-highway dump truck, 36.6 ton pay load	Op.	h	64,672.29	1.32	98.59	85,367.43	6,376,041.30
	(transport of loam to dam)	s.b.	h	12,934.46	0.00	33.74	0.00	436,408.63
1.2.06	Off-highway dump truck, 36.60 ton pay load	Op.	h	2,249.47	1.32	98.59	2,969.30	221,775.35

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	(transport of boulders to stockpile)	s.b.	h	449.89	0.00	33.74	0.00	15,179.43
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	3,107.32	0.07	6.41	217.51	19,917.95
		s.b.	h	621.46	0.00	3.46	0.00	2,150.27
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	200.93	0.00	43.75	0.00	8,790.89
2.1.02	Gang foreman	---	h	2,009.35	6.11	0.00	12,277.10	0.00
2.1.03	Equipment, operator	---	h	17,182.48	5.39	0.00	92,613.55	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Vibrating rammer, operator	---	h	1,455.49	2.77	0.00	4,031.70	0.00
2.1.06	Vibrating rammer, helper	---	h	1,455.49	2.20	0.00	3,202.07	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	5,007.53	1.29	97.19	6,459.71	486,681.56
		s.b.	h	1,001.51	0.00	36.66	0.00	36,715.19
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	4,515.94	0.79	66.33	3,567.59	299,542.43
		s.b.	h	903.19	0.00	32.25	0.00	29,127.83
2.2.03	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	2,205.29	0.75	80.64	1,653.96	177,834.18
		s.b.	h	441.06	0.00	25.83	0.00	11,392.50
2.2.04	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	3,891.68	0.28	43.95	1,089.67	171,039.31
		s.b.	h	778.34	0.00	10.46	0.00	8,141.39
2.2.05	Tyred roller, 27 t operating weight with ballast	Op.	h	661.59	0.50	49.14	330.79	32,510.31
		s.b.	h	132.32	0.00	17.49	0.00	2,314.23
2.2.06	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	1,323.17	0.00	2.61	3.97	3,453.48

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	264.63	0.00	1.13	0.00	299.04
2.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	2,345.75	0.07	6.41	164.20	15,036.26
		s.b.	h	469.15	0.00	3.46	0.00	1,623.26
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							993,148	9,367,913
Missing items and construction contingencies			%	1.50%			14,897	140,519
Total Direct Costs							1,008,046	9,508,432
Overheads, risks and profit			%	52.00%			546,857	4,921,711
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>1,098,068</b>			<b>1.42</b>	<b>13.14</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>14.56</b>



## **SEC 2-04: Core – Fine component**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 CORE – FINE COMPONENT - DAM PHASE 3 - LOADING IN BORROW AREA N11, STRANSPORT TO DAM AND PLACING**

**SEC 2-04  
 ANA 001  
 Tabel A**

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P	F.C.P.	L.C.P	F.C.P.
					(US\$ eq.)	(US\$)	(US\$ eq.)	(US\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	248.08	0.00	43.75	0.00	10,853.39
1.1.02	Gang foreman	----	h	2,480.78	6.11	0.00	15,157.54	0.00
1.1.03	Equipment, operator	----	h	24,807.75	5.39	0.00	133,713.78	0.00
1.1.04	Equipment, helper	----	h	0.00	2.20	0.00	0.00	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	866.31	0.63	48.81	545.77	42,284.46
		s.b.	h	173.26	0.00	20.84	0.00	3,610.77
1.2.02	Bulldozer with universal blade, 179 kW	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
1.2.03	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	869.28	0.75	70.52	651.96	61,301.74
		s.b.	h	173.86	0.00	26.87	0.00	4,671.52
1.2.04	Wheel loader, 199 kW 4.30 m <sup>3</sup> heaped bucket	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
1.2.05	Rear tipper, 24.0 ton pay load	Op.	h	20,816.91	0.44	55.14	9,159.44	1,147,844.52
		s.b.	h	4,163.38	0.00	16.94	0.00	70,527.70
1.2.05	Off-highway dump truck, 36.60 ton pay load	Op.	h	0.00	1.32	98.59	0.00	0.00

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	0.00	0.00	33.74	0.00	0.00
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	347.12	0.07	6.41	24.30	2,225.03
		s.b.	h	69.42	0.00	3.46	0.00	240.21
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	41.55	0.00	43.75	0.00	1,817.73
2.1.02	Gang foreman	---	h	415.48	6.11	0.00	2,538.59	0.00
2.1.03	Equipment, operator	---	h	1,038.70	5.39	0.00	5,598.61	0.00
2.1.04	Equipment, helper	---	h	1,038.70	2.20	0.00	2,285.15	0.00
2.1.05	Skilled	---	h	1,038.70	2.99	0.00	3,105.72	0.00
2.1.06	Semiskilled	---	h	1,038.70	2.38	0.00	2,472.11	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Clay spreade machine, 82 kW, 6100 mm width	Op.	h	944.28	0.68	51.57	642.11	48,696.26
		s.b.	h	188.86	0.00	27.79	0.00	5,248.28
2.2.02	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	314.76	0.75	80.64	236.07	25,382.11
		s.b.	h	62.95	0.00	25.83	0.00	1,626.04
2.2.03	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	555.46	0.28	43.95	155.53	24,412.29
		s.b.	h	111.09	0.00	10.46	0.00	1,162.01
2.2.04	Tyred roller, 27 t operating weight with ballast	Op.	h	0.00	0.50	49.14	0.00	0.00
		s.b.	h	0.00	0.00	17.49	0.00	0.00
2.2.05	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	113.31	0.00	2.61	0.34	295.75
		s.b.	h	22.66	0.00	1.13	0.00	25.61
2.2.06	Mobile diesel powered floodlight, 6000 W	Op.	h	362.90	0.07	6.41	25.40	2,326.18

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	72.58	0.00	3.46	0.00	251.13
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							176,312	1,454,803
Missing items and construction contingencies			%	1.00%			1,763	14,548
Total Direct Costs							178,076	1,469,351
Overheads, risks and profit			%	52.00%			85,666	770,995
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>157,726</b>			<b>1.67</b>	<b>14.20</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>15.88</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 CORE - FINE COMPONENT - DAM PHASE 4 - LOADING IN BORROW AREA N11, STRANSPORT TO DAM AND PLACING**

**SEC 2-04  
 ANA 002  
 Tabel 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	578.90	0.00	43.75	0.00	25,326.96
1.1.02	Gang foreman	----	h	5,789.02	6.11	0.00	35,370.91	0.00
1.1.03	Equipment, operator	----	h	57,890.19	5.39	0.00	312,028.14	0.00
1.1.04	Equipment, helper	----	h	0.00	2.20	0.00	0.00	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	1,773.80	0.63	48.81	1,117.50	86,579.31
		s.b.	h	354.76	0.00	20.84	0.00	7,393.21
1.2.02	Bulldozer with universal blade, 179 kW	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
1.2.03	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	1,779.89	0.75	70.52	1,334.92	125,518.04
		s.b.	h	355.98	0.00	26.87	0.00	9,565.14
1.2.04	Wheel loader, 199 kW 4.30 m <sup>3</sup> heaped bucket	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
1.2.05	Rear tipper, 24.0 ton pay load	Op.	h	49,073.75	0.44	55.14	21,592.45	2,705,926.70

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	9,814.75	0.00	16.94	0.00	166,261.87
1.2.05	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
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	710.74	0.07	6.41	49.75	4,555.84
		s.b.	h	142.15	0.00	3.46	0.00	491.83
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	85.07	0.00	43.75	0.00	3,721.88
2.1.02	Gang foreman	---	h	850.72	6.11	0.00	5,197.87	0.00
2.1.03	Equipment, operator	---	h	2,126.79	5.39	0.00	11,463.40	0.00
2.1.04	Equipment, helper	---	h	2,126.79	2.20	0.00	4,678.94	0.00
2.1.05	Skilled	---	h	2,126.79	2.99	0.00	6,359.10	0.00
2.1.06	Semiskilled	---	h	2,126.79	2.38	0.00	5,061.76	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Clay spreader, 82 kW, 6100 mm width	Op.	h	1,933.45	0.68	51.57	1,314.74	99,707.76
		s.b.	h	386.69	0.00	27.79	0.00	10,746.09
2.2.02	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	644.48	0.75	80.64	483.36	51,971.00
		s.b.	h	128.90	0.00	25.83	0.00	3,329.39
2.2.03	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	1,137.32	0.28	43.95	318.45	49,985.24
		s.b.	h	227.46	0.00	10.46	0.00	2,379.27

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.2.04	Tyred roller, 27 t operating weight with ballast	Op.	h	0.00	0.50	49.14	0.00	0.00
		s.b.	h	0.00	0.00	17.49	0.00	0.00
2.2.05	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	232.01	0.00	2.61	0.70	605.55
		s.b.	h	46.40	0.00	1.13	0.00	52.44
1.2.06	Mobile diesel powered floodlight, 6000 W	Op.	h	743.05	0.07	6.41	52.01	4,762.95
		s.b.	h	148.61	0.00	3.46	0.00	514.19
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							406,424	3,359,395
Missing items and construction contingencies			%	1.00%			4,064	33,594
Total Direct Costs							410,488	3,392,989
Overheads, risks and profit			%	52.00%			197,781	1,780,027
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>320,904</b>			<b>1.90</b>	<b>16.12</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>18.02</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 CORE – FINE COMPONENT - DAM PHASE 5 - LOADING IN BORROW AREA N11, STRANSPORT TO DAM AND PLACING**

**SEC 2-04  
 ANA 003  
 Tabel 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	188.41	0.00	43.75	0.00	8,242.97
1.1.02	Gang foreman	----	h	1,884.11	6.11	0.00	11,511.90	0.00
1.1.03	Equipment, operator	----	h	18,841.09	5.39	0.00	101,553.45	0.00
1.1.04	Equipment, helper	----	h	0.00	2.20	0.00	0.00	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	550.61	0.63	48.81	346.88	26,875.05
		s.b.	h	110.12	0.00	20.84	0.00	2,294.92
1.2.02	Bulldozer with universal blade, 179 kW	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
1.2.03	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	552.50	0.75	70.52	414.37	38,962.01
		s.b.	h	110.50	0.00	26.87	0.00	2,969.11
1.2.04	Wheel loader, 199 kW 4.30 m <sup>3</sup> heaped bucket	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



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1.2.05	Rear tipper, 24.0 ton pay load	Op.	h	16,025.16	0.44	55.14	7,051.07	883,627.20
		s.b.	h	3,205.03	0.00	16.94	0.00	54,293.23
1.2.05	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
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	220.62	0.07	6.41	15.44	1,414.18
		s.b.	h	44.12	0.00	3.46	0.00	152.67
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	26.41	0.00	43.75	0.00	1,155.31
2.1.02	Gang foreman	---	h	264.07	6.11	0.00	1,613.47	0.00
2.1.03	Equipment, operator	---	h	660.18	5.39	0.00	3,558.35	0.00
2.1.04	Equipment, helper	---	h	660.18	2.20	0.00	1,452.39	0.00
2.1.05	Skilled	---	h	660.18	2.99	0.00	1,973.93	0.00
2.1.06	Semiskilled	---	h	660.18	2.38	0.00	1,571.22	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Clay spreader, 82 kW, 6100 mm width	Op.	h	600.16	0.68	51.57	408.11	30,950.25
		s.b.	h	120.03	0.00	27.79	0.00	3,335.69
2.2.02	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	200.05	0.75	80.64	150.04	16,132.30
		s.b.	h	40.01	0.00	25.83	0.00	1,033.48
2.2.03	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	353.04	0.28	43.95	98.85	15,515.90

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	70.61	0.00	10.46	0.00	738.55
2.2.04	Tyred roller, 27 t operating weight with ballast	Op.	h	0.00	0.50	49.14	0.00	0.00
		s.b.	h	0.00	0.00	17.49	0.00	0.00
2.2.05	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	72.02	0.00	2.61	0.22	187.97
		s.b.	h	14.40	0.00	1.13	0.00	16.28
1.2.06	Mobile diesel powered floodlight, 6000 W	Op.	h	230.65	0.07	6.41	16.15	1,478.46
		s.b.	h	46.13	0.00	3.46	0.00	159.61
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							131,736	1,089,535
Missing items and construction contingencies			%	1.00%			1,317	10,895
Total Direct Costs							133,053	1,100,431
Overheads, risks and profit			%	52.00%			64,141	577,270
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>99,612</b>			<b>1.98</b>	<b>16.84</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>18.82</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 CORE - FINE - DAM PHASE 6 - LOADING IN BORROW AREA N11, STRANSPORT TO DAM AND PLACING**

**SEC 2-04  
 ANA 004  
 Tabel 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	249.60	0.00	43.75	0.00	10,919.84
1.1.02	Gang foreman	----	h	2,495.96	6.11	0.00	15,250.33	0.00
1.1.03	Equipment, operator	----	h	24,959.62	5.39	0.00	134,532.37	0.00
1.1.04	Equipment, helper	----	h	0.00	2.20	0.00	0.00	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Bulldozer with universal blade, 153 kW	Op.	h	674.40	0.63	48.81	424.87	32,917.42
		s.b.	h	134.88	0.00	20.84	0.00	2,810.90
1.2.02	Bulldozer with universal blade, 179 kW	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
1.2.03	Wheel loader, 157 kW 3.10 m <sup>3</sup> heaped bucket	Op.	h	676.71	0.75	70.52	507.54	47,721.91
		s.b.	h	135.34	0.00	26.87	0.00	3,636.66
1.2.04	Wheel loader, 199 kW 4.30 m <sup>3</sup> heaped bucket	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

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1.2.05	Rear tipper, 24.0 ton pay load	Op.	h	21,339.45	0.44	55.14	9,389.36	1,176,657.48
		s.b.	h	4,267.89	0.00	16.94	0.00	72,298.07
1.2.05	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
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	270.22	0.07	6.41	18.92	1,732.13
		s.b.	h	54.04	0.00	3.46	0.00	186.99
<b>2</b>	<b>SPREADING, MIXING &amp; COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	32.34	0.00	43.75	0.00	1,415.06
2.1.02	Gang foreman	---	h	323.44	6.11	0.00	1,976.23	0.00
2.1.03	Equipment, operator	---	h	808.60	5.39	0.00	4,358.38	0.00
2.1.04	Equipment, helper	---	h	808.60	2.20	0.00	1,778.93	0.00
2.1.05	Skilled	---	h	808.60	2.99	0.00	2,417.73	0.00
2.1.06	Semiskilled	---	h	808.60	2.38	0.00	1,924.48	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Clay spreader, 82 kW, 6100 mm width	Op.	h	735.10	0.68	51.57	499.86	37,908.85
		s.b.	h	147.02	0.00	27.79	0.00	4,085.66
2.2.02	Soil stabilizer, 245 kW, 2400 mm width	Op.	h	245.03	0.75	80.64	183.77	19,759.35
		s.b.	h	49.01	0.00	25.83	0.00	1,265.83
2.2.03	Pad-foot single drum vibrating roller, 44.0 kg/cm	Op.	h	432.41	0.28	43.95	121.07	19,004.37

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	86.48	0.00	10.46	0.00	904.60
2.2.04	Tyred roller, 27 t operating weight with ballast	Op.	h	0.00	0.50	49.14	0.00	0.00
		s.b.	h	0.00	0.00	17.49	0.00	0.00
2.2.05	Vibrating rammer (tamper), 70 kg operating w.	Op.	h	88.21	0.00	2.61	0.26	230.23
		s.b.	h	17.64	0.00	1.13	0.00	19.94
1.2.06	Mobile diesel powered floodlight, 6000 W	Op.	h	282.51	0.07	6.41	19.78	1,810.87
		s.b.	h	56.50	0.00	3.46	0.00	195.49
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							173,404	1,435,482
Missing items and construction contingencies			%	1.00%			1,734	14,355
Total Direct Costs							175,138	1,449,836
Overheads, risks and profit			%	52.00%			84,499	760,488
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>122,008</b>			<b>2.13</b>	<b>18.12</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>20.24</b>

## **SEC 2-05: Filters (Fine and coarse)**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM PHASE 1 - FILTERS - TRANSPORT OF ALLUVIUM FROM BORROW AREA 15 TO PROCESSING PLANT**

**SEC 2-05  
 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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	30.40	0.00	43.75	0.00	1,330.00
1.02	Gang foreman	----	h	304.00	6.11	0.00	1,857.44	0.00
1.03	Operator, front shovel (s)	----	h	189.42	5.39	0.00	1,021.00	0.00
1.04	Helper for ditto	1	h	189.42	2.20	0.00	416.73	0.00
1.05	Operator, wheel loader (s)	----	h	41.26	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	41.26	2.20	0.00	0.00	0.00
1.07	Operator, bulldozer(s) - borrow area	----	h	37.88	5.39	0.00	204.20	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, dump truck	----	h	2,468.62	5.39	0.00	0.00	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, bulldozer (s)	----	h	0.00	5.39	0.00	388.74	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</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\$)
2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	172.20	1.80	163.89	309.97	28,222.46
		s.b.	h	34.44	0.00	72.58	0.00	2,499.71
2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.03	97.91	0.00	0.00
		s.b.	h	0.00	0.00	35.81	0.00	0.00
2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	37.51	1.56	142.03	58.51	5,327.41
		s.b.	h	7.50	0.00	53.94	0.00	404.65
2.05	Bulldozer with universal blade, 231 kW ( in borrow area)	Op.	h	34.44	1.64	121.99	56.48	4,201.43
		s.b.	h	6.89	0.00	45.46	0.00	313.14
2.06	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
2.07	Off-highway dump truck, 55.60 ton pay load	Op.	h	2,244.20	1.86	133.53	4,174.22	299,668.47
		s.b.	h	448.84	0.00	41.34	0.00	18,555.07
2.08	Bulldozer with universal blade, 153 kW	Op.	h	0.00	0.96	79.55	0.00	0.00
		s.b.	h	0.00	0.00	30.76	0.00	0.00
2.09	Mobile diesel powered floodlight, 6000 W	Op.	h	55.06	0.07	6.41	3.85	352.91
		s.b.	h	11.01	0.00	3.46	0.00	38.10
	<i>Op.=Oprating, s.b.=Standby</i>							



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	Sub-total						8,554	366,532
	Missing items and construction contingencies		%	0.50%			43	1,833
	Total Direct Costs						8,597	368,365
	Overheads, risks and profit		%	52.00%			19,602	176,418
	<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m<sup>3</sup></b>	<b>88,890</b>			<b>0.32</b>	<b>6.13</b>
	<b>AGGREGATE UNIT PRICE</b>		<b>m<sup>3</sup></b>					<b>6.45</b>

**ROGUN HYDROELECTRIC POWER PLANT**  
**CIVIL WORKS COST ESTIMATE - PHASE II**  
**FILTERS - DAM PHASE 3 - TRANSPORT OF ALLUVIUM FROM LG2 TO PROCESSING PLANT**

**SEC 2-05**  
**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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	80.13	0.00	43.75	0.00	3,505.85
1.02	Gang foreman	----	h	801.34	6.11	0.00	4,896.17	0.00
1.03	Operator, front shovel	----	h	0.00	5.39	0.00	0.00	0.00
1.04	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, wheel loader	----	h	1,149.80	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	1,149.80	2.20	0.00	0.00	0.00
1.07	Operator, bulldozer	----	h	0.00	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, dump truck	----	h	5,713.76	5.39	0.00	0.00	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</b>							
2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	0.00	1.80	163.89	0.00	0.00
		s.b.	h	0.00	0.00	72.58	0.00	0.00

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	1,045.28	1.03	97.91	1,076.64	102,343.06
		s.b.	h	209.06	0.00	35.81	0.00	7,486.27
2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.56	142.03	0.00	0.00
		s.b.	h	0.00	0.00	53.94	0.00	0.00
2.05	Bulldozer with universal blade, 231 kW	Op.	h	0.00	1.64	121.99	0.00	0.00
		s.b.	h	0.00	0.00	45.46	0.00	0.00
2.06	Off-highway dump truck, 36.60 ton pay load	Op.	h	5,194.33	1.32	98.59	6,856.51	512,108.55
		s.b.	h	1,038.87	0.00	33.74	0.00	35,051.31
2.07	Off-highway dump truck, 55.60 ton pay load	Op.	h	0.00	1.86	133.53	0.00	0.00
		s.b.	h	0.00	0.00	41.34	0.00	0.00
2.09	Mobile diesel powered floodlight, 6000 W	Op.	h	209.06	0.07	6.41	14.63	1,340.04
		s.b.	h	41.81	0.00	3.46	0.00	144.67
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							12,844	661,980
Missing items and construction contingencies			%	0.50%			64	3,310
Total Direct Costs							12,908	665,290
Overheads, risks and profit			%	52.00%			35,266	317,397
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>372,840</b>			<b>0.13</b>	<b>2.64</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>2.76</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM FILTERS - PROCESSING PLANT**

**SEC 2-05  
 ANA 003  
 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\$)
<b>1</b>	<b>ALLUVIUM MATERIAL PROCESSING</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	---	h	1,800.00	0.00	43.75	0.00	78,750.00
1.1.02	Gang foreman	1	h	18,000.00	6.11	0.00	109,980.00	0.00
1.1.03	Specialist	2	h	36,000.00	3.42	0.00	123,120.00	0.00
1.1.04	Skilled	2	h	36,000.00	2.77	0.00	99,720.00	0.00
1.1.05	Semiskilled	3	h	54,000.00	2.20	0.00	118,800.00	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Crushing and processing plant, 380 t/hr	1	m.th	179.00	0.00	21,165.99	0.00	3,788,712.21
		---	h	85,920.00	7.17	250.66	616,046.40	21,536,707.20
1.2.02	Staker of processed filter	1	m.th	179.00	0.00	3,143.25	0.00	562,641.75
		---	h	85,920.00	0.74	17.57	63,580.80	1,509,614.40
1.2.03	Alogen floodlights, 1000 W	4	m.th	716.00	0.00	79.92	0.00	57,222.72
		---	h	143,200.00	0.01	0.43	1,432.00	61,576.00

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\$)
1.2.04	Alogen floodlights, 2000 W	6	m.th	1,074.00	0.00	92.77	0.00	99,634.98
		---	h	214,800.00	0.01	0.48	2,148.00	103,104.00
1.2.05	Transformer cabin, 900 kVA	1	m.th	179.00	10.00	1,350.00	1,790.00	241,650.00
1.2.06	Control board, 900 kVA	1	m.th	179.00	2.60	250.00	465.40	44,750.00
1.2.07	Control board, 10 kVA	1	m.th	179.00	0.24	27.23	42.96	4,874.17
<b>1.3</b>	<b>Civil works for installation</b>							
1.3.01	Excavation	---	m <sup>3</sup>	290.00	0.15	2.60	43.50	754.00
1.3.02	Concrete, foundation	---	m <sup>3</sup>	400.00	13.50	27.50	5,400.00	11,000.00
1.3.03	Concrete, structures	---	m <sup>3</sup>	280.00	16.80	34.30	4,704.00	9,604.00
1.3.04	Portland cement	---	t	194.80	0.00	206.20	0.00	40,167.76
1.3.05	Reinforcing steel	---	t	56.00	280.00	990.00	15,680.00	55,440.00
1.3.06	Formworks	---	m <sup>2</sup>	600.00	5.80	11.85	3,480.00	7,110.00
1.3.07	Random fills and backfills	---	m <sup>3</sup>	40,000.00	0.20	1.50	8,000.00	60,000.00
1.3.08	Concrete demolition	---	m <sup>3</sup>	280.00	10.00	60.00	2,800.00	16,800.00
<b>1.4</b>	<b>Installation and removal</b>							
1.4.01	Installation	---	l.s.	-----	-----	-----	28,473.30	256,259.70
1.4.02	Removal	---	l.s.	-----	-----	-----	7,592.88	68,335.92
Sub-total							1,213,299	28,614,709
Missing items and construction contingencies			%	0.50%			6,066	143,074
Total Direct Costs							1,219,366	28,757,782

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\$)
UNIT COST IN LOCAL & FOREIGN CURRENCY			t	12,807,643			0.10	2.25
AGGREGATE UNIT COST			t					2.34

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-05  
 ANA 004**

**DAM PHASE 1 –FILTERS - LOADING IN PROCESSING PLANT STOCKPILE, TRANSPORT TO DAM & PLACING**

**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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	60.00	0.00	43.75	0.00	2,625.18
1.1.02	Gang foreman	----	h	600.04	6.11	0.00	3,666.25	0.00
1.1.03	Equipment, operator	----	h	3,000.20	5.39	0.00	16,171.08	0.00
1.1.04	Equipment, helper	1	h	3,000.20	2.20	0.00	6,600.44	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
1.2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	0.00	1.80	163.89	0.00	0.00
		s.b.	h	0.00	0.00	72.58	0.00	0.00
1.2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.03	97.91	0.00	0.00
		s.b.	h	0.00	0.00	35.81	0.00	0.00
1.2.04	Wheel loader, 199 kW, 4.30 m <sup>3</sup> heaped bucket	Op.	h	325.61	1.56	142.03	507.95	46,246.44
		s.b.	h	65.12	0.00	53.94	0.00	3,512.68

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1.2.05	Off-highway dump truck, 36.6 ton pay load	Op.	h	2,401.85	1.32	98.59	3,170.44	236,797.91
		s.b.	h	480.37	0.00	33.74	0.00	16,207.65
1.2.05	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
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	65.12	0.07	6.41	4.56	417.43
		s.b.	h	13.02	0.00	3.46	0.00	45.06
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	23.66	0.00	43.75	0.00	1,034.97
2.1.02	Gang foreman	---	h	236.56	6.11	0.00	1,445.41	0.00
2.1.03	Equipment, operator	---	h	1,741.78	5.39	0.00	9,388.20	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	58.01	2.77	0.00	160.70	0.00
2.1.06	Skilled	---	h	565.85	2.20	0.00	1,244.87	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 72 kW	Op.	h	460.27	0.63	48.81	289.97	22,465.69
		s.b.	h	92.05	0.00	20.84	0.00	1,918.40
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	126.57	0.79	66.33	99.99	8,395.64
		s.b.	h	25.31	0.00	32.25	0.00	816.40



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.2.03	Mobile water tank, 38000 liters capacity	Op.	h	514.41	1.05	5.18	540.13	2,664.64
2.2.04	Tank truck, 24,000 liters capacity	Op.	h	514.41	0.00	47.56	0.00	24,465.33
		s.b.	h	102.88	0.00	15.67	0.00	1,612.16
2.2.05	Smooth single drum vibrating roller, 38.0 kg/cm	Op.	h	482.19	0.23	31.18	110.90	15,034.55
		s.b.	h	96.44	0.00	8.92	0.00	860.22
2.2.06	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	52.74	0.01	5.39	0.37	284.26
		s.b.	h	10.55	0.00	2.85	0.00	30.06
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							43,401	385,435
Missing items and construction contingencies			%	1.00%			434	3,854
Total Direct Costs							43,835	389,289
Overheads, risks and profit			%	52.00%			22,522	202,702
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>				<b>m<sup>3</sup></b>	<b>88,890</b>		<b>0.75</b>	<b>6.66</b>
<b>AGGREGATE UNIT PRICE</b>				<b>m<sup>3</sup></b>				<b>7.41</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 FILTERS - DAM PHASE 3 - TRANSPORT FROM PROCESSING PLANT TO LOADING STATION 2**

**SEC 2-05  
 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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	61.79	0.00	43.75	0.00	2,703.48
1.02	Gang foreman	----	h	617.94	6.11	0.00	3,775.60	0.00
1.03	Operator, front shovel	----	h	0.00	5.39	0.00	0.00	0.00
1.04	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, wheel loader	----	h	1,149.80	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	1,149.80	2.20	0.00	0.00	0.00
1.07	Operator, bulldozer	----	h	0.00	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, dump truck	----	h	3,879.77	5.39	0.00	0.00	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</b>							
2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	0.00	1.80	163.89	0.00	0.00

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	0.00	0.00	72.58	0.00	0.00
2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	1,045.28	1.03	97.91	1,076.64	102,343.06
		s.b.	h	209.06	0.00	35.81	0.00	7,486.27
2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.56	142.03	0.00	0.00
		s.b.	h	0.00	0.00	53.94	0.00	0.00
2.05	Bulldozer with universal blade, 231 kW	Op.	h	0.00	1.64	121.99	0.00	0.00
		s.b.	h	0.00	0.00	45.46	0.00	0.00
2.06	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
2.07	Off-highway dump truck, 55.60 ton pay load	Op.	h	3,527.07	1.86	133.53	6,560.34	470,969.01
		s.b.	h	705.41	0.00	41.34	0.00	29,161.77
2.08	Mobile diesel powered floodlight, 6000 W	Op.	h	209.06	0.07	6.41	14.63	1,340.04
		s.b.	h	41.81	0.00	3.46	0.00	144.67
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							11,427	614,148
Missing items and construction contingencies			%	0.50%			57	3,071
Total Direct Costs							11,484	617,219
Overheads, risks and profit			%	52.00%			32,693	294,233
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>372,840</b>			<b>0.10</b>	<b>2.44</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\$)
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>2.54</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 FILTERS - DAM PHASE 3 - TRANSPORT FROM BELT CONVEYOR HOPPER TO DAM AND PLACING**

**SEC 2-05  
 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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	207.25	0.00	43.75	0.00	9,067.29
1.1.02	Gang foreman	----	h	2,072.52	6.11	0.00	12,663.11	0.00
1.1.03	Equipment operator	----	h	10,362.61	5.39	0.00	55,854.48	0.00
1.1.04	Mobile hopper assistant	1	h	10,362.61	2.20	0.00	22,797.75	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	9,420.56	0.03	3.98	282.62	37,493.81
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	9,420.56	1.32	98.59	12,435.13	928,772.61
		s.b.	h	1,884.11	0.00	33.74	0.00	63,569.91
1.2.03	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
1.2.04	Halogen floodlight, 1000 W	Op.	h	1,884.11	0.01	0.75	18.84	1,413.08
		s.b.	h	376.82	0.00	0.29	0.00	109.28

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	99.22	0.00	43.75	0.00	4,341.07
2.1.02	Gang foreman	---	h	992.24	6.11	0.00	6,062.61	0.00
2.1.03	Equipment, operator	---	h	7,305.70	5.39	0.00	39,377.75	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	243.33	2.77	0.00	674.02	0.00
2.1.06	Skilled	---	h	2,373.40	2.20	0.00	5,221.49	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 72 kW	Op.	h	1,930.54	0.63	48.81	1,216.24	94,229.70
		s.b.	h	386.11	0.00	20.84	0.00	8,046.49
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	530.90	0.79	66.33	419.41	35,214.51
		s.b.	h	106.18	0.00	32.25	0.00	3,424.30
2.2.03	Mobile water tank, 38000 liters capacity	Op.	h	2,157.64	1.05	5.18	2,265.52	11,176.57
2.2.04	Tank truck, 24,000 liters capacity	Op.	h	2,157.64	0.00	47.56	0.00	102,617.31
		s.b.	h	431.53	0.00	15.67	0.00	6,762.04
2.2.05	Smooth single drum vibrating roller, 38.0 kg/cm	Op.	h	2,022.47	0.23	31.18	465.17	63,060.66
		s.b.	h	404.49	0.00	8.92	0.00	3,608.09
2.2.06	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	221.21	0.01	5.39	1.55	1,192.31

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	44.24	0.00	2.85	0.00	126.09
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							159,756	1,374,225
Missing items and construction contingencies			%	1.00%			1,598	13,742
Total Direct Costs							161,353	1,387,967
Overheads, risks and profit			%	52.00%			80,565	725,082
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>				<b>m<sup>3</sup></b>	<b>372,840</b>		<b>0.65</b>	<b>5.67</b>
<b>AGGREGATE UNIT PRICE</b>				<b>m<sup>3</sup></b>				<b>6.32</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 FILTERS - DAM PHASE 4 - TRANSPORT FROM BELT CONVEYOR HOPPER TO DAM AND PLACING**

**SEC 2-05  
 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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	194.59	0.00	43.75	0.00	8,513.21
1.1.02	Gang foreman	----	h	1,945.88	6.11	0.00	11,889.31	0.00
1.1.03	Equipment operator	----	h	9,729.38	5.39	0.00	52,441.38	0.00
1.1.04	Mobile hopper assistant	1	h	9,729.38	2.20	0.00	21,404.64	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	8,844.89	0.03	3.98	265.35	35,202.68
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	8,844.89	1.32	98.59	11,675.26	872,018.12
		s.b.	h	1,768.98	0.00	33.74	0.00	59,685.35
1.2.03	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
1.2.04	Halogen floodlight, 1000 W	Op.	h	1,768.98	0.01	0.75	17.69	1,326.73
		s.b.	h	353.80	0.00	0.29	0.00	102.60



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	55.20	0.00	43.75	0.00	2,414.86
2.1.02	Gang foreman	---	h	551.97	6.11	0.00	3,372.53	0.00
2.1.03	Equipment, operator	---	h	4,064.04	5.39	0.00	21,905.19	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	135.36	2.77	0.00	374.95	0.00
2.1.06	Skilled	---	h	1,320.29	2.20	0.00	2,904.63	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 72 kW	Op.	h	1,073.93	0.63	48.81	676.57	52,418.39
		s.b.	h	214.79	0.00	20.84	0.00	4,476.13
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	295.33	0.79	66.33	233.31	19,589.24
		s.b.	h	59.07	0.00	32.25	0.00	1,904.88
2.2.03	Mobile water tank, 38000 liters capacity	Op.	h	1,200.26	1.05	5.18	1,260.27	6,217.35
2.2.04	Tank truck, 24,000 liters capacity	Op.	h	1,200.26	0.00	47.56	0.00	57,084.39
		s.b.	h	240.05	0.00	15.67	0.00	3,761.62
2.2.05	Smooth single drum vibrating roller, 38.0 kg/cm	Op.	h	1,125.07	0.23	31.18	258.77	35,079.58
		s.b.	h	225.01	0.00	8.92	0.00	2,007.12
2.2.06	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	123.05	0.01	5.39	0.86	663.26

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	L.C.P. (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	24.61	0.00	2.85	0.00	70.14
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							128,681	1,162,536
Missing items and construction contingencies			%	1.00%			1,287	11,625
Total Direct Costs							129,968	1,174,161
Overheads, risks and profit			%	52.00%			67,815	610,332
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>				<b>m<sup>3</sup></b>	<b>207,405</b>		<b>0.95</b>	<b>8.60</b>
<b>AGGREGATE UNIT PRICE</b>				<b>m<sup>3</sup></b>				<b>9.56</b>

**ROGUN HYDROELECTRIC POWER PLANT**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**FILTERS - DAM PHASE 5 & 6 - TRANSPORT FROM BELT CONVEYOR HOPPER TO INTERMEDIATE STOCKPILE**

**SEC 2-05**

**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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	73.33	0.00	43.75	0.00	3,207.99
1.1.02	Gang foreman	----	h	733.26	6.11	0.00	4,480.19	0.00
1.1.03	Equipment operator	----	h	5,933.63	5.39	0.00	31,982.27	0.00
1.1.04	Mobile hopper assistant	----	h	1,398.92	2.20	0.00	3,077.63	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	1,271.75	0.17	3.14	216.20	3,993.29
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	5,086.99	1.32	98.59	6,714.83	501,526.79
		s.b.	h	1,017.40	0.00	33.74	0.00	34,327.04
1.2.03	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
1.2.04	Bulldozer with universal blade, 153 kW	Op.	h	307.21	0.96	79.55	294.93	24,438.92
	(in stockpile area)	s.b.	h	61.44	0.00	30.76	0.00	1,889.98
1.2.05	Halogen floodlight at the hopper,	Op.	h	1,017.40	0.01	0.75	10.17	763.05

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	1000 W (n. 2)							
		s.b.	h	203.48	0.00	0.29	0.00	59.01
1.2.06	Diesel powered floodlight, heigth 9 m, 6000 W	Op.	h	508.70	0.07	6.41	35.61	3,260.76
	(in stockpile area)	s.b.	h	101.74	0.00	3.46	0.00	352.02
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							46,812	573,819
Missing items and construction contingencies			%	1.00%			468	5,738
Total Direct Costs							47,280	579,557
Overheads, risks and profit			%	52.00%			32,596	293,360
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>385,270</b>			<b>0.24</b>	<b>2.29</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>2.53</b>

**ROGUN HYDROELECTRIC POWER PLANT**

**SEC 2-05**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**ANA 009**

**FILTERS - DAM PHASE 5 - LOADING IN INTERMEDIATE STOCKPILE, TRANSPORT TO DAM AND PLACING**

**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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	148.61	0.00	43.75	0.00	6,501.67
1.1.02	Gang foreman	----	h	1,486.10	6.11	0.00	9,080.04	0.00
1.1.03	Wheel loader operator	----	h	1,188.13	5.39	0.00	6,404.03	0.00
1.1.04	Dump truck operator	----	h	13,672.82	2.20	0.00	30,080.21	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	1,080.12	1.03	97.91	1,112.52	105,754.55
		s.b.	h	216.02	0.00	35.81	0.00	7,735.82
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	13,671.72	1.32	98.59	18,046.67	1,347,895.13
		s.b.	h	2,734.34	0.00	33.74	0.00	92,256.78
1.2.03	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
1.2.04	Mobile diesel powered floodlight, 6000 W	Op.	h	432.05	0.07	6.41	30.24	2,769.43
		s.b.	h	86.41	0.00	3.46	0.00	298.98

2	SPREADING, WATERING AND COMPACTION								
<b>2.1</b>	<b>Labour</b>								
2.1.01	General foreman	---	h	102.53	0.00	43.75	0.00	4,485.79	
2.1.02	Gang foreman	---	h	1,025.32	6.11	0.00	6,264.72	0.00	
2.1.03	Equipment, operator	---	h	7,549.26	5.39	0.00	40,690.52	0.00	
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00	
2.1.05	Plate compactor, operator	---	h	251.44	2.77	0.00	696.49	0.00	
2.1.06	Skilled	---	h	2,452.53	2.20	0.00	5,395.56	0.00	
<b>2.2</b>	<b>Equipment</b>								
2.2.01	Bulldozer with universal type blade, 72 kW	Op.	h	1,994.90	0.63	48.81	1,256.79	97,371.07	
		s.b.	h	398.98	0.00	20.84	0.00	8,314.74	
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	548.60	0.79	66.33	433.39	36,388.47	
		s.b.	h	109.72	0.00	32.25	0.00	3,538.45	
2.2.03	Mobile water tank, 38000 liters capacity	Op.	h	2,229.57	1.05	5.18	2,341.05	11,549.18	
2.2.04	Tank truck, 24,000 liters capacity	Op.	h	2,229.57	0.00	47.56	0.00	106,038.43	
		s.b.	h	445.91	0.00	15.67	0.00	6,987.48	
2.2.05	Smooth single drum vibrating roller, 38.0 kg/cm	Op.	h	2,089.90	0.23	31.18	480.68	65,162.93	
		s.b.	h	417.98	0.00	8.92	0.00	3,728.37	
2.2.06	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	228.58	0.01	5.39	1.60	1,232.06	
		s.b.	h	45.72	0.00	2.85	0.00	130.29	
	<i>Op.=Oprating, s.b.=Standby</i>								
<b>Sub-total</b>							<b>122,315</b>	<b>1,908,140</b>	

Missing items and construction contingencies	%	1.00%		1,223	19,081
Total Direct Costs				123,538	1,927,221
Overheads, risks and profit	%	52.00%		106,639	959,755
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>	<b>m<sup>3</sup></b>	<b>385,270</b>		<b>0.60</b>	<b>7.49</b>
<b>AGGREGATE UNIT PRICE</b>	<b>m<sup>3</sup></b>				<b>8.09</b>

**ROGUN HYDROELECTRIC POWER PLANT**

**SEC 2-05**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**ANA 010**

**FILTERS - DAM PHASE 6 - LOADING IN INTERMEDIATE STOCKPILE, TRANSPORT TO DAM AND PLACING**

**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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	888.64	0.00	43.75	0.00	38,877.80
1.1.02	Gang foreman	----	h	8,886.35	6.11	0.00	54,295.62	0.00
1.1.03	Wheel loader operator	----	h	3,011.45	5.39	0.00	239,487.24	0.00
1.1.04	Dump truck operator	----	h	44,431.77	2.20	0.00	97,749.89	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	2,737.68	1.03	97.91	1,112.52	105,754.55
		s.b.	h	216.02	0.00	35.81	0.00	7,735.82
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	40,392.52	1.32	98.59	53,318.12	3,982,298.38
		s.b.	h	8,078.50	0.00	33.74	0.00	272,568.71
1.2.03	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
1.2.04	Mobile diesel powered floodlight, 6000 W	Op.	h	1,095.08	0.07	6.41	30.24	2,769.43



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	219.16	0.00	3.46	0.00	298.98
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	259.88	0.00	43.75	0.00	11,369.73
2.1.01	Gang foreman	---	h	2,598.80	6.11	0.00	15,878.64	0.00
2.1.01	Equipment, operator	---	h	19,134.44	5.39	0.00	103,134.64	0.00
2.1.01	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.01	Plate compactor, operator	---	h	637.30	2.77	0.00	1,765.33	0.00
2.1.01	Skilled	---	h	6,216.21	2.20	0.00	13,675.66	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 72 kW	Op.	h	5,056.30	0.63	48.81	3,185.47	246,797.78
		s.b.	h	1,011.26	0.00	20.84	0.00	21,074.64
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	1,390.48	0.79	66.33	1,098.48	92,230.62
		s.b.	h	278.10	0.00	32.25	0.00	8,968.60
2.2.03	Mobile water tank, 38000 liters capacity	Op.	h	5,651.10	1.05	5.18	5,933.65	29,272.70
2.2.04	Tank truck, 24,000 liters capacity	Op.	h	5,651.10	0.00	47.56	0.00	268,766.29
		s.b.	h	1,130.22	0.00	15.67	0.00	17,710.55
2.2.05	Smooth single drum vibrating roller, 38.0 kg/cm	Op.	h	5,297.07	0.23	31.18	1,218.33	165,162.69
		s.b.	h	1,059.41	0.00	8.92	0.00	9,449.98

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.2.06	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	579.37	0.01	5.39	4.06	3,122.79
		s.b.	h	115.87	0.00	2.85	0.00	330.24
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							592,038	5,335,291
Missing items and construction contingencies			%	1.00%			5,920	53,353
Total Direct Costs							597,958	5,388,644
Overheads, risks and profit			%	52.00%			311,303	2,801,730
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>976,510</b>			<b>0.93</b>	<b>8.39</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>9.32</b>

## **SEC 2-06: Alluvium shells**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I  
 BORROW AREA 15 - PRE-BLASTING OF CEMENTED ALLUVIUM**

**SEC 2-06  
 ANA 001  
 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\$)
<b>1</b>	<b>LABOUR</b>						
1.01	General foreman	h	1,296.04	0.00	43.75	0.00	56,701.81
1.02	Gang foreman	h	12,960.41	6.11	0.00	79,188.13	0.00
1.03	Crawler drill operator	h	42,042.32	5.39	0.00	226,608.10	0.00
1.04	Helper for ditto	h	42,042.32	2.20	0.00	92,493.10	0.00
1.05	Explosive specialist	h	21,021.16	3.42	0.00	71,892.37	0.00
1.06	Explosive specialist's helper	h	21,021.16	2.20	0.00	46,246.55	0.00
1.07	Integral steel and bit grinder specialist	h	3,477.18	3.42	0.00	11,891.96	0.00
<b>2</b>	<b>EQUIPMENT</b>						
2.01	Hydraulic crawler rock drill, 116 kw, Ø 76 mm h.	h	38,220.29	0.68	66.30	25,989.80	2,534,005.25
		h	7,644.06	0.00	34.44	0.00	263,261.36
2.02	Flat bed lorry with crane, 10 t pay load	h	3,793.75	0.32	29.23	1,214.00	110,891.25
		h	758.75	0.00	12.36	0.00	9,378.14
2.03	Portable diesel powered floodlight, 6000 W	h	7,644.06	0.07	6.41	535.08	48,998.41
		h	1,528.81	0.00	3.46	0.00	5,289.69
2.04	Button bits grinder	h	2,897.65	0.04	5.32	115.91	15,415.50

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\$)
	<b>MATERIALS</b>						
3	Explosive, amonite type	kg	0.00	2.31	0.00	0.00	0.00
3.01	Explosive, gramonite type	kg	1,504,509.36	2.06	0.00	3,099,289.28	0.00
3.02	Detonating fuse	m	1,716,132.20	0.00	0.82	0.00	1,407,228.41
3.03	Electric detonator, 3.0 m leading wire	ea	113,812.44	0.00	1.98	0.00	225,348.62
3.04	Copper type shottfiring cable	m	811,862.05	0.00	0.13	0.00	105,542.07
3.05	Crawler drill rod for 76 mm holes, L 3,660 mm	ea	1,819.72	0.00	483.24	0.00	879,363.65
3.06	Shank adapter for Ø 76 mm holes	ea	618.17	0.00	277.11	0.00	171,299.82
3.07	Coupling for Ø 76 mm holes	ea	2,799.58	0.00	54.15	0.00	151,597.04
3.08	Crawler drill bit for Ø 76 mm holes	ea	1,931.77	0.00	394.21	0.00	761,521.84
3.09	Grease for rods, couplings and shank adapters	kg	1,911.01	0.00	4.80	0.00	9,172.87
	Sub-total					3,655,464.27	6,755,015.73
	Missing items and construction contingencies	%	2.00%			73,109.29	135,100.31
	Total direct costs					3,728,573.56	6,890,116.05
	Overheads, risks and profit	%	52.00%			552,171.86	4,969,546.74
	<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>	<b>m3</b>	<b>12,537,578</b>			<b>0.34</b>	<b>0.95</b>
	<b>AGGREGATE UNIT PRICE</b>						<b>1.29</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I**

**ALLUVIUM SHELL - DAM PHASE 1 - LODING OF ALLUVIUM IN BA15 & TRANSPORT TO RIGTH BANK STOCKPILE**

**SEC 2-06**

**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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	3,131.03	0.00	43.75	0.00	136,982.60
1.02	Gang foreman	----	h	31,310.31	6.11	0.00	191,305.99	0.00
1.03	Operator, front shovel (s)	----	h	21,018.29	5.39	0.00	113,288.57	0.00
1.04	Helper for ditto	1	h	21,018.29	2.20	0.00	46,240.23	0.00
1.05	Operator, wheel loader (s)	----	h	4,578.16	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	4,578.16	2.20	0.00	0.00	0.00
1.07	Operator, bulldozer(s) - borrow area	----	h	4,203.66	5.39	0.00	22,657.71	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, dump truck	----	h	249,703.99	5.39	0.00	0.00	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, bulldozer (s) - stockpile area	----	h	8,002.55	5.39	0.00	43,133.74	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</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\$)
2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	19,107.53	1.80	163.89	34,393.56	3,131,533.85
		s.b.	h	3,821.51	0.00	72.58	0.00	277,364.97
2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.03	97.91	0.00	0.00
		s.b.	h	0.00	0.00	35.81	0.00	0.00
2.04	Wheel loader, 373 kW, 5.50 m <sup>3</sup> heaped bucket	Op.	h	4,161.96	1.56	142.03	6,492.66	591,123.63
		s.b.	h	832.39	0.00	53.94	0.00	44,899.26
2.05	Bulldozer with universal blade, 231 kW	Op.	h	3,821.51	1.64	121.99	6,267.27	466,185.63
	( in borrow area)	s.b.	h	764.30	0.00	45.46	0.00	34,745.14
2.06	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
2.07	Off-highway dump truck, 55.60 ton pay load	Op.	h	227,003.63	1.86	133.53	422,226.75	30,311,794.80
		s.b.	h	45,400.73	0.00	41.34	0.00	1,876,866.02
2.08	Bulldozer with universal blade, 153 kW	Op.	h	7,275.04	0.96	79.55	6,984.04	578,729.79
	( in stockpile area)	s.b.	h	1,455.01	0.00	30.76	0.00	44,756.07
2.09	Mobile diesel powered floodlight, 6000 W	Op.	h	6,108.91	0.07	6.41	427.62	39,158.10
		s.b.	h	1,221.78	0.00	3.46	0.00	4,227.36

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							893,418	37,538,367
Missing items and construction contingencies			%	0.50%			4,467	187,692
Total Direct Costs							897,885	37,726,059
Overheads, risks and profit			%	52.00%			2,008,445	18,076,006
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			m <sup>3</sup>	<b>11,235,590</b>			<b>0.26</b>	<b>4.97</b>
<b>AGGREGATE UNIT PRICE</b>			m <sup>3</sup>					<b>5.23</b>



**ROGUN HYDROELECTRIC POWER PLANT**

**SEC 2-06**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**ANA 003**

**ALLUVIUM SHELL - DAM PHASE 2 - MATERIAL OF BORROW AREA 15 STOCKPILED IN AREA LG1**

**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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	563.88	0.00	43.75	0.00	24,669.56
1.02	Gang foreman	----	h	5,638.76	6.11	0.00	34,452.81	0.00
1.03	Operator, front shovel (s)	----	h	4,842.63	5.39	0.00	26,101.78	0.00
1.04	Helper for ditto	1	h	4,842.63	2.20	0.00	10,653.79	0.00
1.05	Operator, wheel loader (s)	----	h	1,054.81	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	1,054.81	2.20	0.00	0.00	0.00
1.07	Operator, bulldozer(s) - borrow area	----	h	968.53	5.39	0.00	5,220.36	0.00
1.08	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.09	Operator, dump truck	----	h	41,780.37	5.39	0.00	0.00	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
1.11	Operator, bulldozer (s) - stockpile area	----	h	1,843.79	5.39	0.00	9,938.05	0.00
1.12	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</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\$)
2.01	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> 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
2.02	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> h. b.	Op.	h	4,402.39	1.80	163.89	7,924.30	721,507.92
		s.b.	h	880.48	0.00	72.58	0.00	63,905.11
2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.03	97.91	0.00	0.00
		s.b.	h	0.00	0.00	35.81	0.00	0.00
2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	958.92	1.56	142.03	1,495.91	136,195.36
		s.b.	h	191.78	0.00	53.94	0.00	10,344.83
2.05	Bulldozer with universal blade, 231 kW	Op.	h	880.48	1.64	121.99	1,443.98	107,409.55
	( in borrow area)	s.b.	h	176.10	0.00	45.46	0.00	8,005.31
2.06	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
2.07	Off-highway dump truck, 55.60 ton pay load	Op.	h	37,982.16	1.86	133.53	70,646.81	5,071,757.44
		s.b.	h	7,596.43	0.00	41.34	0.00	314,036.48
2.08	Bulldozer with universal blade, 153 kW	Op.	h	1,676.18	0.96	79.55	1,609.13	133,339.81
	( in stockpile area)	s.b.	h	335.24	0.00	30.76	0.00	10,311.84
2.09	Mobile diesel powered floodlight, 6000 W	Op.	h	1,407.50	0.07	6.41	98.52	9,022.06
		s.b.	h	281.50	0.00	3.46	0.00	973.99

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							169,585	6,611,479
Missing items and construction contingencies			%	0.50%			848	33,057
Total Direct Costs							170,433	6,644,537
Overheads, risks and profit			%	52.00%			354,378	3,189,406
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>2,418,575</b>			<b>0.22</b>	<b>4.07</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>4.28</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-06**

**ALLUVIUM SHELL - DAM PHASE 2 - LOADING IN STOCKPILE LG1 & TRANSPORT TO LOADING STATION 1**

**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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	631.86	0.00	43.75	0.00	27,643.82
1.1.02	Gang foreman	----	h	6,318.59	6.11	0.00	38,606.57	0.00
1.1.03	Equipment, operator	----	h	31,592.94	5.39	0.00	170,285.94	0.00
1.1.04	Equipment, helper	1	h	31,592.94	2.20	0.00	69,504.46	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
1.2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	4,759.34	1.80	163.89	8,566.82	780,008.57
		s.b.	h	951.87	0.00	72.58	0.00	69,086.61
1.2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.03	97.91	0.00	0.00
		s.b.	h	0.00	0.00	35.81	0.00	0.00
1.2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	1,036.67	1.56	142.03	1,617.21	147,238.23

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	207.33	0.00	53.94	0.00	11,183.60
1.2.05	Off-highway dump truck, 36.6 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
1.2.06	Off-highway dump truck, 55.6 ton pay load	Op.	h	22,924.84	1.86	133.53	42,640.20	3,061,154.01
		s.b.	h	4,584.97	0.00	41.34	0.00	189,542.58
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	1,159.20	0.07	6.41	81.14	7,430.49
		s.b.	h	231.84	0.00	3.46	0.00	802.17
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							331,302	4,294,090
Missing items and construction contingencies			%	1.00%			3,313	42,941
Total Direct Costs							334,615	4,337,031
Overheads, risks and profit			%	52.00%			242,926	2,186,330
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>2,418,575</b>			<b>0.24</b>	<b>2.70</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>2.94</b>

**ROGUN HYDROELECTRIC POWER PLANT**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**ALLUVIUM SHELL - DAM PHASE 4 - LOADING IN STOCKPILE LG2 AND TRANSPORT TO LOADING STATION 2**

**SEC 2-06**

**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\$)
<b>1</b>	<b>LABOUR</b>							
1.01	General foreman	----	h	1,546.57	0.00	43.75	0.00	67,662.24
1.02	Gang foreman	----	h	15,465.65	6.11	0.00	94,495.15	0.00
1.03	Operator, front shovel	----	h	0.00	5.39	0.00	0.00	0.00
1.04	Helper for ditto	1	h	0.00	2.20	0.00	0.00	0.00
1.05	Operator, wheel loader	----	h	21,703.24	5.39	0.00	0.00	0.00
1.06	Helper for ditto	1	h	21,703.24	2.20	0.00	0.00	0.00
1.07	Operator, bulldozer	----	h	0.00	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, dump truck	----	h	111,250.08	5.39	0.00	0.00	0.00
1.10	Helper for ditto	0	h	0.00	2.20	0.00	0.00	0.00
<b>2</b>	<b>EQUIPMENT</b>							
2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	0.00	1.80	163.89	0.00	0.00
		s.b.	h	0.00	0.00	72.58	0.00	0.00

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	19,730.21	1.03	97.91	20,322.12	1,931,785.23
		s.b.	h	3,946.04	0.00	35.81	0.00	141,307.79
2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.56	142.03	0.00	0.00
		s.b.	h	0.00	0.00	53.94	0.00	0.00
2.05	Bulldozer with universal blade, 231 kW	Op.	h	0.00	1.64	121.99	0.00	0.00
		s.b.	h	0.00	0.00	45.46	0.00	0.00
2.06	Off-highway dump truck, 36.60 ton pay load	Op.	h	101,136.43	1.32	98.59	133,500.09	9,971,040.89
		s.b.	h	20,227.29	0.00	33.74	0.00	682,468.65
2.07	Off-highway dump truck, 55.60 ton pay load	Op.	h	0.00	1.86	133.53	0.00	0.00
		s.b.	h	0.00	0.00	41.34	0.00	0.00
2.09	Mobile diesel powered floodlight, 6000 W	Op.	h	3,946.04	0.07	6.41	276.22	25,294.13
		s.b.	h	789.21	0.00	3.46	0.00	2,730.66
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							248,594	12,822,290
Missing items and construction contingencies			%	0.50%			1,243	64,111
Total Direct Costs							249,837	12,886,401
Overheads, risks and profit			%	52.00%			683,084	6,147,759
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			m <sup>3</sup>	<b>7,295,306</b>			<b>0.12</b>	<b>2.54</b>
<b>AGGREGATE UNIT PRICE</b>			m <sup>3</sup>					<b>2.67</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE I  
 ALLUVIUM SHELL - DAM PHASE 1 - LOADING IN LG2 STOCKPILE, TRANSPORT TO DAM AND PLACING**

**SEC 2-06  
 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\$)
<b>1</b>	<b>LOADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	20,341.98	0.00	43.75	0.00	889,961.61
1.1.02	Gang foreman	----	h	203,419.80	6.11	0.00	1,242,894.95	0.00
1.1.03	Equipment, operator	----	h	1,017,098.98	5.39	0.00	5,482,163.50	0.00
1.1.04	Equipment, helper	1	h	1,017,098.98	2.20	0.00	2,237,617.76	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Hydraulic front shovel, 301 kW, 4.10 m3 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
1.2.02	Hydraulic front shovel, 390 kW, 5.70 m3 h. b.	Op.	h	0.00	1.80	163.89	0.00	0.00
		s.b.	h	0.00	0.00	72.58	0.00	0.00
1.2.03	Wheel loader, 275 kW 5.80 m <sup>3</sup> heaped bucket	Op.	h	27,651.94	1.03	97.91	28,481.49	2,707,401.04
		s.b.	h	5,530.39	0.00	35.81	0.00	198,043.16



N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
1.2.04	Wheel loader, 373 kW, 7.30 m <sup>3</sup> heaped bucket	Op.	h	0.00	1.56	142.03	0.00	0.00
		s.b.	h	0.00	0.00	53.94	0.00	0.00
1.2.05	Off-highway dump truck, 36.6 ton pay load	Op.	h	896,983.50	1.32	98.59	1,184,018.22	88,433,603.35
		s.b.	h	179,396.70	0.00	33.74	0.00	6,052,844.66
1.2.06	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
1.2.07	Mobile diesel powered floodlight, 6000 W	Op.	h	5,530.39	0.07	6.41	387.13	35,449.78
		s.b.	h	1,106.08	0.00	3.46	0.00	3,827.03
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	1,140.96	0.00	43.75	0.00	49,916.82
2.1.02	Gang foreman	---	h	11,409.56	6.11	0.00	69,712.41	0.00
2.1.03	Equipment, operator	---	h	69,042.40	5.39	0.00	372,138.52	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	3,862.23	2.77	0.00	10,698.39	0.00
2.1.06	Skilled	---	h	41,190.97	2.20	0.00	90,620.13	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	6,809.45	1.29	97.19	8,784.19	661,810.30
		s.b.	h	1,361.89	0.00	36.66	0.00	49,926.88

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	0.00	0.79	66.33	0.00	0.00
		s.b.	h	0.00	0.00	32.25	0.00	0.00
2.2.03	Water supply	---	m3	2,099,450.20	0.02	0.22	41,989.00	461,879.04
2.2.04	Mobile water tank, 38000 liters capacity	Op.	h	37,446.33	0.05	3.98	1,872.32	149,036.41
2.2.05	Trailer water tank , 38000 liters capacity	Op.	h	37,446.33	1.79	75.58	67,028.94	2,830,193.92
		s.b.	h	7,489.27	0.00	19.36	0.00	144,992.21
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	Op.	h	18,510.03	0.27	43.87	4,997.71	812,035.15
		s.b.	h	3,702.01	0.00	9.89	0.00	36,612.85
2.2.07	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	3,511.12	0.01	5.39	24.58	18,924.95
		s.b.	h	702.22	0.00	2.85	0.00	2,001.34
2.2.08	Portable diesel powered floodlight, 6000 W	Op.	h	7,489.27	0.07	6.41	524.25	48,006.20
		s.b.	h	1,497.85	0.00	3.46	0.00	5,182.57
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							10,843,953	103,591,649
Missing items and construction contingencies			%	1.00%			108,440	1,035,916
Total Direct Costs							10,952,393	104,627,566
Overheads, risks and profit			%	52.00%			6,010,158	54,091,421
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>10,497,251</b>			<b>1.62</b>	<b>15.12</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>16.74</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-06  
 ANA 007**

**ALLUVIUM SHELL - DAM PHASE 2 - TRANSPORT FROM BELT CONVEYOR HOPPER TO DAM & PLACING**

**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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	995.88	0.00	43.75	0.00	43,569.65
1.1.02	Gang foreman	----	h	9,958.78	6.11	0.00	60,848.13	0.00
1.1.03	Equipment operator	----	h	49,793.89	5.39	0.00	268,389.06	0.00
1.1.04	Mobile hopper assistant	1	h	49,793.89	2.20	0.00	109,546.56	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	0.00	0.17	3.14	0.00	0.00
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	45,267.17	1.32	98.59	59,752.67	4,462,890.47
		s.b.	h	9,053.43	0.00	33.74	0.00	305,462.88
1.2.03	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
1.2.04	Halogen floodlight, 1000 W	Op.	h	0.00	0.01	0.75	0.00	0.00

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	0.00	0.00	0.29	0.00	0.00
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	264.43	0.00	43.75	0.00	11,568.93
2.1.02	Gang foreman	---	h	2,644.33	6.11	0.00	16,156.84	0.00
2.1.03	Equipment, operator	---	h	15,985.19	5.39	0.00	86,160.18	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	889.86	2.77	0.00	2,464.91	0.00
2.1.06	Skilled	---	h	9,568.22	2.20	0.00	21,050.09	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	1,568.90	1.29	97.19	2,023.88	152,481.10
		s.b.	h	313.78	0.00	36.66	0.00	11,503.15
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	0.00	0.79	66.33	0.00	0.00
		s.b.	h	0.00	0.00	32.25	0.00	0.00
2.2.03	Water supply	---	m3	483,715.00	0.03	0.23	14,511.45	111,254.45
2.2.04	Mobile water tank, 38000 liters capacity	Op.	h	8,698.38	0.05	3.98	434.92	34,619.57
2.2.05	Trailer water tank , 38000 liters capacity	Op.	h	8,698.38	1.79	75.58	15,570.11	657,423.85
		s.b.	h	1,739.68	0.00	19.36	0.00	33,680.14
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	Op.	h	4,264.71	0.27	43.87	1,151.47	187,092.90

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	852.94	0.00	9.89	0.00	8,435.60
2.2.07	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	808.96	0.01	5.39	5.66	4,360.31
		s.b.	h	161.79	0.00	2.85	0.00	461.11
2.2.08	Diesel powered floodlight, height 9 m, 6000 W	Op.	h	1,382.04	0.07	6.41	96.74	8,858.89
		s.b.	h	276.41	0.00	3.46	0.00	956.37
	<i>Op.=Operating, s.b.=Standby</i>							
Sub-total							658,163	6,034,619
Missing items and construction contingencies			%	1.00%			6,582	60,346
Total Direct Costs							664,744	6,094,966
Overheads, risks and profit			%	52.00%			351,505	3,163,544
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			m <sup>3</sup>	<b>2,418,575</b>			<b>0.42</b>	<b>3.83</b>
<b>AGGREGATE UNIT PRICE</b>			m <sup>3</sup>					<b>4.25</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 ALLUVIUM SHELL - DAM PHASE 3 - TRANSPORT FROM BELT CONVEYOR HOPPER TO DAM AND PLACING**

**SEC 2-06  
 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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	3,200.37	0.00	43.75	0.00	140,016.31
1.1.02	Gang foreman	----	h	32,003.73	6.11	0.00	195,542.77	0.00
1.1.03	Equipment operator	----	h	160,018.64	5.39	0.00	862,500.45	0.00
1.1.04	Mobile hopper assistant	1	h	160,018.64	2.20	0.00	352,041.00	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	0.00	0.17	3.14	0.00	0.00
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	145,471.49	1.32	98.59	192,022.36	14,342,034.04
		s.b.	h	29,094.30	0.00	33.74	0.00	981,641.60
1.2.03	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
1.2.04	Halogen floodlight, 1000 W	Op.	h	0.00	0.01	0.75	0.00	0.00
		s.b.	h	0.00	0.00	0.29	0.00	0.00
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</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\$)
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	767.24	0.00	43.75	0.00	33,566.95
2.1.02	Gang foreman	---	h	7,672.45	6.11	0.00	46,878.64	0.00
2.1.03	Equipment, operator	---	h	46,287.37	5.39	0.00	249,488.94	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	2,551.88	2.77	0.00	7,068.71	0.00
2.1.06	Skilled	---	h	27,885.20	2.20	0.00	61,347.44	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	4,499.18	1.29	97.19	5,803.94	437,275.48
		s.b.	h	899.84	0.00	36.66	0.00	32,988.00
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	0.00	0.79	66.33	0.00	0.00
		s.b.	h	0.00	0.00	32.25	0.00	0.00
2.2.03	Water supply	---	m3	1,387,162	0.03	0.24	41,614.86	332,918.88
2.2.04	Mobile water tank, 38000 liters capacity	Op.	h	25,350.18	0.05	3.98	1,267.51	100,893.73
2.2.05	Trailer water tank , 38000 liters capacity	Op.	h	25,350.18	1.79	75.58	45,376.83	1,915,966.81
		s.b.	h	5,070.04	0.00	19.36	0.00	98,155.91
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	Op.	h	12,230.07	0.27	43.87	3,302.12	536,532.99
		s.b.	h	2,446.01	0.00	9.89	0.00	24,191.07
2.2.07	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	2,319.89	0.01	5.39	16.24	12,504.21

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	463.98	0.00	2.85	0.00	1,322.34
2.2.08	Diesel powered floodlight, heigh 9 m, 6000 W	Op.	h	3,963.32	0.07	6.41	277.43	25,404.88
		s.b.	h	792.66	0.00	3.46	0.00	2,742.62
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							2,064,549	19,018,156
Missing items and construction contingencies			%	1.00%			20,645	190,182
Total Direct Costs							2,085,195	19,208,337
Overheads, risks and profit			%	52.00%			1,107,264	9,965,373
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			m <sup>3</sup>	<b>6,935,810</b>			<b>0.46</b>	<b>4.21</b>
<b>AGGREGATE UNIT PRICE</b>			m <sup>3</sup>					<b>4.67</b>



**ROGUN HYDROELECTRIC POWER PLANT**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**ALLUVIUM SHELL - DAM PHASE 4 - TRANSPORT FROM BELT CONVEYOR HOPPER TO DAM AND PLACING**

**SEC 2-06**

**ANA 09**

**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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	4,925.20	0.00	43.75	0.00	215,477.67
1.1.02	Gang foreman	----	h	49,252.04	6.11	0.00	300,929.96	0.00
1.1.03	Equipment operator	----	h	246,260.19	5.39	0.00	1,327,342.44	0.00
1.1.04	Mobile hopper assistant	1	h	246,260.19	2.20	0.00	541,772.42	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	0.00	0.17	3.14	0.00	0.00
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	223,872.90	1.32	98.59	295,512.23	22,071,629.50
		s.b.	h	44,774.58	0.00	33.74	0.00	1,510,694.35
1.2.03	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
1.2.04	Halogen floodlight, 1000 W	Op.	h	0.00	0.01	0.75	0.00	0.00
		s.b.	h	0.00	0.00	0.29	0.00	0.00
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</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\$)
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	726.66	0.00	43.75	0.00	31,791.55
2.1.02	Gang foreman	---	h	7,266.64	6.11	0.00	44,399.18	0.00
2.1.03	Equipment, operator	---	h	43,839.18	5.39	0.00	236,293.19	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	2,416.91	2.77	0.00	6,694.84	0.00
2.1.06	Skilled	---	h	26,410.32	2.20	0.00	58,102.71	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	4,261.22	1.29	97.19	5,496.97	414,147.50
		s.b.	h	852.24	0.00	36.66	0.00	31,243.23
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	0.00	0.79	66.33	0.00	0.00
		s.b.	h	0.00	0.00	32.25	0.00	0.00
2.2.03	Water supply	---	m3	1,313,793	0.06	0.54	78,827.60	709,448.44
2.2.04	Mobile water tank, 38000 liters capacity	Op.	h	24,009.38	0.05	3.98	1,200.47	95,557.34
2.2.05	Trailer water tank , 38000 liters capacity	Op.	h	24,009.38	1.79	75.58	42,976.79	1,814,629.11
		s.b.	h	4,801.88	0.00	19.36	0.00	92,964.33
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	Op.	h	11,583.20	0.27	43.87	3,127.47	508,155.17
		s.b.	h	2,316.64	0.00	9.89	0.00	22,911.58
2.2.07	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	2,197.19	0.01	5.39	15.38	11,842.85

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	439.44	0.00	2.85	0.00	1,252.40
2.2.08	Diesel powered floodlight, heigth 9 m, 6000 W	Op.	h	3,753.70	0.07	6.41	262.76	24,061.19
		s.b.	h	750.74	0.00	3.46	0.00	2,597.56
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							2,942,954	27,558,404
Missing items and construction contingencies			%	1.00%			29,430	275,584
Total Direct Costs							2,972,384	27,833,988
Overheads, risks and profit			%	52.00%			1,601,931	14,417,382
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>6,568,967</b>			<b>0.70</b>	<b>6.43</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>7.13</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 ALLUVIUM SHELL - DAM PHASE 5 - TRANSPORT FROM BELT CONVEYOR HOPPER TO DAM AND PLACING**

**SEC 2-06  
 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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	5357.90	0.00	43.75	0.00	234,407.94
1.1.02	Gang foreman	----	h	53578.96	6.11	0.00	327,367.44	0.00
1.1.03	Equipment operator	----	h	267894.79	5.39	0.00	1,443,952.93	0.00
1.1.04	Mobile hopper assistant	1	h	267894.79	2.20	0.00	589,368.54	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	0.00	0.17	3.14	0.00	0.00
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	243540.72	1.32	98.59	321,473.75	24,010,679.58
		s.b.	h	48708.14	0.00	33.74	0.00	1,643,412.78
1.2.03	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
1.2.04	Halogen floodlight, 1000 W	Op.	h	0.00	0.01	0.75	0.00	0.00
		s.b.	h	0.00	0.00	0.29	0.00	0.00
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</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\$)
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	745.06	0.00	43.75	0.00	32,596.22
2.1.02	Gang foreman	---	h	7450.57	6.11	0.00	45,522.96	0.00
2.1.03	Equipment, operator	---	h	44948.79	5.39	0.00	242,273.96	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	2478.08	2.77	0.00	6,864.29	0.00
2.1.06	Skilled	---	h	27078.79	2.20	0.00	59,573.33	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	4369.07	1.29	97.19	5,636.10	424,629.88
		s.b.	h	873.81	0.00	36.66	0.00	32,034.02
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	0.00	0.79	66.33	0.00	0.00
		s.b.	h	0.00	0.00	32.25	0.00	0.00
2.2.03	Water supply	---	m3	1347046.6	0.09	0.81	121,234.19	1,091,107.75
2.2.04	Mobile water tank, 38000 liters capacity	Op.	h	24617.08	0.05	3.98	1,230.85	97,975.98
2.2.05	Trailer water tank , 38000 liters capacity	Op.	h	24617.08	1.79	75.58	44,064.57	1,860,558.88
		s.b.	h	4923.42	0.00	19.36	0.00	95,317.33
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	Op.	h	11876.38	0.27	43.87	3,206.62	521,016.96
		s.b.	h	2375.28	0.00	9.89	0.00	23,491.49
2.2.07	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	2252.80	0.01	5.39	15.77	12,142.60

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	450.56	0.00	2.85	0.00	1,284.10
2.2.08	Diesel powered floodlight, height 9 m, 6000 W	Op.	h	3848.70	0.07	6.41	269.41	24,670.20
		s.b.	h	769.74	0.00	3.46	0.00	2,663.30
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							3,212,055	30,107,989
Missing items and construction contingencies			%	1.00%			32,121	301,080
Total Direct Costs							3,244,175	30,409,069
Overheads, risks and profit			%	52.00%			1,749,969	15,749,718
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			m <sup>3</sup>	<b>6,735,233</b>			<b>0.74</b>	<b>6.85</b>
<b>AGGREGATE UNIT PRICE</b>			m <sup>3</sup>					<b>7.59</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II**

**SEC 2-06**

**ALLUVIUM SHELL - DAM PHASE 6 - TRANSPORT FROM BELT CONVEYOR HOPPER TO INTERMEDIATE STOCKPILE**

**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\$)
<b>1</b>	<b>TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	231.46	0.00	43.75	0.00	10,126.48
1.1.02	Gang foreman	----	h	2,314.62	6.11	0.00	14,142.36	0.00
1.1.03	Equipment operator	----	h	18,711.77	5.39	0.00	100,856.43	0.00
1.1.04	Mobile hopper assistant	----	h	4,434.48	2.20	0.00	9,755.86	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Mobile receiving hopper, 200 m3 capacity	Op.	h	4,031.35	0.17	3.14	685.33	12,658.43
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	16,125.38	1.32	98.59	21,285.50	1,589,801.47
		s.b.	h	3,225.08	0.00	33.74	0.00	108,814.08
1.2.03	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
1.2.04	Bulldozer with universal blade, 153 kW	Op.	h	885.32	0.96	79.55	849.90	70,426.82
	( in stockpile area)	s.b.	h	177.06	0.00	30.76	0.00	5,446.46
1.2.05	Halogen floodlight at the hopper, 1000 W (n. 2)	Op.	h	3,225.08	0.01	0.75	32.25	2,418.81

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
		s.b.	h	645.02	0.00	0.29	0.00	187.05
1.2.06	Diesel powered floodlight, height 9 m, 6000 W	Op.	h	1,612.54	0.07	6.41	112.88	10,336.37
	( in stockpile area)	s.b.	h	322.51	0.00	3.46	0.00	1,115.88
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							147,721	1,811,332
Missing items and construction contingencies			%	1.00%			1,477	18,113
Total Direct Costs							149,198	1,829,445
Overheads, risks and profit			%	52.00%			102,889	926,005
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>1,181,625</b>			<b>0.21</b>	<b>2.33</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>2.55</b>



**ROGUN HYDROELECTRIC POWER PLANT**

**SEC 2-06**

**CIVIL WORKS COST ESTIMATE - PHASE II**

**ANA 012**

**ALLUVIUM SHELL - DAM PHASE 6 - LOADING IN INTEMEDIATE STOCKPILE, TRANSPORT TO DAM & PLACING**

**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\$)
<b>1</b>	<b>LADING AND TRANSPORT</b>							
<b>1.1</b>	<b>Labour</b>							
1.1.01	General foreman	----	h	505.29	0.00	43.75	0.00	22,106.42
1.1.02	Gang foreman	----	h	5,052.90	6.11	0.00	30,873.19	0.00
1.1.03	Wheel loader opertor	----	h	3,423.92	5.39	0.00	18,454.90	0.00
1.1.04	Dump truck operator	----	h	50,528.95	5.39	0.00	272,351.04	0.00
<b>1.2</b>	<b>Equipment</b>							
1.2.01	Wheel loader, 275 kW, 5.80 m <sup>3</sup> heaped bucket	Op.	h	3,112.65	1.03	97.91	3,206.03	304,759.56
		s.b.	h	622.53	0.00	35.81	0.00	22,292.80
1.2.02	Off-highway dump truck, 36.6 ton pay load	Op.	h	45,935.41	1.32	98.59	60,634.74	4,528,772.05
		s.b.	h	9,187.08	0.00	33.74	0.00	309,972.15
1.2.03	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
1.2.04	Mobile diesel powered floodlight, 6000 W	Op.	h	1,245.06	0.07	6.41	87.15	7,980.83
		s.b.	h	249.01	0.00	3.46	0.00	861.58

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>							
<b>2.1</b>	<b>Labour</b>							
2.1.01	General foreman	---	h	129.19	0.00	43.75	0.00	5,652.15
2.1.02	Gang foreman	---	h	1,291.92	6.11	0.00	7,893.63	0.00
2.1.03	Equipment, operator	---	h	7,809.78	5.39	0.00	42,094.69	0.00
2.1.04	Equipment, helper	---	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	---	h	434.75	2.77	0.00	1,204.27	0.00
2.1.06	Skilled	---	h	4,674.67	2.20	0.00	10,284.28	0.00
<b>2.2</b>	<b>Equipment</b>							
2.2.01	Bulldozer with universal type blade, 179 kW	Op.	h	766.51	1.29	97.19	988.79	74,496.78
		s.b.	h	153.30	0.00	36.66	0.00	5,620.03
2.2.02	Motorgrader, 103 kW, 3.66 m blade width	Op.	h	0.00	0.79	66.33	0.00	0.00
		s.b.	h	0.00	0.00	32.25	0.00	0.00
2.2.03	Water supply	---	m3	236,325.00	0.12	1.08	28,359.00	255,231.00
2.2.04	Mobile water tank, 38000 liters capacity	Op.	h	4,249.70	0.05	3.98	212.49	16,913.82
2.2.05	Trailer water tank , 38000 liters capacity	Op.	h	4,249.70	1.79	75.58	7,606.97	321,192.62
		s.b.	h	849.94	0.00	19.36	0.00	16,454.85
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	Op.	h	2,083.58	0.27	43.87	562.57	91,406.87
		s.b.	h	416.72	0.00	9.89	0.00	4,121.33

N°	DESCRIPTION	AUX.	UNIT	QUANTITY	UNIT COST		TOTAL COST	
					L.C.P (US\$ eq.)	F.C.P. (US\$)	L.C.P (US\$ eq.)	F.C.P. (US\$)
2.2.07	Vibrating plate compactor, 7.5 kW, 490 kg o.w.	Op.	h	395.23	0.01	5.39	2.77	2,130.29
		s.b.	h	79.05	0.00	2.85	0.00	225.28
2.2.08	Diesel powered floodlight, heighth 9 m, 6000 W	Op.	h	675.21	0.07	6.41	47.27	4,328.12
		s.b.	h	135.04	0.00	3.46	0.00	467.25
	<i>Op.=Oprating, s.b.=Standby</i>							
Sub-total							484,864	5,994,986
Missing items and construction contingencies			%	1.00%			4,849	59,950
Total Direct Costs							489,712	6,054,936
Overheads, risks and profit			%	52.00%			340,322	3,062,895
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>			<b>m<sup>3</sup></b>	<b>1,181,625</b>			<b>0.70</b>	<b>7.72</b>
<b>AGGREGATE UNIT PRICE</b>			<b>m<sup>3</sup></b>					<b>8.42</b>

## **SEC 2-07: Rockfill shells**

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 ROCKFILL SHELL - DAM PHASE 1 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 001  
 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\$)
<b>1</b>	<b>DRILLING AND BLASTING</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	1,619.53	0.00	43.75	0.00	70,854.61
1.1.02	Foreman	h	16,195.34	6.11	0.00	98,953.53	0.00
1.1.03	Equipment operator	h	130,300.04	5.39	0.00	702,317.21	0.00
1.1.05	Hand held drill miner	h	2,819.03	2.77	0.00	7,808.72	0.00
1.1.06	Operator's helper	h	4,492.04	2.20	0.00	9,882.49	0.00
1.1.07	Explosive specialist	h	11,974.95	3.42	0.00	40,954.33	0.00
1.1.08	Explosive specialist's helper	h	11,974.95	2.20	0.00	26,344.89	0.00
1.1.09	Integral steel and bit grinder	h	392.39	3.42	0.00	1,341.97	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	1,281.38	0.05	2.71	64.07	3,472.54
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	1,768.62	0.73	77.76	1,291.09	137,527.89
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	1,732.15	0.73	77.76	1,264.47	134,691.98
1.2.05	Motorcompressor, 15.0 m3/min	h	320.34	0.20	40.08	64.07	12,839.42

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\$)
1.2.06	Flat bed lorry with crane, 10 t pay load	h	255.92	0.32	29.23	81.89	7,480.40
1.2.07	Integral drill steel grinder	h	79.75	0.01	2.29	0.80	182.62
1.2.08	Button bits grinder	h	247.24	0.04	5.32	9.89	1,315.34
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	6,820.87	1.37	123.22	9,344.60	840,468.06
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW	h	2,559.70	1.64	121.99	4,197.91	312,257.99
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	105,317.32	1.32	98.59	139,018.86	10,383,234.7
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	2,728.35	0.01	6.41	19.10	17,488.72
1.2.17	Cost of construction equipment standby units	%	----	0.0%	6.96%	0.00	824,269.13
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	80,226.26	2.31	0.00	185,322.67	0.00
1.3.02	Explosive, gramonite type	kg	401,131.32	2.06	0.00	826,330.52	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	102,499.39	0.00	0.82	0.00	84,049.50
1.3.05	Slow burning fuse fuse	ea	817.12	0.00	0.51	0.00	416.73
1.3.06	Electric detonator, 3.0 m leading wire	ea	10,881.85	0.00	1.98	0.00	21,546.06
1.3.07	Plain detonator	ea	665.64	0.00	0.78	0.00	519.20

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\$)
1.3.08	Copper type shottfiring cable	m	97,625.62	0.00	0.13	0.00	12,691.33
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	102.78	0.00	538.94	0.00	55,391.47
1.3.10	Shank adapter for Ø 102 mm holes	ea	29.29	0.00	284.67	0.00	8,339.16
1.3.11	Coupling for Ø 102 mm holes	ea	158.12	0.00	77.24	0.00	12,213.25
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	102.78	0.00	538.94	0.00	55,391.47
1.3.13	Shank adapter for Ø 89 mm holes	ea	29.29	0.00	284.67	0.00	8,339.16
1.3.14	Coupling for Ø 89 mm dia.	ea	158.12	0.00	77.24	0.00	12,213.25
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	91.54	0.00	586.85	0.00	53,722.67
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	73.29	0.00	468.06	0.00	34,302.03
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	59.46	0.00	180.14	0.00	10,710.16
1.3.18	Grease for rods, couplings and shank adapters	kg	114.96	0.00	4.80	0.00	551.81
Total to carry forward						2,054,613.1	13,116,480.6

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 1 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 001  
 Table B**

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\$)
Total brought forward						2,054,613.1	13,116,480.6
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	49.20	0.00	43.75	0.00	12,982.51
2.1.02	Gang foreman	h	492.04	6.11	0.00	18,131.00	0.00
2.1.03	Equipment, operator	h	3,146.13	5.39	0.00	97,270.85	0.00
2.1.04	Equipment, helper	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	h	1,774.26	2.77	0.00	4,914.71	0.00
2.1.06	Skilled	h	0.00	2.20	0.00	21,677.70	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Bulldozer with universal type blade, 179 kW	h	0.00	1.29	97.19	3,382.09	254,810.15
		h	0.00	0.00	36.66	0.00	19,222.84
2.2.02	Bulldozer with universal type blade, 231 kW	h	0.00	1.64	121.99	3,224.78	239,872.60
		h	0.00	0.00	45.46	0.00	17,877.87
2.2.03	Water supply	m3	0.00	0.02	0.22	9,438.38	103,822.22
2.2.04	Self erected water tank, 38000	h	0.00	0.05	3.98	447.89	35,651.75



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\$)
	liters capacity						
2.2.05	Heavy-duty trailer water tank, 38,000 liters cap.	h	0.00	1.79	75.58	16,034.33	677,024.90
		h	0.00	0.00	19.36	0.00	34,684.31
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	h	2,860.12	0.27	43.87	772.23	125,473.30
		h	572.02	0.00	9.89	0.00	5,657.31
2.2.07	Smooth single drum vibrating roller, 38.0 kg/cm	h	0.00	0.23	31.18	0.00	0.00
		h	0.00	0.00	8.92	0.00	0.00
2.2.08	Portable diesel powered floodlight, 6000 W	h	1,613.0	0.07	6.41	112.91	10,339.12
		h	322.6	0.00	3.46	0.00	1,116.17
Sub-total						2,230,020.0	14,655,015.7
Missing items and construction contingencies		%	1.50%			33,450.3	219,825.2
Total direct costs						2,263,470.2	14,874,840.9
Overheads, risks and profit		%	52.00%			891,192.2	8,020,729.6
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>2,016,210</b>			<b>1.56</b>	<b>11.36</b>
<b>AGGREGATE UNIT PRICE</b>							<b>12.92</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 2 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 002  
 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\$)
<b>1</b>	<b>DRILLING AND BLASTING</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	581.87	0.00	43.75	0.00	25,456.71
1.1.02	Foreman	h	5,818.68	6.11	0.00	35,552.11	0.00
1.1.03	Equipment operator	h	43,504.56	5.39	0.00	234,489.59	0.00
1.1.05	Hand held drill miner	h	1,307.35	2.77	0.00	3,621.36	0.00
1.1.06	Operator's helper	h	2,083.22	2.20	0.00	4,583.09	0.00
1.1.07	Explosive specialist	h	5,554.83	3.42	0.00	18,997.51	0.00
1.1.08	Explosive specialist's helper	h	5,554.83	2.20	0.00	12,220.62	0.00
1.1.09	Integral steel and bit grinder	h	181.97	3.42	0.00	622.35	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	594.25	0.05	2.71	29.71	1,610.42
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	820.21	0.73	77.76	598.76	63,779.75
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	803.30	0.73	77.76	586.41	62,464.57
1.2.05	Motorcompressor, 15.0 m3/min	h	148.56	0.20	40.08	29.71	5,954.39
1.2.06	Flat bed lorry with crane, 10 t pay load	h	118.68	0.32	29.23	37.98	3,469.10

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\$)
1.2.07	Integral drill steel grinder	h	36.98	0.01	2.29	0.37	84.69
1.2.08	Button bits grinder	h	114.66	0.04	5.32	4.59	610.00
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	3,163.24	1.37	123.22	4,333.64	389,774.31
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW	h	474.49	1.64	121.99	778.16	57,882.53
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	34,169.68	1.32	98.59	45,103.98	3,368,788.95
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	1,265.30	0.01	6.41	8.86	8,110.54
1.2.16	Cost of construction equipment standby units	%	----	0.0%	7.02%	0.00	278,170.41
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	37,205.62	2.31	0.00	85,944.99	0.00
1.3.02	Explosive, gramonite type	kg	186,028.11	2.06	0.00	383,217.91	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	47,534.98	0.00	0.82	0.00	38,978.68
1.3.05	Slow burning fuse fuse	ea	378.95	0.00	0.51	0.00	193.26
1.3.06	Electric detonator, 3.0 m leading wire	ea	5,046.55	0.00	1.98	0.00	9,992.17
1.3.07	Plain detonator	ea	308.70	0.00	0.78	0.00	240.78
1.3.08	Copper type shottfiring cable	m	45,274.72	0.00	0.13	0.00	5,885.71
1.3.09	Crawler drill rod for 102 mm holes,	ea	47.66	0.00	538.94	0.00	25,688.27

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\$)
	L 3,660 mm						
1.3.10	Shank adapter for Ø 102 mm holes	ea	13.59	0.00	284.67	0.00	3,867.36
1.3.11	Coupling for Ø 102 mm holes	ea	73.33	0.00	77.24	0.00	5,664.00
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	47.66	0.00	538.94	0.00	25,688.27
1.3.13	Shank adapter for Ø 89 mm holes	ea	13.59	0.00	284.67	0.00	3,867.36
1.3.14	Coupling for Ø 89 mm dia.	ea	73.33	0.00	77.24	0.00	5,664.00
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	42.45	0.00	586.85	0.00	24,914.35
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	33.99	0.00	468.06	0.00	15,907.86
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	27.57	0.00	180.14	0.00	4,966.93
1.3.18	Grease for rods, couplings and shank adapters	kg	53.31	0.00	4.80	0.00	255.91
Total to carry forward						830,761.7	4,437,931.3

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 2 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 002  
 Table B**

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\$)
Total brought forward						830,761.7	4,437,931.3
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	130.87	0.00	43.75	0.00	5,725.78
2.1.02	Gang foreman	h	1,308.75	6.11	0.00	7,996.46	0.00
2.1.03	Equipment, operator	h	8,443.54	5.39	0.00	45,510.69	0.00
2.1.04	Equipment, helper	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	h	0.00	2.77	0.00	0.00	0.00
2.1.06	Skilled	h	4,643.95	2.20	0.00	10,216.69	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Bulldozer with universal type blade, 179 kW	h	1,215.87	1.29	97.19	1,568.47	118,170.41
		h	243.17	0.00	36.66	0.00	8,914.76
2.2.02	Bulldozer with universal type blade, 231 kW	h	911.90	1.64	121.99	1,495.52	111,242.99
		h	182.38	0.00	45.46	0.00	8,291.02
2.2.03	Water supply	m3	218,856.60	0.02	0.24	4,377.13	52,525.58
2.2.04	Self erected water tank, 38000	h	4,221.77	0.05	3.98	211.09	16,802.65

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\$)
	liters capacity						
2.2.05	Heavy-duty trailer water tank, 38,000 liters cap.	h	4,221.77	1.79	75.58	7,556.97	319,081.44
		h	844.35	0.00	19.36	0.00	16,346.70
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	h	1,326.40	0.27	43.87	358.13	58,189.33
		h	265.28	0.00	9.89	0.00	2,623.63
2.2.07	Smooth single drum vibrating roller, 38.0 kg/cm	h	0.00	0.23	31.18	0.00	0.00
		h	0.00	0.00	8.92	0.00	0.00
2.2.08	Portable diesel powered floodlight, 6000 W	h	748.03	0.07	6.41	52.36	4,794.86
		h	149.61	0.00	3.46	0.00	517.64
Sub-total						910,105.2	5,161,158.1
Missing items and construction contingencies		%	1.50%			13,651.6	77,417.4
Total direct costs						923,756.8	5,238,575.4
Overheads, risks and profit		%	52.00%			320,441.27	2,883,971.47
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>935,035</b>			<b>1.33</b>	<b>8.69</b>
<b>AGGREGATE UNIT PRICE</b>							<b>10.02</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 3 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 003  
 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\$)
<b>1</b>	<b>DRILLING AND BLASTING</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	710.44	0.00	43.75	0.00	31,081.77
1.1.02	Foreman	h	7,104.40	6.11	0.00	43,407.91	0.00
1.1.03	Equipment operator	h	54,129.64	5.39	0.00	291,758.78	0.00
1.1.05	Hand held drill miner	h	1,506.18	2.77	0.00	4,172.12	0.00
1.1.06	Operator's helper	h	2,400.05	2.20	0.00	5,280.12	0.00
1.1.07	Explosive specialist	h	6,399.26	3.42	0.00	21,885.46	0.00
1.1.08	Explosive specialist's helper	h	6,399.26	2.20	0.00	14,078.37	0.00
1.1.09	Integral steel and bit grinder	h	209.65	3.42	0.00	717.00	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	684.63	0.05	2.71	34.23	1,855.34
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	944.96	0.73	77.76	689.82	73,479.74
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	925.47	0.73	77.76	675.59	71,964.55
1.2.05	Motorcompressor, 15.0 m3/min	h	171.16	0.20	40.08	34.23	6,859.97
1.2.06	Flat bed lorry with crane, 10 t pay load	h	136.73	0.32	29.23	43.75	3,996.70

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\$)
1.2.07	Integral drill steel grinder	h	42.61	0.01	2.29	0.43	97.57
1.2.08	Button bits grinder	h	132.10	0.04	5.32	5.28	702.77
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	3,644.32	1.37	123.22	4,992.72	449,053.48
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW (in rock loading area)	h	546.65	1.64	121.99	896.50	66,685.65
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	43,010.64	1.32	98.59	56,774.04	4,240,418.7
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	1,457.73	0.01	6.41	10.20	9,344.04
1.2.16	Cost of construction equipment standby units	%	----	0.0%	7.00%	0.00	344,742.22
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	42,864.07	2.31	0.00	99,016.01	0.00
1.3.02	Explosive, gramonite type	kg	214,320.36	2.06	0.00	441,499.94	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	54,764.38	0.00	0.82	0.00	44,906.79
1.3.05	Slow burning fuse fuse	ea	436.58	0.00	0.51	0.00	222.66
1.3.06	Electric detonator, 3.0 m leading wire	ea	5,814.06	0.00	1.98	0.00	11,511.84
1.3.07	Plain detonator	ea	355.64	0.00	0.78	0.00	277.40
1.3.08	Copper type shotfiring cable	m	52,160.37	0.00	0.13	0.00	6,780.85



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\$)
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	54.91	0.00	538.94	0.00	29,595.09
1.3.10	Shank adapter for Ø 102 mm holes	ea	15.65	0.00	284.67	0.00	4,455.53
1.3.11	Coupling for Ø 102 mm holes	ea	84.48	0.00	77.24	0.00	6,525.42
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	54.91	0.00	538.94	0.00	29,595.09
1.3.13	Shank adapter for Ø 89 mm holes	ea	15.65	0.00	284.67	0.00	4,455.53
1.3.14	Coupling for Ø 89 mm dia.	ea	84.48	0.00	77.24	0.00	6,525.42
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	48.91	0.00	586.85	0.00	28,703.47
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	39.16	0.00	468.06	0.00	18,327.22
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	615.54	0.00	180.14	0.00	110,880.05
1.3.18	Grease for rods, couplings and shank adapters	kg	61.42	0.00	4.80	0.00	294.83
Total to carry forward						985,972.5	5,603,339.7

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCK SHELLFILL - DAM PHASE 3 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 003  
 Table B**

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\$)
Total brought forward						985,972.5	5,603,339.7
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	150.78	0.00	43.75	0.00	6,596.59
2.1.02	Gang foreman	h	1,507.79	6.11	0.00	9,212.60	0.00
2.1.03	Equipment, operator	h	9,727.69	5.39	0.00	52,432.22	0.00
2.1.04	Equipment, helper	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	h	0.00	2.77	0.00	0.00	0.00
2.1.06	Skilled	h	5,350.23	2.20	0.00	11,770.50	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Bulldozer with universal type blade, 179 kW	h	1,400.79	1.29	97.19	1,807.01	136,142.46
		h	280.16	0.00	36.66	0.00	10,270.57
2.2.02	Bulldozer with universal type blade, 231 kW	h	1,050.59	1.64	121.99	1,722.97	128,161.47
		h	210.12	0.00	45.46	0.00	9,551.96
2.2.03	Water supply	m3	252,141.60	0.03	0.25	7,564.25	63,035.40
2.2.04	Self erected water tank, 38000	h	4,863.84	0.05	3.98	243.19	19,358.09

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\$)
	liters capacity						
2.2.05	Heavy-duty trailer water tank, 38,000 liters cap.	h	4,863.84	1.79	75.58	8,706.28	367,609.22
		h	972.77	0.00	19.36	0.00	18,832.80
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	h	1,528.13	0.27	43.87	412.60	67,039.10
		h	305.63	0.00	9.89	0.00	3,022.64
2.2.07	Smooth single drum vibrating roller, 38.0 kg/cm	h	0.00	0.23	31.18	0.00	0.00
		h	0.00	0.00	8.92	0.00	0.00
2.2.08	Portable diesel powered floodlight, 6000 W	h	861.79	0.07	6.41	60.33	5,524.09
		h	172.36	0.00	3.46	0.00	596.36
Sub-total						1,079,904.5	6,439,080.4
Missing items and construction contingencies		%	1.50%			16,198.6	96,586.2
Total direct costs						1,096,103.0	6,535,666.6
Overheads, risks and profit		%	52.00%			396,852.0	3,571,668.2
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>1,077,240</b>			<b>1.39</b>	<b>9.38</b>
<b>AGGREGATE UNIT PRICE</b>							<b>10.77</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 4 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 004  
 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\$)
<b>1</b>	<b>DRILLING AND BLASTING</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	2,065.27	0.00	43.75	0.00	90,355.44
1.1.02	Foreman	h	20,652.67	6.11	0.00	126,187.82	0.00
1.1.03	Equipment operator	h	165,600.75	5.39	0.00	892,588.1	0.00
1.1.05	Hand held drill miner	h	3,644.98	2.77	0.00	10,096.59	0.00
1.1.06	Operator's helper	h	5,808.16	2.20	0.00	12,777.95	0.00
1.1.07	Explosive specialist	h	15,482.73	3.42	0.00	52,950.95	0.00
1.1.08	Explosive specialist's helper	h	15,482.73	2.20	0.00	34,062.02	0.00
1.1.09	Integral steel and bit grinder	h	507.35	3.42	0.00	1,735.15	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	1,656.81	0.05	2.71	82.84	4,489.95
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	2,286.80	0.73	77.76	1,669.37	177,821.92
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	2,239.65	0.73	77.76	1,634.94	174,155.13
1.2.05	Motorcompressor, 15.0 m3/min	h	414.20	0.20	40.08	82.84	16,601.22
1.2.06	Flat bed lorry with crane, 10 t pay	h	330.90	0.32	29.23	105.89	9,672.07

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\$)
	load						
1.2.07	Integral drill steel grinder	h	103.11	0.01	2.29	1.03	236.12
1.2.08	Button bits grinder	h	319.68	0.04	5.32	12.79	1,700.72
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	8,819.31	1.37	123.22	12,082.45	1,086,715.18
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW (in rock loading area)	h	1,322.90	1.64	121.99	2,169.55	161,380.11
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	135,546.59	1.32	98.59	178,921.49	13,363,538.0
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	3,527.72	0.01	6.41	24.69	22,612.71
1.2.16	Cost of construction equipment standby units	%	----	0.0%	6.95%	0.00	1,043,767.68
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	103,731.60	2.31	0.00	239,620.00	0.00
1.3.02	Explosive, gramonite type	kg	518,658.02	2.06	0.00	1,068,435.5	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	132,530.49	0.00	0.82	0.00	108,675.00
1.3.05	Slow burning fuse fuse	ea	1,056.53	0.00	0.51	0.00	538.83
1.3.06	Electric detonator, 3.0 m leading wire	ea	14,070.10	0.00	1.98	0.00	27,858.80
1.3.07	Plain detonator	ea	860.66	0.00	0.78	0.00	671.32

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\$)
1.3.08	Copper type shotfiring cable	m	126,228.76	0.00	0.13	0.00	16,409.74
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	132.89	0.00	538.94	0.00	71,620.51
1.3.10	Shank adapter for Ø 102 mm holes	ea	37.88	0.00	284.67	0.00	10,782.43
1.3.11	Coupling for Ø 102 mm holes	ea	204.45	0.00	77.24	0.00	15,791.59
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	132.89	0.00	538.94	0.00	71,620.51
1.3.13	Shank adapter for Ø 89 mm holes	ea	37.88	0.00	284.67	0.00	10,782.43
1.3.14	Coupling for Ø 89 mm dia.	ea	204.45	0.00	77.24	0.00	15,791.59
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	118.37	0.00	586.85	0.00	69,462.77
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	94.76	0.00	468.06	0.00	44,352.11
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	26.97	0.00	180.14	0.00	4,858.04
1.3.18	Grease for rods, couplings and shank adapters	kg	148.64	0.00	4.80	0.00	713.48
Total to carry forward						2,635,241.9	16,622,975.4

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 4 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 004  
 Table B**

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\$)
Total brought forward						2,635,241.9	16,622,975.4
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	364.89	0.00	43.75	0.00	15,963.82
2.1.02	Gang foreman	h	3,648.87	6.11	0.00	22,294.62	0.00
2.1.03	Equipment, operator	h	23,541.12	5.39	0.00	126,886.65	0.00
2.1.04	Equipment, helper	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	h	0.00	2.77	0.00	0.00	0.00
2.1.06	Skilled	h	12,947.62	2.20	0.00	28,484.76	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Bulldozer with universal type blade, 179 kW	h	3,389.92	1.29	97.19	4,373.00	329,466.49
		h	677.98	0.00	36.66	0.00	24,854.91
2.2.02	Bulldozer with universal type blade, 231 kW	h	2,542.44	1.64	121.99	4,169.60	310,152.41
		h	508.49	0.00	45.46	0.00	23,115.88
2.2.03	Water supply	m3	610,185.90	0.06	0.54	36,611.15	329,500.39

2.2.04	Self erected water tank, 38000 liters capacity	h	11,770.56	0.05	3.98	588.53	46,846.83
2.2.05	Heavy-duty trailer water tank, 38,000 liters cap.	h	11,770.56	1.79	75.58	21,069.30	889,619.03
		h	2,354.11	0.00	19.36	0.00	45,575.61
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	h	3,698.10	0.27	43.87	998.49	162,235.49
		h	739.62	0.00	9.89	0.00	7,314.83
2.2.07	Smooth single drum vibrating roller, 38.0 kg/cm	h	0.00	0.23	31.18	0.00	0.00
		h	0.00	0.00	8.92	0.00	0.00
2.2.08	Portable diesel powered floodlight, 6000 W	h	2,085.55	0.07	6.41	145.99	13,368.36
		h	417.11	0.00	3.46	0.00	1,443.20
Sub-total						2,880,864.0	18,822,432.6
Missing items and construction contingencies		%	1.50%			43,213.0	282,336.5
Total direct costs						2,924,077.0	19,104,769.1
Overheads, risks and profit		%	52.00%			1,145,500.0	10,309,500.0
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>2,606,935</b>			<b>1.56</b>	<b>11.28</b>
<b>AGGREGATE UNIT PRICE</b>							<b>12.84</b>



**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 5 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 005  
 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\$)
<b>1</b>	<b>DRILLING AND BLASTING</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	3,429.07	0.00	43.75	0.00	150,021.70
1.1.02	Foreman	h	34,290.67	6.11	0.00	209,516.02	0.00
1.1.03	Equipment operator	h	278,245.65	5.39	0.00	1,499,744.1	0.00
1.1.05	Hand held drill miner	h	5,759.15	2.77	0.00	15,952.85	0.00
1.1.06	Operator's helper	h	9,177.03	2.20	0.00	20,189.46	0.00
1.1.07	Explosive specialist	h	24,461.64	3.42	0.00	83,658.80	0.00
1.1.08	Explosive specialist's helper	h	24,461.64	2.20	0.00	53,815.60	0.00
1.1.09	Integral steel and bit grinder	h	801.63	3.42	0.00	2,741.57	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	2,617.80	0.05	2.71	130.89	7,094.23
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	3,613.21	0.73	77.76	2,637.64	280,962.86
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	3,538.70	0.73	77.76	2,583.25	275,169.24
1.2.05	Motorcompressor, 15.0 m3/min	h	654.45	0.20	40.08	130.89	26,230.32
1.2.06	Flat bed lorry with crane, 10 t pay load	h	522.82	0.32	29.23	167.30	15,282.11

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\$)
1.2.07	Integral drill steel grinder	h	162.92	0.01	2.29	1.63	373.08
1.2.08	Button bits grinder	h	505.11	0.04	5.32	20.20	2,687.18
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	13,934.72	1.37	123.22	19,090.56	1,717,035.77
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW (in rock loading area)	h	2,090.21	1.64	121.99	3,427.94	254,984.41
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	229,250.94	1.32	98.59	302,611.25	22,601,850.5
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	5,573.89	0.01	6.41	39.02	35,728.61
1.2.16	Cost of construction equipment standby units	%	----	0.0%	6.94%	0.00	1,749,619.76
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	163,898.39	2.31	0.00	378,605.29	0.00
1.3.02	Explosive, gramonite type	kg	819,491.97	2.06	0.00	1,688,153.5	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	209,401.32	0.00	0.82	0.00	171,709.08
1.3.05	Slow burning fuse fuse	ea	1,669.34	0.00	0.51	0.00	851.36
1.3.06	Electric detonator, 3.0 m leading wire	ea	22,231.09	0.00	1.98	0.00	44,017.57
1.3.07	Plain detonator	ea	1,359.87	0.00	0.78	0.00	1,060.70
1.3.08	Copper type shotfiring cable	m	199,444.44	0.00	0.13	0.00	25,927.78

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\$)
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	209.97	0.00	538.94	0.00	113,162.10
1.3.10	Shank adapter for Ø 102 mm holes	ea	59.85	0.00	284.67	0.00	17,036.50
1.3.11	Coupling for Ø 102 mm holes	ea	323.03	0.00	77.24	0.00	24,951.09
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	209.97	0.00	538.94	0.00	113,162.10
1.3.13	Shank adapter for Ø 89 mm holes	ea	59.85	0.00	284.67	0.00	17,036.50
1.3.14	Coupling for Ø 89 mm dia.	ea	323.03	0.00	77.24	0.00	24,951.09
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	187.02	0.00	586.85	0.00	109,752.83
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	149.72	0.00	468.06	0.00	70,077.39
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	175.77	0.00	180.14	0.00	31,662.72
1.3.18	Grease for rods, couplings and shank adapters	kg	234.86	0.00	4.80	0.00	1,127.32
Total to carry forward						4,283,217.7	27,883,525.9

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 5 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 005  
 Table B**

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\$)
Total brought forward						4,283,217.7	27,883,525.9
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	576.53	0.00	43.75	0.00	25,223.22
2.1.02	Gang foreman	h	5,765.31	6.11	0.00	35,226.03	0.00
2.1.03	Equipment, operator	h	37,195.53	5.39	0.00	200,483.92	0.00
2.1.04	Equipment, helper	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	h	0.00	2.77	0.00	0.00	0.00
2.1.06	Skilled	h	20,457.54	2.20	0.00	45,006.59	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Bulldozer with universal type blade, 179 kW	h	5,356.16	1.29	97.19	6,909.44	520,564.87
		h	1,071.23	0.00	36.66	0.00	39,271.34
2.2.02	Bulldozer with universal type blade, 231 kW	h	4,017.12	1.64	121.99	6,588.07	490,048.16
		h	803.42	0.00	45.46	0.00	36,523.63
2.2.03	Water supply	m3	964,108	0.09	0.81	86,769.74	780,927.64
2.2.04	Self erected water tank, 38000	h	18,597.77	0.05	3.98	929.89	74,019.11

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\$)
	liters capacity						
2.2.05	Heavy-duty trailer water tank, 38,000 liters cap.	h	18,597.77	1.79	75.58	33,290.00	1,405,619.17
		h	3,719.55	0.00	19.36	0.00	72,010.55
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	h	5,843.08	0.27	43.87	1,577.63	256,335.92
		h	1,168.62	0.00	9.89	0.00	11,557.61
2.2.07	Smooth single drum vibrating roller, 38.0 kg/cm	h	0.00	0.23	31.18	0.00	0.00
		h	0.00	0.00	8.92	0.00	0.00
2.2.08	Portable diesel powered floodlight, 6000 W	h	3,295.22	0.07	6.41	230.67	21,122.33
		h	659.04	0.00	3.46	0.00	2,280.29
Sub-total						4,700,229.7	31,619,029.7
Missing items and construction contingencies		%	1.50%			70,503.4	474,285.4
Total direct costs						4,770,733.1	32,093,315.2
Overheads, risks and profit		%	52.00%			1,916,930.5	17,252,374.6
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>4,119,019</b>			<b>1.62</b>	<b>11.98</b>
<b>AGGREGATE UNIT PRICE</b>							<b>13.60</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 6 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 006  
 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\$)
<b>1</b>	<b>DRILLING AND BLASTING</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	5,657.77	0.00	43.75	0.00	247,527.41
1.1.02	Foreman	h	56,577.69	6.11	0.00	345,689.71	0.00
1.1.03	Equipment operator	h	462,005.29	5.39	0.00	2,490,208.5	0.00
1.1.05	Hand held drill miner	h	9,242.87	2.77	0.00	25,602.75	0.00
1.1.06	Operator's helper	h	14,728.22	2.20	0.00	32,402.09	0.00
1.1.07	Explosive specialist	h	39,257.00	3.42	0.00	134,258.96	0.00
1.1.08	Explosive specialist's helper	h	39,257.00	2.20	0.00	86,365.41	0.00
1.1.09	Integral steel and bit grinder	h	1,286.54	3.42	0.00	4,399.96	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	4,201.30	0.05	2.71	210.07	11,385.53
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	5,798.84	0.73	77.76	4,233.15	450,917.68
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	5,679.26	0.73	77.76	4,145.86	441,619.49
1.2.05	Motorcompressor, 15.0 m3/min	h	1,050.33	0.20	40.08	210.07	42,097.07
1.2.06	Flat bed lorry with crane, 10 t pay load	h	839.08	0.32	29.23	268.51	24,526.27

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\$)
1.2.07	Integral drill steel grinder	h	261.46	0.01	2.29	2.61	598.75
1.2.08	Button bits grinder	h	810.65	0.04	5.32	32.43	4,312.66
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	22,363.85	1.37	123.22	30,638.47	2,755,673.11
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW (in rock loading area)	h	3,354.58	1.64	121.99	5,501.51	409,224.84
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	381,969.21	1.32	98.59	504,199.36	37,658,344.3
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	8,945.54	0.01	6.41	62.62	57,340.90
1.2.16	Cost of construction equipment standby units	%	----	0.0%	6.93%	0.00	2,901,483.71
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	263,040.76	2.31	0.00	607,624.16	0.00
1.3.02	Explosive, gramonite type	kg	1,315,203.8	2.06	0.00	2,709,319.8	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	336,068.48	0.00	0.82	0.00	275,576.15
1.3.05	Slow burning fuse fuse	ea	2,679.12	0.00	0.51	0.00	1,366.35
1.3.06	Electric detonator, 3.0 m leading wire	ea	35,678.71	0.00	1.98	0.00	70,643.85
1.3.07	Plain detonator	ea	2,182.46	0.00	0.78	0.00	1,702.31
1.3.08	Copper type shotfiring cable	m	320,088.66	0.00	0.13	0.00	41,611.53

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\$)
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	336.98	0.00	538.94	0.00	181,614.02
1.3.10	Shank adapter for Ø 102 mm holes	ea	96.05	0.00	284.67	0.00	27,341.90
1.3.11	Coupling for Ø 102 mm holes	ea	518.44	0.00	77.24	0.00	40,044.04
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	336.98	0.00	538.94	0.00	181,614.02
1.3.13	Shank adapter for Ø 89 mm holes	ea	96.05	0.00	284.67	0.00	27,341.90
1.3.14	Coupling for Ø 89 mm dia.	ea	518.44	0.00	77.24	0.00	40,044.04
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	300.15	0.00	586.85	0.00	176,142.47
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	240.28	0.00	468.06	0.00	112,467.30
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	20.63	0.00	180.14	0.00	3,716.32
1.3.18	Grease for rods, couplings and shank adapters	kg	376.92	0.00	4.80	0.00	1,809.24
Total to carry forward						6,985,376.1	46,188,087.2



**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 DAM ROCKFILL SHELL - DAM PHASE 6 - ROCK FROM QUARRIES Q26a AND Q26b**

**SEC 007  
 ANA 006  
 Table B**

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\$)
Total brought forward						6,985,376.1	46,188,087.2
<b>2</b>	<b>SPREADING, WATERING AND COMPACTION</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	925.28	0.00	43.75	0.00	40,480.78
2.1.02	Gang foreman	h	9,252.75	6.11	0.00	56,534.30	0.00
2.1.03	Equipment, operator	h	59,695.16	5.39	0.00	321,756.92	0.00
2.1.04	Equipment, helper	h	0.00	2.20	0.00	0.00	0.00
2.1.05	Plate compactor, operator	h	0.00	2.77	0.00	0.00	0.00
2.1.06	Skilled	h	32,832.34	2.20	0.00	72,231.15	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Bulldozer with universal type blade, 179 kW	h	8,596.10	1.29	97.19	11,088.97	835,455.28
		h	1,719.22	0.00	36.66	0.00	63,026.63
2.2.02	Bulldozer with universal type blade, 231 kW	h	6,447.08	1.64	121.99	10,573.21	786,478.98
		h	1,289.42	0.00	45.46	0.00	58,616.83
2.2.03	Water supply	m3	1,547,299	0.12	1.08	185,675.83	1,671,082.49
2.2.04	Self erected water tank, 38000	h	29,847.58	0.05	3.98	1,492.38	118,793.37

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\$)
	liters capacity						
2.2.05	Heavy-duty trailer water tank, 38,000 liters cap.	h	29,847.58	1.79	75.58	53,427.17	2,255,880.17
		h	5,969.52	0.00	19.36	0.00	115,569.83
2.2.06	Smooth single drum vibrating roller, 50.0 kg/cm	h	9,377.57	0.27	43.87	2,531.94	411,393.88
		h	1,875.51	0.00	9.89	0.00	18,548.83
2.2.07	Smooth single drum vibrating roller, 38.0 kg/cm	h	0.00	0.23	31.18	0.00	0.00
		h	0.00	0.00	8.92	0.00	0.00
2.2.08	Portable diesel powered floodlight, 6000 W	h	5,288.50	0.07	6.41	370.19	33,899.26
		h	1,057.70	0.00	3.46	0.00	3,659.64
Sub-total						7,701,058.1	52,600,973.1
Missing items and construction contingencies		%	1.50%			115,515.9	789,014.6
Total direct costs						7,816,574.0	53,389,987.7
Overheads, risks and profit		%	52.00%			3,182,741.2	28,644,670.9
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>6,610,620</b>			<b>1.66</b>	<b>12.41</b>
<b>AGGREGATE UNIT PRICE</b>							<b>14.07</b>

## **SEC 2-08: Rip - rap**

**ROGUN HYDROELECTRIC POWER PLANT**  
**CIVIL WORKS COST ESTIMATE - PHASE II**  
**RIP-RAP - DAM PHASE 5 - ROCK FROM QUARRIES Q26a AND 26b**

**SEC 008**  
**ANA 001**  
**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\$)
<b>1</b>	<b>DRILLING, BLASTING &amp; TRANSPORT TO DAM</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	90.42	0.00	43.75	0.00	3,955.70
1.1.02	Foreman	h	904.16	6.11	0.00	5,524.42	0.00
1.1.03	Equipment operator	h	6,997.83	5.39	0.00	37,718.33	0.00
1.1.05	Hand held drill miner	h	181.60	2.77	0.00	503.03	0.00
1.1.06	Operator's helper	h	289.38	2.20	0.00	636.63	0.00
1.1.07	Explosive specialist	h	773.76	3.42	0.00	2,646.26	0.00
1.1.08	Explosive specialist's helper	h	773.76	2.20	0.00	1,702.27	0.00
1.1.09	Integral steel and bit grinder	h	25.28	3.42	0.00	86.45	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	82.55	0.05	2.71	4.13	223.70
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	113.93	0.73	77.76	83.17	8,859.48
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	111.58	0.73	77.76	81.46	8,676.79
1.2.05	Motorcompressor, 15.0 m3/min	h	20.64	0.20	40.08	4.13	827.11
1.2.06	Flat bed lorry with crane, 10 t pay	h	16.49	0.32	29.23	5.28	481.88

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\$)
	load						
1.2.07	Integral drill steel grinder	h	5.14	0.01	2.29	0.05	11.76
1.2.08	Button bits grinder	h	15.93	0.04	5.32	0.64	84.73
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	439.40	1.37	123.22	601.97	54,142.53
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW	h	164.89	1.64	121.99	270.43	20,115.50
1.2.13	Off-highway dup truck, 36.6 ton pay load	h	5,515.37	1.32	98.59	7,280.29	543,760.48
1.2.14	Off-highway dup truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	175.76	0.01	6.41	1.23	1,126.61
1.2.16	Cost of construction equipment standby units	%	----	0.0%	6.99%	0.00	44,648.23
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	5,168.14	2.31	0.00	11,938.39	0.00
1.3.02	Explosive, gramonite type	kg	25,840.68	2.06	0.00	53,231.80	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	6,602.96	0.00	0.82	0.00	5,414.43
1.3.05	Slow burning fuse fuse	ea	52.64	0.00	0.51	0.00	26.85
1.3.06	Electric detonator, 3.0 m leading wire	ea	701.00	0.00	1.98	0.00	1,387.99
1.3.07	Plain detonator	ea	42.88	0.00	0.78	0.00	33.45
1.3.08	Copper type shottfiring cable	m	6,288.99	0.00	0.13	0.00	817.57

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\$)
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	6.62	0.00	538.94	0.00	3,568.29
1.3.10	Shank adapter for Ø 102 mm holes	ea	1.89	0.00	284.67	0.00	537.20
1.3.11	Coupling for Ø 102 mm holes	ea	10.19	0.00	77.24	0.00	786.77
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	6.62	0.00	538.94	0.00	3,568.29
1.3.13	Shank adapter for Ø 89 mm holes	ea	1.89	0.00	284.67	0.00	537.20
1.3.14	Coupling for Ø 89 mm dia.	ea	10.19	0.00	77.24	0.00	786.77
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	5.90	0.00	586.85	0.00	3,460.79
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	4.72	0.00	468.06	0.00	2,209.72
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	3.83	0.00	180.14	0.00	689.94
1.3.18	Grease for rods, couplings and shank adapters	kg	7.41	0.00	4.80	0.00	35.55
Total to carry forward						122,320.35	710,775.33

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 RIP-RAP - DAM PHASE 5 - ROCK FROM QUARRIES Q26a AND 26b**

**SEC 008  
 ANA 001  
 Table B**

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\$)
Total brought forward						122,320.35	710,775.33
<b>2</b>	<b>SELECTION OF ROCK FRAGMENTS IN QUARRY AND STOCKPILING IN SURROUNDING AREA</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	40.53	0.00	43.75	0.00	1,773.38
2.1.02	Gang foreman	h	405.34	6.11	0.00	2,476.65	0.00
2.1.03	Operator, wheel loader	h	4,053.44	5.39	0.00	21,848.04	0.00
2.1.04	Helper for ditto	h	0.00	2.20	0.00	0.00	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Wheel loader with rock grapple, 157 kW	h	3,377.87	0.60	54.76	2,026.72	184,971.98
		h	675.57	0.00	21.07	0.00	14,234.33
2.2.02	Off-highway dump truck, 36.6 ton pay load	h	2,239.61	1.32	98.59	2,956	220,803
		h	447.92	0.00	33.74	0.00	15,113
<b>3</b>	<b>RELOADING OF ROCK FRAGMENTS</b>						

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\$)
<b>3.1</b>	<b>Labour</b>						
3.1.01	General foreman	h	16.21	0.00	43.75	0.00	709.35
3.1.02	Gang foreman	h	162.14	6.11	0.00	990.66	0.00
3.1.03	Operator, wheel loader	h	1,621.38	5.39	0.00	8,739.22	0.00
3.1.04	Helper for ditto	h	0.00	2.20	0.00	0.00	0.00
<b>3.2</b>	<b>Equipment</b>						
3.2.01	Wheel loader with rock grapple, 157 kW	h	1,351.15	0.60	54.76	810.69	73,988.79
		h	270.23	0.00	21.07	0.00	5,693.73
<b>4</b>	<b>PLACING OF ROCK FRAGMENTS</b>						
<b>4.1</b>	<b>Labour</b>						
4.1.01	General foreman	h	29.73	0.00	43.75	0.00	1,300.48
4.1.02	Gang foreman	h	297.25	6.11	0.00	1,816.21	0.00
4.1.03	Operator, hydraulic excavator	h	2,972.52	5.39	0.00	16,021.90	0.00
4.1.04	Helper for ditto	h	0.00	2.20	0.00	0.00	0.00
<b>4.2</b>	<b>Equipment</b>						
4.2.01	Hydraulic excavator with rock grapple, 200 kW	h	2,702.29	0.67	81.94	1,810.54	221,425.92
		h	540.46	0.00	27.32	0.00	14,765.33
4.2.02	Portable diesel powered floodlight, 6000 W	h	540.46	0.07	6.41	37.83	3,464.34
		h	108.09	0.00	3.46	0.00	374.00



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\$)
Sub-total						181,855	1,469,393
Missing items and construction contingencies		%	1.50%			2,728	22,041
Total direct costs						184,583	1,491,433
Overheads, risks and profit		%	52.00%			87,153	784,376
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>129,790</b>			<b>2.09</b>	<b>17.53</b>
<b>AGGREGATE UNIT PRICE</b>							<b>19.63</b>

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 RIP-RAP - DAM PHASE 6 - ROCK FROM QUARRIES Q26a AND 26b**

**SEC 008  
 ANA 002  
 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\$)
<b>1</b>	<b>DRILLING, BLASTING &amp; TRANSPORT TO DAM</b>						
<b>1.1</b>	<b>Labour</b>						
1.1.01	General foreman	h	334.44	0.00	43.75	0.00	14,631.74
1.1.02	Foreman	h	3,344.40	6.11	0.00	20,434.27	0.00
1.1.03	Equipment operator	h	26,764.78	5.39	0.00	144,262.17	0.00
1.1.05	Hand held drill miner	h	594.49	2.77	0.00	1,646.75	0.00
1.1.06	Operator's helper	h	947.31	2.20	0.00	2,084.08	0.00
1.1.07	Explosive specialist	h	2,527.32	3.42	0.00	8,643.44	0.00
1.1.08	Explosive specialist's helper	h	2,527.32	2.20	0.00	5,560.11	0.00
1.1.09	Integral steel and bit grinder	h	82.75	3.42	0.00	283.00	0.00
<b>1.2</b>	<b>Equipment</b>						
1.2.01	Air powered hand-held rock drill, heavy weight	h	270.22	0.05	2.71	13.51	732.31
1.2.02	Hydraulic crawler rock drill, 116 kw, Ø 76 mm	h	0.00	0.68	66.30	0.00	0.00
1.2.03	Hydraulic crawler rock drill, 149 kw, Ø 102 mm	h	372.98	0.73	77.76	272.27	29,002.69
1.2.04	Hydraulic crawler rock drill, 149 kw, Ø 89 mm	h	365.29	0.73	77.76	266.66	28,404.64
1.2.05	Motorcompressor, 15.0 m3/min	h	67.56	0.20	40.08	13.51	2,707.65

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\$)
1.2.06	Flat bed lorry with crane, 10 t pay load	h	53.97	0.32	29.23	17.27	1,577.51
1.2.07	Integral drill steel grinder	h	16.82	0.01	2.29	0.17	38.51
1.2.08	Button bits grinder	h	52.14	0.04	5.32	2.09	277.39
1.2.09	Hydraulic front shovel, 301 kW, 4.10 m <sup>3</sup> heap.	h	1,438.43	1.37	123.22	1,970.64	177,242.85
1.2.10	Hydraulic front shovel, 390 kW, 5.70 m <sup>3</sup> heap.	h	0.00	1.80	163.89	0.00	0.00
1.2.11	Hydraulic backhoe, 130 kW, 1.8 m <sup>3</sup> heaped	h	0.00	0.58	56.52	0.00	0.00
1.2.12	Bulldozer with blade, 231 kW	h	539.80	1.64	121.99	885.28	65,850.80
1.2.13	Off-highway dump truck, 36.6 ton pay load	h	21,561.16	1.32	98.59	28,460.73	2,125,714.35
1.2.14	Off-highway dump truck, 46.2 ton pay load	h	0.00	1.61	116.24	0.00	0.00
1.2.15	Portable diesel powered floodlight, 6000 W	h	575.37	0.01	6.41	4.03	3,688.12
1.2.16	Cost of construction equipment standby units	%	----	0.0%	6.96%	0.00	169,506.63
<b>1.3</b>	<b>Materials</b>						
1.3.01	Explosive, amonite type	kg	16,918.59	2.31	0.00	39,081.94	0.00
1.3.02	Explosive, gramonite type	kg	84,592.94	2.06	0.00	174,261.45	0.00
1.3.03	Explosive, ammonium nitrate	kg	0.00	0.74	0.00	0.00	0.00
1.3.04	Detonating fuse	m	21,615.68	0.00	0.82	0.00	17,724.85
1.3.05	Slow burning fuse fuse	ea	172.32	0.00	0.51	0.00	87.88
1.3.06	Electric detonator, 3.0 m leading wire	ea	2,294.83	0.00	1.98	0.00	4,543.76
1.3.07	Plain detonator	ea	140.37	0.00	0.78	0.00	109.49

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\$)
1.3.08	Copper type shotfiring cable	m	20,587.87	0.00	0.13	0.00	2,676.42
1.3.09	Crawler drill rod for 102 mm holes, L 3,660 mm	ea	21.67	0.00	538.94	0.00	11,681.28
1.3.10	Shank adapter for Ø 102 mm holes	ea	6.18	0.00	284.67	0.00	1,758.61
1.3.11	Coupling for Ø 102 mm holes	ea	33.35	0.00	77.24	0.00	2,575.60
1.3.12	Crawler drill rod for 89 mm holes, L 3,660 mm	ea	21.67	0.00	538.94	0.00	11,681.28
1.3.13	Shank adapter for Ø 89 mm holes	ea	6.18	0.00	284.67	0.00	1,758.61
1.3.14	Coupling for Ø 89 mm dia.	ea	33.35	0.00	77.24	0.00	2,575.60
1.3.15	Crawler drill bit for Ø 102 mm holes	ea	19.31	0.00	586.85	0.00	11,329.35
1.3.16	Crawler drill bit for Ø 89 mm holes	ea	15.45	0.00	468.06	0.00	7,233.81
1.3.17	Integrall drill steel, 800/4000 mm (average)	ea	12.54	0.00	180.14	0.00	2,258.62
1.3.18	Grease for rods, couplings and shank adapters	kg	24.24	0.00	4.80	0.00	116.37
Total to carry forward						428,163.35	2,697,486.76

**ROGUN HYDROELECTRIC POWER PLANT  
 CIVIL WORKS COST ESTIMATE - PHASE II  
 RIP-RAP - DAM PHASE 6 - ROCK FROM QUARRIES Q26a AND 26b**

**SEC 008  
 ANA 002  
 Table B**

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\$)
Total brought forward						428,163.35	2,697,486.76
<b>2</b>	<b>SELECTION OF ROCK FRAGMENTS IN QUARRY AND STOCKPILING IN SURROUNDING AREA</b>						
<b>2.1</b>	<b>Labour</b>						
2.1.01	General foreman	h	132.69	0.00	43.75	0.00	5,805.40
2.1.02	Gang foreman	h	1,326.95	6.11	0.00	8,107.65	0.00
2.1.03	Operator, wheel loader	h	13,269.48	5.39	0.00	71,522.50	0.00
2.1.04	Helper for ditto	h	0.00	2.20	0.00	0.00	0.00
<b>2.2</b>	<b>Equipment</b>						
2.2.01	Wheel loader with rock grapple, 157 kW	h	11,057.90	0.60	54.76	6,634.74	605,530.60
		h	2,211.58	0.00	21.07	0.00	46,597.99
2.2.02	Off-highway dump truck, 36.6 ton pay load	h	7,331.65	1.32	98.59	9,677.78	722,827.33
		h	1,466.33	0.00	33.74	0.00	49,473.97
<b>3</b>	<b>RELOADING OF ROCK FRAGMENTS</b>						

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\$)
<b>3.1</b>	<b>Labour</b>						
3.1.01	General foreman	h	53.08	0.00	43.75	0.00	2,322.16
3.1.02	Gang foreman	h	530.78	6.11	0.00	3,243.06	0.00
3.1.03	Operator, wheel loader	h	5,307.79	5.39	0.00	28,609.00	0.00
3.1.04	Helper for ditto	h	0.00	2.20	0.00	0.00	0.00
<b>3.2</b>	<b>Equipment</b>						
3.2.01	Wheel loader with rock grapple, 157 kW	h	4,423.16	0.60	54.76	2,653.90	242,212.24
		h	884.63	0.00	21.07	0.00	18,639.20
<b>4</b>	<b>PLACING OF ROCK FRAGMENTS</b>						
<b>4.1</b>	<b>Labour</b>						
4.1.01	General foreman	h	97.31	0.00	43.75	0.00	4,257.29
4.1.02	Gang foreman	h	973.10	6.11	0.00	5,945.61	0.00
4.1.03	Operator, hydraulic excavator	h	9,730.95	5.39	0.00	52,449.83	0.00
4.1.04	Helper for ditto	h	0.00	2.20	0.00	0.00	0.00
<b>4.2</b>	<b>Equipment</b>						
4.2.01	Hydraulic excavator with rock grapple, 200 kW	h	8,846.32	0.67	81.94	5,927.03	724,867.46
		h	1,769.26	0.00	27.32	0.00	48,336.29
4.2.02	Portable diesel powered floodlight, 6000 W	h	1,769.26	0.07	6.41	123.85	11,340.98
		h	353.85	0.00	3.46	0.00	1,224.33

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\$)
Sub-total						623,058.29	5,180,922.01
Missing items and construction contingencies		%	1.50%			9,345.87	77,713.83
Total direct costs						632,404.17	5,258,635.84
Overheads, risks and profit		%	52.00%			306,334.08	2,757,006.72
<b>UNIT PRICE IN LOCAL &amp; FOREIGN CURRENCY</b>		<b>m3</b>	<b>424,885</b>			<b>2.21</b>	<b>18.87</b>
<b>AGGREGATE UNIT PRICE</b>							<b>21.07</b>

## **APPENDIX A - SUMMARY OF DAM FILLS UNIT PRICES**



## **Alternative 1: FSL=1290 m.a.s.l**

SUMMARY TABLE  
DAM FILL - UNIT PRICES PER PHASE  
ALTERNATIVE 1290

ROGUN HPP  
CIVIL WORKS COST ESTIMATE - PHASE II  
DAM FILLS - SUMMARY OF UNIT PRICES - Alternative FSL=1290 m a.s.l

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
<b>Phase 1</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15 (by trucks, Cofferdam)</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	2 429 580	2 274 500	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to right bank stockpile area	m3	2 429 580	2 274 500	0.26	4.97	5.23
	c) Loading in stockpile area, transport to dam and placing	m3	2 429 580	2 274 500	1.62	15.12	16.74
	Aggregate unit price	m3	----->		<b>2.22</b>	<b>21.04</b>	<b>23.26</b>
	<b>Alluvium shell - Material source: alluvium of Borrow Area 15 (by conveyor, Stage 1)</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	8 783 393	8 222 751	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	8 783 393	8 222 751	0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	8 783 393	8 222 751	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	19 323 465	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	19 323 465	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	2 583 478	2 418 575	0.42	3.83	4.25
	Aggregate unit price	m3	----->		<b>1.64</b>	<b>17.59</b>	<b>19.23</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	1 573 064	2 016 210	<b>1.56</b>	<b>11.36</b>	<b>12.92</b>
	<b>Fine Filter - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	101 335	88 890	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to filter processing plant	m3	101 335	88 890	0.32	6.13	6.45
	c) Filter processing and stockpiling	t	202 669	(2.28 t/m3)	0.10	2.25	2.35
	d) Transfer to belt conveyor by mens of Loading Station 2	t	202 669	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	202 669	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	101 335	88 890	0.42	3.83	4.25
	Aggregate unit price	m3	----->		<b>1.60</b>	<b>19.78</b>	<b>21.38</b>
	<b>Coarse Filter - Materail source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	202 669	177 780	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to filter processing plant	m3	202 669	177 780	0.32	6.13	6.45
	c) Filter processing and stockpiling	t	405 338	(2.28 t/m3)	0.10	2.25	2.35
	d) Transfer to belt conveyor by mens of Loading Station 2	t	405 338	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	405 338	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	202 669	177 780	0.42	3.83	4.25
	Aggregate unit price	m3	----->		<b>1.60</b>	<b>19.78</b>	<b>21.38</b>
<b>Phase 2</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	2 588 689	2 418 575	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	2 588 689	2 418 575	0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	2 588 689	2 418 575	0.24	2.7	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	5 965 115	(2.35 t/m3)	0.02	0.19	0.21

SUMMARY TABLE  
DAM FILL - UNIT PRICES PER PHASE  
ALTERNATIVE 1290

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	5 965 115	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	2 588 689	2 418 575	0.42	3.83	4.25
	Aggregate unit price	m3	----->		<b>1.64</b>	<b>17.59</b>	<b>19.23</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	729 522	935 035	<b>1.33</b>	<b>8.69</b>	<b>10.02</b>
<b>Phase 3</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	7 423 650	6 935 810	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	7 423 650	6 935 810	0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	7 423 650	6 935 810	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	16 332 030	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	16 332 030	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	7 423 650	6 935 810	0.46	4.21	4.67
	Aggregate unit price	m3	----->		<b>1.68</b>	<b>17.97</b>	<b>19.65</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	840 472	1 077 240	<b>1.39</b>	<b>9.38</b>	<b>10.77</b>
	<b>Dam core - Material source: loam of Stockpile Area LL3, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	1 888 549	1 567 260			
	b) Loading in LL3 stockpile, screening, transport to dam and placing of loam	m3	(90%)	1 410 534	1.16	10.72	11.88
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	157 726	1.67	14.20	15.87
	d) Care of water and material processing in borrow area for moisture control	m3		1 567 260	0.44	1.74	2.18
	Aggregate unit price	m3	----->		<b>1.65</b>	<b>12.81</b>	<b>14.46</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	424 719	372 840	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	849 437	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	424 719	372 840	0.10	2.44	2.54
	d) Transfer to belt conveyor by mens of Loading Station 2	t	849 437	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	849 437	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	424 719	372 840	0.65	5.67	6.32
	Aggregate unit price	m3	----->		<b>1.40</b>	<b>19.62</b>	<b>21.02</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	534 424	469 145	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	1 068 847	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	534 424	469 145	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	1 068 847	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 068 847	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	534 424	469 145	0.65	5.67	6.32
	Aggregate unit price	m3	----->		<b>1.40</b>	<b>19.62</b>	<b>21.02</b>
<b>Phase 4</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	2 044 881	1 910 503	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	2 044 881	1 910 503	0.22	4.07	4.29

SUMMARY TABLE  
DAM FILL - UNIT PRICES PER PHASE  
ALTERNATIVE 1290

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	2 044 881	1 910 503	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	4 498 738	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	4 498 738	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	2 044 881	1 910 503	0.70	6.43	7.13
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>20.19</b>	<b>22.11</b>
	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG1</b>						
	a) Loading of alluvium in LG1 stockpile and transport to belt conveyor Loading Station 1	m3	7 031 005	6 568 967	0.24	2.7	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	15 468 210	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	15 468 210	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	7 031 005	6 568 967	0.70	6.43	7.13
	Aggregate unit price	m3	----->		<b>1.36</b>	<b>15.17</b>	<b>16.53</b>
	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG2</b>						
	a) Loading of alluvium in LG2 stockpile and transport to belt conveyor Loading Station 2	m3	7 295 306	6 815 900	0.12	2.54	2.66
	b) Transfer to belt conveyor by means of Loading Station 2	t	16 049 673	(2.35 t/m3)	0.03	0.26	0.29
	c) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	16 049 673	(2.35 t/m3)	0.10	1.38	1.48
	d) Transport from belt conveyor hopper to dam and placing	m3	8 016 820	6 815 900	0.70	6.43	7.13
	Aggregate unit price	m3	----->		<b>1.13</b>	<b>12.82</b>	<b>13.95</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	2 033 953	2 606 935	<b>1.56</b>	<b>11.28</b>	<b>12.84</b>
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	3 866 893	3 209 040			
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(90%)	2 888 136	1.35	12.51	13.86
	c) Loading in BA N11, transport to dam and placing of Fine	m3	(10%)	320 904	1.90	16.12	18.02
	d) Care of water and material processing in borrow area for moisture control	m3		3 209 040	0.44	1.74	2.18
	Aggregate unit price	m3	----->		<b>1.85</b>	<b>14.61</b>	<b>16.46</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	236 264	207 405	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	472 528	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	236 264	207 405	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	472 528	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	472 528	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	236 264	207 405	0.95	8.60	9.55
	Aggregate unit price	m3	----->		<b>1.70</b>	<b>22.55</b>	<b>24.25</b>
	<b>Fine Filter - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	496 371	435 740	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG2 stockpile area	m3	496 371	(2.28 t/m3)	0.32	6.26	6.58
	c) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	496 371	(2.28 t/m3)	0.13	2.64	2.77
	d) Filter processing and stockpiling	t	992 741	(2.28 t/m3)	0.10	2.25	2.35
	e) Loading in stockpile area and transport to Loading Station 2	m3	496 371	435 740	0.10	2.44	2.54
	f) Transfer to belt conveyor by means of Loading Station 2	t	992 741	(2.28 t/m3)	0.03	0.26	0.29
	g) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	992 741	(2.28 t/m3)	0.10	1.38	1.48
	h) Transport from belt conveyor hopper to dam and placing	m3	496 371	435 740	0.95	8.60	9.55
	Aggregate unit price	m3	----->		<b>2.36</b>	<b>29.76</b>	<b>32.12</b>

SUMMARY TABLE  
DAM FILL - UNIT PRICES PER PHASE  
ALTERNATIVE 1290

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	1 111 941	976 120	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	2 223 882	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	1 111 941	976 120	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	2 223 882	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	2 223 882	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	1 111 941	976 120	0.95	8.60	9.55
	Aggregate unit price	m3	----->		<b>1.70</b>	<b>22.55</b>	<b>24.25</b>
<b>Phase 5</b>	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG1</b>						
	a) Loading of alluvium in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	7 208 965	6 735 233	0.24	2.70	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	15 859 723	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	15 859 723	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	7 208 965	6 735 233	0.74	6.85	7.59
	Aggregate unit price	m3	----->		<b>1.40</b>	<b>15.59</b>	<b>16.99</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	3 213 694	4 119 019	<b>1.62</b>	<b>11.98</b>	<b>13.60</b>
	<b>Dam core - Material source: loam of Stockpile Area LL3, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	1 200 319	996 115			
	b) Loading in LL3 stockpile, screening, transport to dam and placing of loam	m3	(90%)	896 504	1.39	12.94	14.33
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	99 612	1.98	16.84	18.82
	d) Care of water and material processing in borrow area for moisture control	m3		996 115	0.44	1.74	2.18
	Aggregate unit price	m3	----->		<b>1.89</b>	<b>15.07</b>	<b>16.96</b>
	<b>Fine Filter - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	438 878	385 270	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to Stockpile Area LG2	m3	438 878	385 270	0.32	6.26	6.58
	c) Loading in LG2 stockpile area and transport to filter processing plant	m3	438 878	385 270	0.13	2.64	2.77
	d) Filter processing and stockpiling	t	877 756	(2.28 t/m3)	0.10	2.25	2.35
	e) Loading in stockpile area and transport to Loading Station 2	m3	438 878	385 270	0.10	2.44	2.54
	f) Transfer to belt conveyor by means of Loading Station 2	t	877 756	(2.28 t/m3)	0.03	0.26	0.29
	g) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	877 756	(2.28 t/m3)	0.10	1.38	1.48
	h) Transport from belt conveyor hopper to intermedite stockpile	m3	438 878	385 270	0.24	2.29	2.53
	i) Loading in intermediate stockpile, transport to dam and placing	m3	438 878	385 270	0.60	7.49	8.09
	Aggregate unit price	m3	----->		<b>2.25</b>	<b>30.94</b>	<b>33.19</b>
	<b>Coarse Filter - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	574 049	503 930	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to Stockpile Area LG2	m3	574 049	503 930	0.32	6.26	6.58
	c) Loading in LG2 stockpile area and transport to filter processing plant	m3	574 049	503 930	0.13	2.64	2.77
	d) Filter processing and stockpiling	t	1 148 097	(2.28 t/m3)	0.10	2.25	2.35
	e) Loading in stockpile area and transport to Loading Station 2	m3	438 878	503 930	0.10	2.44	2.54
	f) Transfer to belt conveyor by means of Loading Station 2	t	1 148 097	(2.28 t/m3)	0.03	0.26	0.29
	g) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 148 097	(2.28 t/m3)	0.10	1.38	1.48
	h) Transport from belt conveyor hopper to intermedite stockpile	m3	574 049	503 930	0.24	2.29	2.53

SUMMARY TABLE  
DAM FILL - UNIT PRICES PER PHASE  
ALTERNATIVE 1290

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	i) Loading in intermediate stockpile, transport to dam and placing	m3	574 049	503 930	0.60	7.49	8.09
	Aggregate unit price	m3	----->		<b>2.25</b>	<b>30.94</b>	<b>33.19</b>
	<b>Rip-rap - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, fragment selection and stockpiling, loading, transport to dam and placing	m3	101 336	129 790	<b>2.09</b>	<b>17.53</b>	<b>19.62</b>
<b>Phase 6</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	1 264 736	1 181 625	0.34	0.95	1.29
	b) Loading of alluvium in BA15 and transport to Stockpile Area LG1	m3	1 264 736	1 181 625	0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	1 264 736	1 181 625	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	2 782 420	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	2 782 420	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	1 264 736	1 181 625	0.21	2.33	2.54
	g) Loading in intermediate stockpile, transport to dam and placing	m3	1 264 736	1 181 625	0.70	7.72	8.42
	Aggregate unit price	m3	----->		<b>2.13</b>	<b>23.81</b>	<b>25.94</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	5 157 662	6 610 620	<b>1.66</b>	<b>12.41</b>	<b>14.07</b>
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	1 470 191	1 220 075			
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(90%)	1 098 068	1.42	13.14	14.56
	c) Loading in BA N11, transport to dam and placing of Fine	m3	(10%)	122 008	2.13	18.12	20.25
	d) Care of water and material processing in borrow area for moisture control	m3		1 220 075	0.44	1.74	2.18
	Aggregate unit price	m3	----->		<b>1.93</b>	<b>15.38</b>	<b>17.31</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	1 112 385	976 510	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	2 224 770	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	1 112 385	976 510	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	2 224 770	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	2 224 770	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	1 112 385	976 510	0.24	2.29	2.53
	g) Loading in intermediate stockpile, transport to dam and placing	m3	1 112 385	976 510	0.93	8.39	9.32
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>24.63</b>	<b>26.55</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	1 171 017	1 027 980	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	2 342 034	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	1 171 017	1 027 980	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	2 342 034	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	2 342 034	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	1 171 017	1 027 980	0.24	2.29	2.53
	g) Loading in intermediate stockpile, transport to dam and placing	m3	1 171 017	1 027 980	0.93	8.39	9.32
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>24.63</b>	<b>26.55</b>
	<b>Rip-rap - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, fragment selection and stockpiling, loading, transport to dam and placing	m3	331 737	424 885	<b>2.21</b>	<b>18.87</b>	<b>21.08</b>

SUMMARY TABLE  
DAM FILL - UNIT PRICES PER PHASE  
ALTERNATIVE 1290

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	

## **Alternative 2: FSL=1255 m.a.s.l**



SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1255

ROGUN HPP  
CIVIL WORKS COST ESTIMATE - PHASE II  
DAM FILLS - SUMMARY OF UNIT PRICES - Alternative FSL=1255 m a.s.l

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
<b>Phase 1</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15 (by trucks, Cofferdam)</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	2 595 233	2 429 580	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to right bank stockpile area	m3	2 595 233	2 429 580	0.26	4.97	5.23
	c) Loading in stockpile area, transport to dam and placing	m3	2 595 233	2 429 580	1.62	15.12	16.74
	Aggregate unit price	m3	----->		<b>2.22</b>	<b>21.04</b>	<b>23.26</b>
	<b>Alluvium shell - Material source: alluvium of Borrow Area 15 (by conveyor, Stage 1)</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	6 044 939	5 659 092	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	6 044 939	5 659 092	0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	6 044 939	5 659 092	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	13 298 866	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	13 298 866	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	6 044 939	5 659 092	0.42	3.83	4.25
	Aggregate unit price	m3	----->		<b>1.64</b>	<b>17.59</b>	<b>19.23</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	1 130 901	1 448 445	<b>1.56</b>	<b>11.36</b>	<b>12.92</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	55 468	48 657	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	110 937	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	55 468	48 657	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	110 937	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	110 937	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	55 468	48 657	0.42	3.83	4.25
	Aggregate unit price	m3	55 468		<b>1.17</b>	<b>17.78</b>	<b>18.95</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	130 630	114 588	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	261 260	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	130 630	114 588	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	261 260	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	261 260	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	130 630	114 588	0.42	3.83	4.25
	Aggregate unit price	m3	130 630		<b>1.17</b>	<b>17.78</b>	<b>18.95</b>
<b>Phase 2</b>	<b>Alluvium shell - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to belt conveyor Loading Station 2	m3	9 635 000	1 863 636	0.12	2.54	2.66
	b) Transfer to belt conveyor by means of Loading Station 2	t	19 270 000	(2.35 t/m3)	0.03	0.26	0.29
	c) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	19 270 000	(2.35 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	9 635 000	1 863 636	0.42	3.83	4.25
	Aggregate unit price	m3	----->		<b>0.85</b>	<b>10.22</b>	<b>11.07</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	524 465	671 729	<b>1.33</b>	<b>8.69</b>	<b>10.02</b>

SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1255

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
<b>Phase 3</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	460 758	392 135	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	460 758	392 135	0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	460 758	392 135	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	921 516	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	921 516	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	460 758	392 135	0.46	4.21	4.67
	Aggregate unit price	m3	----->		<b>1.68</b>	<b>17.97</b>	<b>19.65</b>
	<b>Alluvium shell - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to belt conveyor Loading Station 2	m3	5 289 918	4 952 264	0.12	2.54	2.66
	b) Transfer to belt conveyor by means of Loading Station 2	t	10 579 836	(2.35 t/m3)	0.03	0.26	0.29
	c) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	10 579 836	(2.35 t/m3)	0.10	1.38	1.48
	d) Transport from belt conveyor hopper to dam and placing	m3	5 289 918	4 952 264	0.46	4.21	4.67
	Aggregate unit price	m3	----->		<b>0.89</b>	<b>10.60</b>	<b>11.49</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	604 229	773 889	<b>1.39</b>	<b>9.38</b>	<b>10.77</b>
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	1 378 640	1 144 100			
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(90%)	1 029 690	1.16	10.72	11.88
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	114 410	1.67	14.20	15.87
	d) Care of water and material processing in borrow area for moisture control	m3	1 378 640	1 144 100	0.44	1.74	2.18
	Aggregate unit price	m3	----->		<b>1.65</b>	<b>12.81</b>	<b>14.46</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	232 657	204 085	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	465 313	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	232 657	204 085	0.10	2.44	2.54
	d) Transfer to belt conveyor by mens of Loading Station 2	t	465 313	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	465 313	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	232 657	204 085	0.65	5.67	6.32
	Aggregate unit price	m3	232 657		<b>1.40</b>	<b>19.62</b>	<b>21.02</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	344 720	302 386	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	689 441	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	344 720	302 386	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	689 441	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	689 441	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	344 720	302 386	0.65	5.67	6.32
	Aggregate unit price	m3	----->		<b>1.40</b>	<b>19.62</b>	<b>21.02</b>
<b>Phase 4</b>	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG1</b>						
	a) Loading of alluvium in LG1 stockpile and transport to belt conveyor Loading Station 1	m3	13 848 396	11 785 869	0.24	2.7	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	27 696 792	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	27 696 792	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	13 848 396	11 785 869	0.70	6.43	7.13
	Aggregate unit price	m3	----->		<b>1.36</b>	<b>15.17</b>	<b>16.53</b>

SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1255

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	1 462 241	1 872 821	1.56	11.28	12.84
	<b>Dam core - Material source: loam of Stockpile Area LL3, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	2 822 832	2 342 599			
	b) Loading in LL3 stockpile, screening, transport to dam and placing of loam	m3	(90%)	1 410 534	1.35	12.51	13.86
	c) Loading in BA N11, transport to dam and placing of Fine	m3	(10%)	234 260	1.90	16.12	18.02
	d) Care of water and material processing in borrow area for moisture control	m3	2 822 832	2 342 599	0.44	1.74	2.18
	Aggregate unit price	m3	----->		1.85	14.61	16.46
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	401 330	352 044	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	802 660	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	401 330	352 044	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	802 660	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	802 660	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	401 330	352 044	0.95	8.60	9.55
	Aggregate unit price	m3	----->		1.70	22.55	24.25
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	717 238	629 156	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	1 434 475	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	717 238	629 156	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	1 434 475	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 434 475	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	717 238	629 156	0.95	8.60	9.55
	Aggregate unit price	m3	----->		1.70	22.55	24.25
<b>Phase 5</b>	<b>Alluvium shell - Material source: alluvium of Stockpile Area BA15</b>						
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	4 314 027	3 671 512	0.34	0.95	1.29
	b) Loading of alluvium in BA 15 and transport to LG1 stockpile area	m3	4 314 027	3 671 512	0.22	4.07	4.29
	c) Loading of alluvium in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	4 314 027	3 671 512	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	8 628 054	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	8 628 054	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to dam and placing	m3	4 314 027	3 671 512	0.74	6.85	7.59
	Aggregate unit price	m3	----->		1.96	20.61	22.57
	<b>Alluvium shell - Material source: alluvium of LG1 Stockpile Area</b>						
	a) Loading of alluvium in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	1 784 039	1 518 331	0.24	2.70	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	3 568 078	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	3 568 078	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	1 784 039	1 518 331	0.74	6.85	7.59
	Aggregate unit price	m3	----->		1.40	15.59	16.99
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	2 310 376	2 959 102	1.62	11.98	13.60
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	686 565	569 763			
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(10%)	569 763	1.39	12.94	14.33
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	56 976	1.98	16.84	18.82
	d) Care of water and material processing in borrow area for moisture control	m3	686 565	569 763	0.44	1.74	2.18

SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1255

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)	
					L.C.P (US\$ eq.)	F.C.P. (US\$)		
	Aggregate unit price	m3	----->			<b>1.89</b>	<b>15.07</b>	<b>16.96</b>
	<b>Dam core - Material source: loam of Stockpile Area LL3, Fine of Borrow Area N 11</b>							
	a) Total volume	m3	189 668	157 401				
	b) Loading in LL3 stockpile, screening, transport to dam and placing of loam	m3	(90%)	141 661		1.39	12.94	14.33
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	15 740		1.98	16.84	18.82
	d) Care of water and material processing in borrow area for moisture control	m3	189 668	157 401		0.44	1.74	2.18
	Aggregate unit price	m3	----->			<b>1.89</b>	<b>15.07</b>	<b>16.96</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>							
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	240 413	210 889		0.13	2.64	2.77
	b) Filter processing and stockpiling	t	480 826	(2.28 t/m3)		0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	240 413	210 889		0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	480 826	(2.28 t/m3)		0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	480 826	(2.28 t/m3)		0.10	1.38	1.48
	h) Transport from belt conveyor hopper to intermedite stockpile	m3	240 413	210 889		0.24	2.29	2.53
	i) Loading in intermediate stockpile, transport to dam and placing	m3	240 413	210 889		0.60	7.49	8.09
	Aggregate unit price	m3	----->			<b>1.59</b>	<b>23.73</b>	<b>25.32</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>							
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	370 280	324 807		0.13	2.64	2.77
	b) Filter processing and stockpiling	t	740 560	(2.28 t/m3)		0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	370 280	324 807		0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	740 560	(2.28 t/m3)		0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	740 560	(2.28 t/m3)		0.10	1.38	1.48
	h) Transport from belt conveyor hopper to intermedite stockpile	m3	370 280	324 807		0.24	2.29	2.53
	i) Loading in intermediate stockpile, transport to dam and placing	m3	370 280	324 807		0.60	7.49	8.09
	Aggregate unit price	m3	----->			<b>1.59</b>	<b>23.73</b>	<b>25.32</b>
	<b>Rip-rap - Material source: quarries Q26a and Q26b</b>							
	a) Blasting, fragment selection and stockpiling, loading, transport to dam and placing	m3	67 346	86 257		<b>2.09</b>	<b>17.53</b>	<b>19.62</b>
<b>Phase 6</b>	<b>Alluvium shell - Material source: alluvium of Borrow Area 15</b>							
	a) Pre-blasting of weak and medium interlayers of cemented BA15 alluvium	m3	1 069 841	910 503		0.34	0.95	1.29
	b) Loading of alluvium in BA15 and transport to Stockpile Area LG1	m3	1 069 841	910 503		0.22	4.07	4.29
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	1 069 841	910 503		0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	2 139 682	(2.35 t/m3)		0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	2 139 682	(2.35 t/m3)		0.16	2.38	2.54
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	1 069 841	910 503		0.21	2.33	2.54
	g) Loading in intermediate stockpile, transport to dam and placing	m3	1 069 841	910 503		0.70	7.72	8.42
	Aggregate unit price	m3	----->			<b>2.13</b>	<b>23.81</b>	<b>25.94</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>							
	a) Blasting, loading, transport and placing	m3	3 707 925	4 749 067		<b>1.66</b>	<b>12.41</b>	<b>14.07</b>
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>							
	a) Total volume	m3	1 073 239	890 655				
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(90%)	890 655		1.42	13.14	14.56
	c) Loading in BA N11, transport to dam and placing of Fine	m3	(10%)	890 655		2.13	18.12	20.25
	d) Care of water and material processing in borrow area for moisture control	m3	1 073 239	890 655		0.44	1.74	2.18
	Aggregate unit price	m3	----->			<b>1.93</b>	<b>15.38</b>	<b>17.31</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>							

SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1255

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P. (US\$ eq.)	F.C.P. (US\$)	
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	609 354	534 521	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	1 218 708	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	609 354	534 521	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	1 218 708	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 218 708	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	609 354	534 521	0.24	2.29	2.53
	g) Loading in intermediate stockpile, transport to dam and placing	m3	609 354	534 521	0.93	8.39	9.32
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>24.63</b>	<b>26.55</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	755 344	662 582	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	1 510 687	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	755 344	662 582	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	1 510 687	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 510 687	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	755 344	662 582	0.24	2.29	2.53
	g) Loading in intermediate stockpile, transport to dam and placing	m3	755 344	662 582	0.93	8.39	9.32
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>24.63</b>	<b>26.55</b>
	<b>Rip-rap - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, fragment selection and stockpiling, loading, transport to dam and placing	m3	220 468	282 372	<b>2.21</b>	<b>18.87</b>	<b>21.08</b>

## **Alternative 3: FSL=1220 m.a.s.l**

SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1220

ROGUN HPP  
CIVIL WORKS COST ESTIMATE - PHASE II  
DAM FILLS - SUMMARY OF UNIT PRICES - Alternative FSL=1220 m a.s.l

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
Phase 1	<b>Alluvium shell - Material source: alluvium of LG1 Stockpile Area (by trucks, Cofferdam)</b>						
	a) Loading of alluvium in BA15, transport to dam and placing	m3	2 595 233	2 429 580	1.99	18.69	20.68
	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG1 (by conveyor, Stage 1)</b>						
	a) Loading of alluvium in LG1 stockpile and transport to belt conveyor Loading Station 1	m3	11 288 611	2 183 484	0.24	2.7	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	22 577 222	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	22 577 222	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	11 288 611	2 183 484	0.42	3.83	4.25
	Aggregate unit price	m3	----->		1.08	12.57	13.65
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	847 820	1 085 877	1.56	11.36	12.92
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	30 714	26 942.36	0.13	2.64	2.77
b) Filter processing and stockpiling	t	61 429	(2.28 t/m3)	0.10	2.25	2.35	
c) Loading in stockpile and transport to Loading Station 2	m3	30 714	26 942	0.10	2.44	2.54	
d) Transfer to belt conveyor by mens of Loading Station 2	t	61 429	(2.28 t/m3)	0.03	0.26	0.29	
e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	61 429	(2.28 t/m3)	0.10	1.38	1.48	
f) Transport from belt conveyor hopper to dam and placing	m3	30 714	26 942	0.42	3.83	4.25	
Aggregate unit price	m3	----->		1.17	17.78	18.95	
<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>							
a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	128 498	112 717.73	0.13	2.64	2.77	
b) Filter processing and stockpiling	t	256 996	(2.28 t/m3)	0.10	2.25	2.35	
c) Loading in stockpile and transport to Loading Station 2	m3	128 498	112 718	0.10	2.44	2.54	
d) Transfer to belt conveyor by means of Loading Station 2	t	256 996	(2.28 t/m3)	0.03	0.26	0.29	
e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	256 996	(2.28 t/m3)	0.10	1.38	1.48	
f) Transport from belt conveyor hopper to dam and placing	m3	128 498	112 718	0.42	3.83	4.25	
Aggregate unit price	m3	----->		1.17	17.78	18.95	
Phase 2	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG1</b>						
	a) Loading of alluvium in LG1 stockpile and transport to belt conveyor Loading Station 1	m3	5 494 952	1 062 853	0.24	2.7	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	10 989 905	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	10 989 905	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	5 494 952	1 062 853	0.42	3.83	4.25
	Aggregate unit price	m3	----->		1.08	12.57	13.65
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	393 184	503 585	1.33	8.69	10.02
Phase 3	<b>Alluvium shell - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to belt conveyor Loading Station 2	m3	3 581 367	3 047 972	0.12	2.54	2.66

SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1220

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	b) Transfer to belt conveyor by means of Loading Station 2	t	7 162 735	(2.35 t/m3)	0.03	0.26	0.29
	c) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	7 162 735	(2.35 t/m3)	0.10	1.38	1.48
	d) Transport from belt conveyor hopper to dam and placing	m3	3 581 367	3 047 972	0.46	4.21	4.67
	Aggregate unit price	m3	----->		<b>0.89</b>	<b>10.60</b>	<b>11.49</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	452 981	580 173	<b>1.39</b>	<b>9.38</b>	<b>10.77</b>
	<b>Dam core - Material source: loam of Stockpile Area LL3, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	1 003 283	832 600			
	b) Loading in LL3 stockpile, screening, transport to dam and placing of loam	m3	(90%)	1 410 534	1.16	10.72	11.88
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	83 260	1.67	14.20	15.87
	d) Care of water and material processing in borrow area for moisture control	m3	1 003 283	832 600	0.44	1.74	2.18
	Aggregate unit price	m3			<b>1.65</b>	<b>12.81</b>	<b>14.46</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	128 828	113 007	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	257 656	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	128 828	113 007	0.10	2.44	2.54
	d) Transfer to belt conveyor by mens of Loading Station 2	t	257 656	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	257 656	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	128 828	113 007	0.65	5.67	6.32
	Aggregate unit price	m3	----->		<b>1.40</b>	<b>19.62</b>	<b>21.02</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to filter processing plant	m3	339 095	297 452	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	678 190	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	339 095	297 452	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	678 190	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	678 190	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	339 095	297 452	0.65	5.67	6.32
	Aggregate unit price	m3	----->		<b>1.40</b>	<b>19.62</b>	<b>21.02</b>
<b>Phase 4</b>	<b>Alluvium shell - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile and transport to belt conveyor Loading Station 2	m3	4 427 315	3 767 928	0.12	2.54	2.66
	b) Transfer to belt conveyor by means of Loading Station 2	t	8 854 630	(2.35 t/m3)	0.03	0.26	0.29
	c) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	8 854 630	(2.35 t/m3)	0.10	1.38	1.48
	d) Transport from belt conveyor hopper to dam and placing	m3	4 427 315	3 767 928	0.70	6.43	7.13
	Aggregate unit price	m3	----->		<b>1.13</b>	<b>12.82</b>	<b>13.95</b>
	<b>Alluvium shell - Material source: alluvium of Stockpile Area LG1</b>						
	a) Loading of alluvium in LG1 stockpile and transport to belt conveyor Loading Station 1	m3	3 470 586	2 953 690	0.24	2.7	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	6 941 172	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	6 941 172	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	3 470 586	2 953 690	0.70	6.43	7.13
	Aggregate unit price	m3	----->		<b>1.36</b>	<b>15.17</b>	<b>16.53</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						



SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1220

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	a) Blasting, loading, transport and placing	m3	1 096 220	1 404 026	1.56	11.28	12.84
	<b>Dam core - Material source: loam of Stockpile Area LL3, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	2 054 269	1 704 788			
	b) Loading in LL3 stockpile, screening, transport to dam and placing of loam	m3	(90%)	1 410 534	1.35	12.51	13.86
	c) Loading in BA N11, transport to dam and placing of Fine	m3	(10%)	170 479	1.90	16.12	18.02
	d) Care of water and material processing in borrow area for moisture control	m3	2 054 269	1 704 788	0.44	1.74	2.18
	Aggregate unit price	m3	----->		1.85	14.61	16.46
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	222 227	194 936	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	444 454	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile and transport to Loading Station 2	m3	222 227	194 936	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	444 454	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	444 454	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	222 227	194 936	0.95	8.60	9.55
	Aggregate unit price	m3	----->		1.70	22.55	24.25
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	705 533	618 889	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	1 411 066	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	705 533	618 889	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	1 411 066	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 411 066	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to dam and placing	m3	705 533	618 889	0.95	8.60	9.55
	Aggregate unit price	m3	----->		1.70	22.55	24.25
<b>Phase 5</b>	<b>Alluvium shell - Material source: alluvium of LG1 Stockpile Area</b>						
	a) Loading of alluvium in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	3 477 798	2 959 828	0.24	2.70	2.94
	b) Transfer to belt conveyor by means of Loading Station 1	t	6 955 595	(2.35 t/m3)	0.02	0.19	0.21
	c) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	6 955 595	(2.35 t/m3)	0.16	2.38	2.54
	d) Transport from belt conveyor hopper to dam and placing	m3	3 477 798	2 959 828	0.74	6.85	7.59
	Aggregate unit price	m3	----->		1.40	15.59	16.99
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	1 732 054	2 218 395	1.62	11.98	13.60
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	637 664	529 181			
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(90%)	529 181	1.39	12.94	14.33
	c) Loading in BA 11, transport to dam and placing of Fine	m3	(10%)	52 918	1.98	16.84	18.82
	d) Care of water and material processing in borrow area for moisture control	m3	637 664	529 181	0.44	1.74	2.18
	Aggregate unit price	m3	----->		1.89	15.07	16.96
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	133 123	116 774	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	266 246	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	133 123	116 774	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	266 246	(2.28 t/m3)	0.03	0.26	0.29

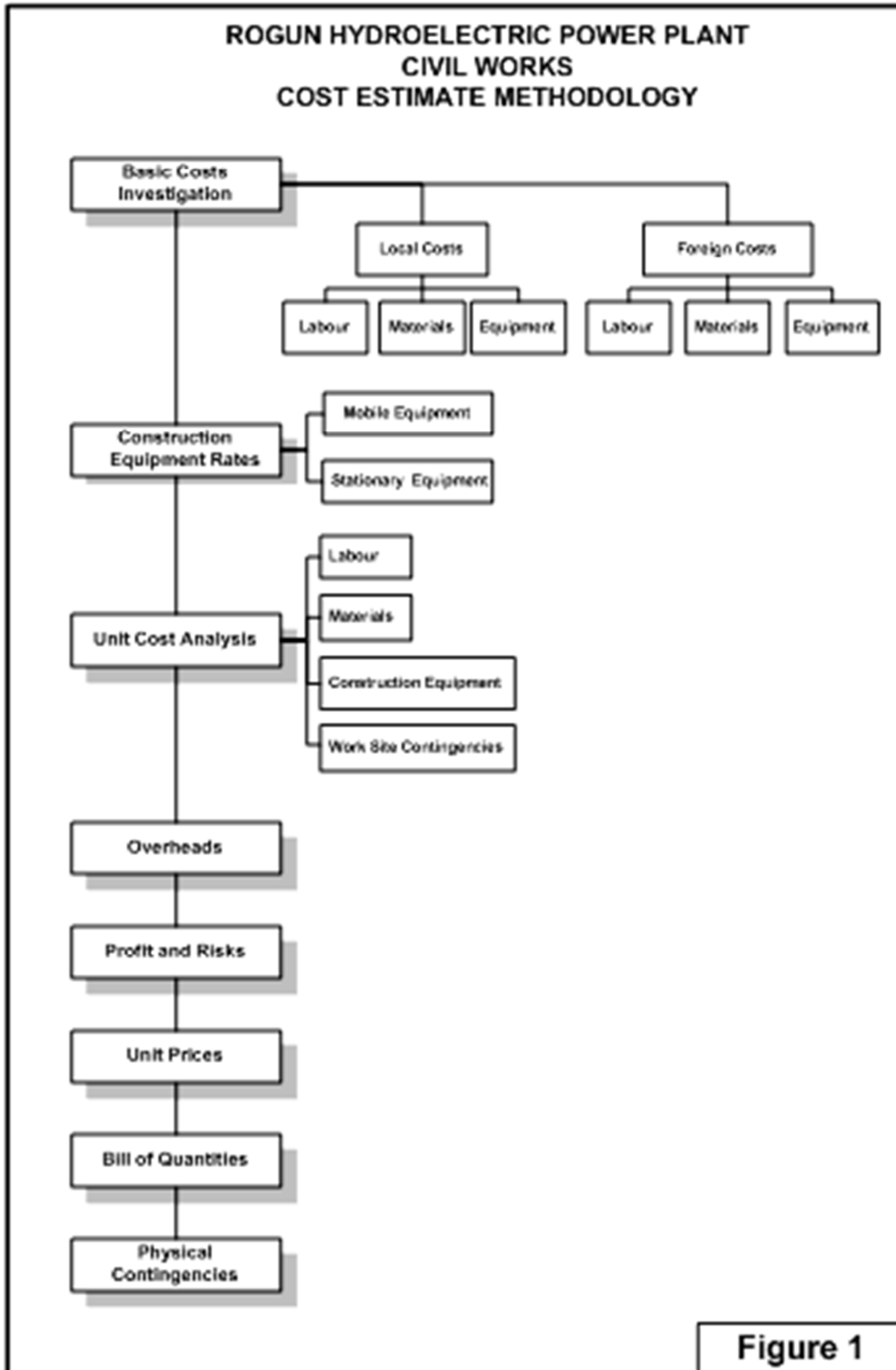
SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1220

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	266 246	(2.28 t/m3)	0.10	1.38	1.48
	h) Transport from belt conveyor hopper to intermedite stockpile	m3	133 123	116 774	0.24	2.29	2.53
	i) Loading in intermediate stockpile, transport to dam and placing	m3	133 123	116 774	0.60	7.49	8.09
	Aggregate unit price	m3	----->		<b>1.59</b>	<b>23.73</b>	<b>25.32</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	364 237	319 506	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	728 475	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	364 237	319 506	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	728 475	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	728 475	(2.28 t/m3)	0.10	1.38	1.48
	h) Transport from belt conveyor hopper to intermedite stockpile	m3	364 237	319 506	0.24	2.29	2.53
	i) Loading in intermediate stockpile, transport to dam and placing	m3	364 237	319 506	0.60	7.49	8.09
	Aggregate unit price	m3	----->		<b>1.59</b>	<b>23.73</b>	<b>25.32</b>
	<b>Rip-rap - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, fragment selection and stockpiling, loading, transport to dam and placing	m3	55 281	70 804	<b>2.09</b>	<b>17.53</b>	<b>19.62</b>
<b>Phase 6</b>	<b>Alluvium shell - Material source: alluvium of LG1 Stockpile Area</b>						
	c) Loading in LG1 stockpile area and transport to belt conveyor Loading Station 1	m3	610 143	519 270	0.24	2.70	2.94
	d) Transfer to belt conveyor by means of Loading Station 1	t	1 220 285	(2.35 t/m3)	0.02	0.19	0.21
	e) Transport with belt conveyors C1, T2 & T3 to hopper located on the terminal platform	t	1 220 285	(2.35 t/m3)	0.16	2.38	2.54
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	610 143	519 270	0.21	2.33	2.54
	g) Loading in intermediate stockpile, transport to dam and placing	m3	610 143	519 270	0.70	7.72	8.42
	Aggregate unit price	m3	----->		<b>1.57</b>	<b>18.79</b>	<b>20.36</b>
	<b>Rockfill shell - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, loading, transport and placing	m3	2 779 777	3 560 305	<b>1.66</b>	<b>12.41</b>	<b>14.07</b>
	<b>Dam core - Material source: loam of Borrow Area 17a, Fine of Borrow Area N 11</b>						
	a) Total volume	m3	781 032	648 159			
	b) Loading in BA 17a, screening, transport to dam and placing of loam	m3	(90%)	648 159	1.42	13.14	14.56
	c) Loading in BA N11, transport to dam and placing of Fine	m3	(10%)	648 159	2.13	18.12	20.25
	d) Care of water and material processing in borrow area for moisture control	m3	781 032	648 159	0.44	1.74	2.18
	Aggregate unit price	m3	----->		<b>1.93</b>	<b>15.38</b>	<b>17.31</b>
	<b>Fine Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	337 415	295 978	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	674 830	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	337 415	295 978	0.10	2.44	2.54
	d) Transfer to belt conveyor by means of Loading Station 2	t	674 830	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	674 830	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	337 415	295 978	0.24	2.29	2.53
	g) Loading in intermediate stockpile, transport to dam and placing	m3	337 415	295 978	0.93	8.39	9.32
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>24.63</b>	<b>26.55</b>
	<b>Coarse Filter - Material source: alluvium of LG2 Stockpile Area</b>						
	a) Loading of alluvium in LG2 stockpile area and transport to filter processing plant	m3	743 017	651 769	0.13	2.64	2.77
	b) Filter processing and stockpiling	t	1 486 034	(2.28 t/m3)	0.10	2.25	2.35
	c) Loading in stockpile area and transport to Loading Station 2	m3	743 017	651 769	0.10	2.44	2.54

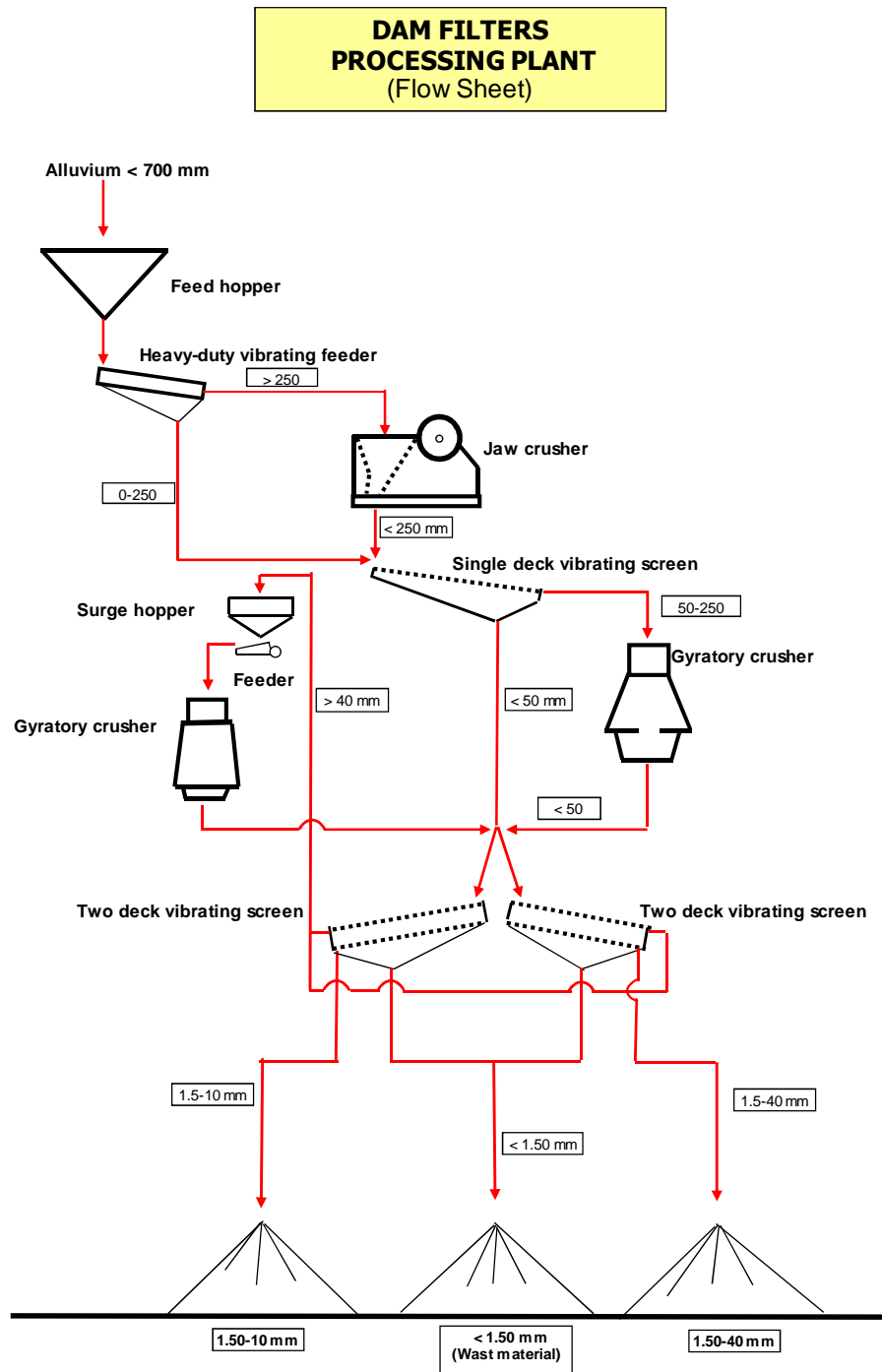
SUMMARY TABLE  
DAM FILL - UNIT PRICES  
ALTERNATIVE 1220

Dam Phase	Description	Unit	In-situ Quantity	In-dam Quantity	UNIT PRICE		Aggregate Unit Price (US\$)
					L.C.P (US\$ eq.)	F.C.P. (US\$)	
	d) Transfer to belt conveyor by means of Loading Station 2	t	1 486 034	(2.28 t/m3)	0.03	0.26	0.29
	e) Transport with belt conveyors T1, T2 & T3 to hopper located on the terminal platform	t	1 486 034	(2.28 t/m3)	0.10	1.38	1.48
	f) Transport from belt conveyor hopper to intermediate stockpile	m3	743 017	651 769	0.24	2.29	2.53
	g) Loading in intermediate stockpile, transport to dam and placing	m3	743 017	651 769	0.93	8.39	9.32
	Aggregate unit price	m3	----->		<b>1.92</b>	<b>24.63</b>	<b>26.55</b>
	<b>Rip-rap - Material source: quarries Q26a and Q26b</b>						
	a) Blasting, fragment selection and stockpiling, loading, transport to dam and placing	m3	180 971	231 785	<b>2.21</b>	<b>18.87</b>	<b>21.08</b>

# APPENDIX B: Cost Estimate Methodology

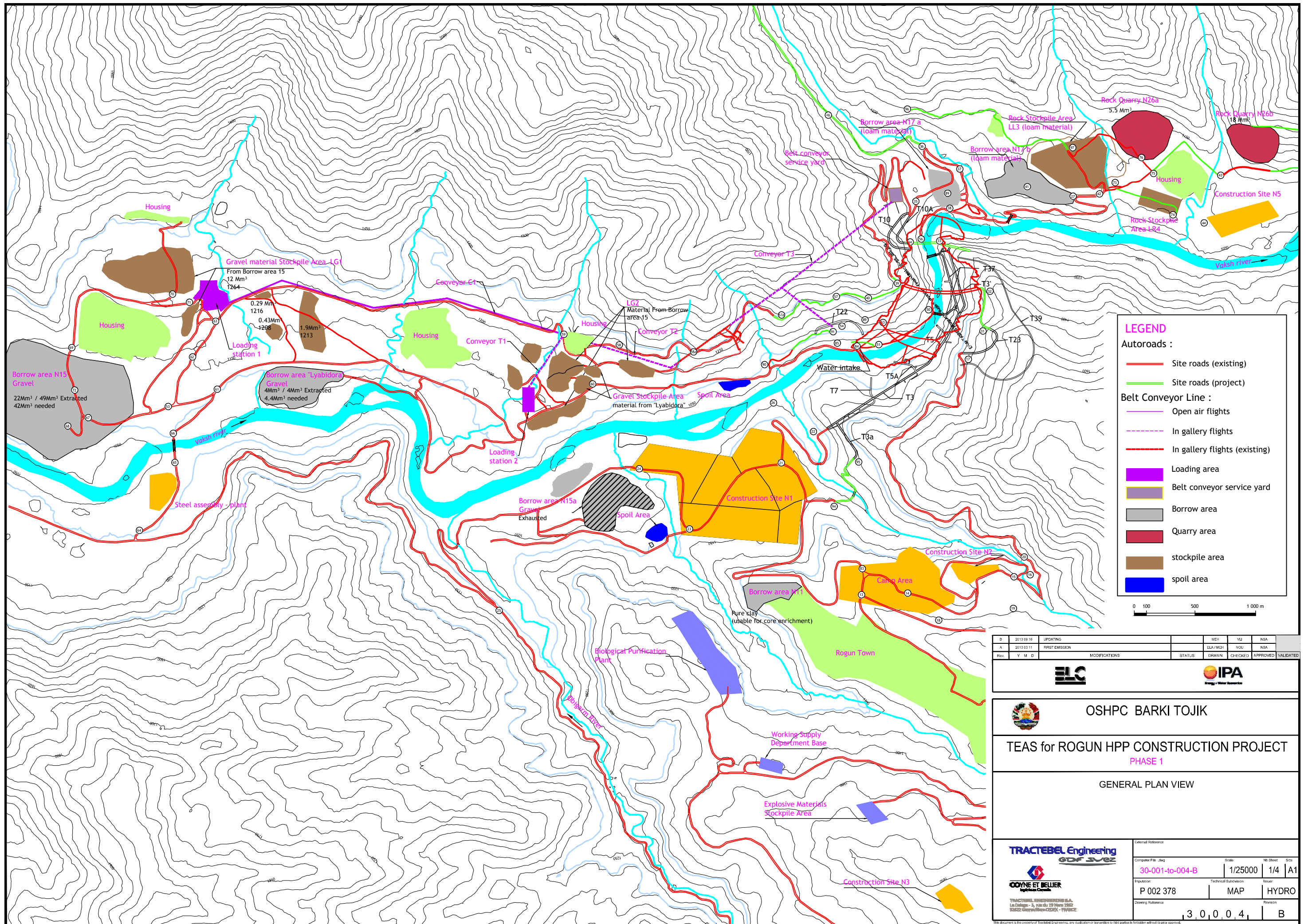


# APPENDIX C: Dam filter processing plant



**Figure 1**

## APPENDIX D: General Plan View



B	2013 09 16	UPDATING			MEH	VLU	NSA		
A	2013 03 11	FIRST EMISSION			ELA/MEH	YOU	NSA		
Rev.	Y	M	D	MODIFICATIONS	STATUS	DRAWN	CHECKED	APPROVED	VALIDATED

**OSHPC BARKI TOJK**

**TEAS for ROGUN HPP CONSTRUCTION PROJECT**

PHASE 1

GENERAL PLAN VIEW

External Reference

Computer File : .dwg

30-001-to-004-B

P 002 378

Scale: 1/25000

Nb. Sheet: 1/4

Size: A1

Technical Subvision: MAP

Issue: HYDRO

Revision: 3 0 0 0 4

Sheet: B

## APPENDIX E: Note on roads





OSHPC BARKI TOJIK

## **TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT**



### **Note on Site Roads**

September 2013





OSHPC BARKI TOJIK

**TECHNO-ECONOMIC ASSESSMENT STUDY  
FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT**

**PHASE II: PROJECT DEFINITIONS OPTIONS**

**Volume 4: Implementation Studies**

**Chapter 2: Cost Estimate**

**Appendix: Note on Site Roads**

September 2013

A	12/09/2013	First Emission	VLI	NSA	NSA



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## 1 INTRODUCTION

The aim of this note is the estimation of the works necessary on site roads to complete the project.

Up to know many roads and access have been built to complete the existing works on site. These roads are clearly indicated in red on the General Plan View (cf. RP48).

However, the conditions of existing roads don't permit to perform correctly the works according to the time of construction allowing in the implementation schedules. The accesses are a key point of the project, and then cannot be neglected. Therefore it is necessary to start the rehabilitation at the beginning of the project.

Moreover, new roads must be built to permit the access to the dam, the quarries, the borrow areas, the construction sites, the camps or others places on site.

A methodology is proposed below to estimate the construction and rehabilitation costs of the roads. Moreover, it is detailed the maintenance cost during the construction period.

In order to not have duplications with the assessment, made by Poyry in ESIA, a check has been performed during the Washington meetings. It is clear that the scale of study is not the same, and no duplication exist between both estimations.

The actual estimation has been discussed with the Client during the Washington meetings. Some corrections have been performed after revision, but the cost range is the same.

## 2 IDENTIFICATION OF SITE ROADS

### 2.1 Site access road

Rogun HPP Site is accessible from the M41 national road which connects Dushanbe to Vkhdat.

The M41 road has been reconstructed before starting the works for the Project some 30 years ago by the public highway authority of Tajikistan and currently some stretches need of a substantial refurbishment.

In Phase II Cost Estimate has been included the refurbishment of the stretch spanning from the camp area in the direction of Dushanbe, with a length of approx. 12 km. The main works foreseen concern the roadway sub-base, base course and asphalt concrete and the reconstruction of the gutters and culverts.

### 2.2 Site roads

The permanent and temporary roads existing in the project area, including the main bridges over the Vakhsh River, which have been constructed for giving access to construction sites, working yards, borrow areas, quarries, stockpile areas, disposal areas, camps and other auxiliary facilities have been included in Phase I Cost Estimate.

Phase II Cost Estimate includes the improvement of part of the existing site roads and the construction of the additional roads necessary for the dam and appurtenant works. The improvement of the existing roads mainly concerns the widening of the roadway which consequently entails additional excavations, sub-bases, bases and paving works. Besides the rocky slopes of both the existing roads and the new roads excavated in very steep areas, have been protected with rock bolts and galvanized nets reinforced with galvanized steel ropes.

The existing and the new Site roads are shown on the General Plan View (Drawing N° 30004 D which is in the annexes volume). Additional points have been considered and are detailed on Figure 2-4 to 2-5.

The General Plan View, reminded below in

Figure 2-1, gives the roads considered. Numbering permits to identify each stretch indicated in the detailed calculation tables in appendix.

Existing roads are indicated in red and new roads in green.

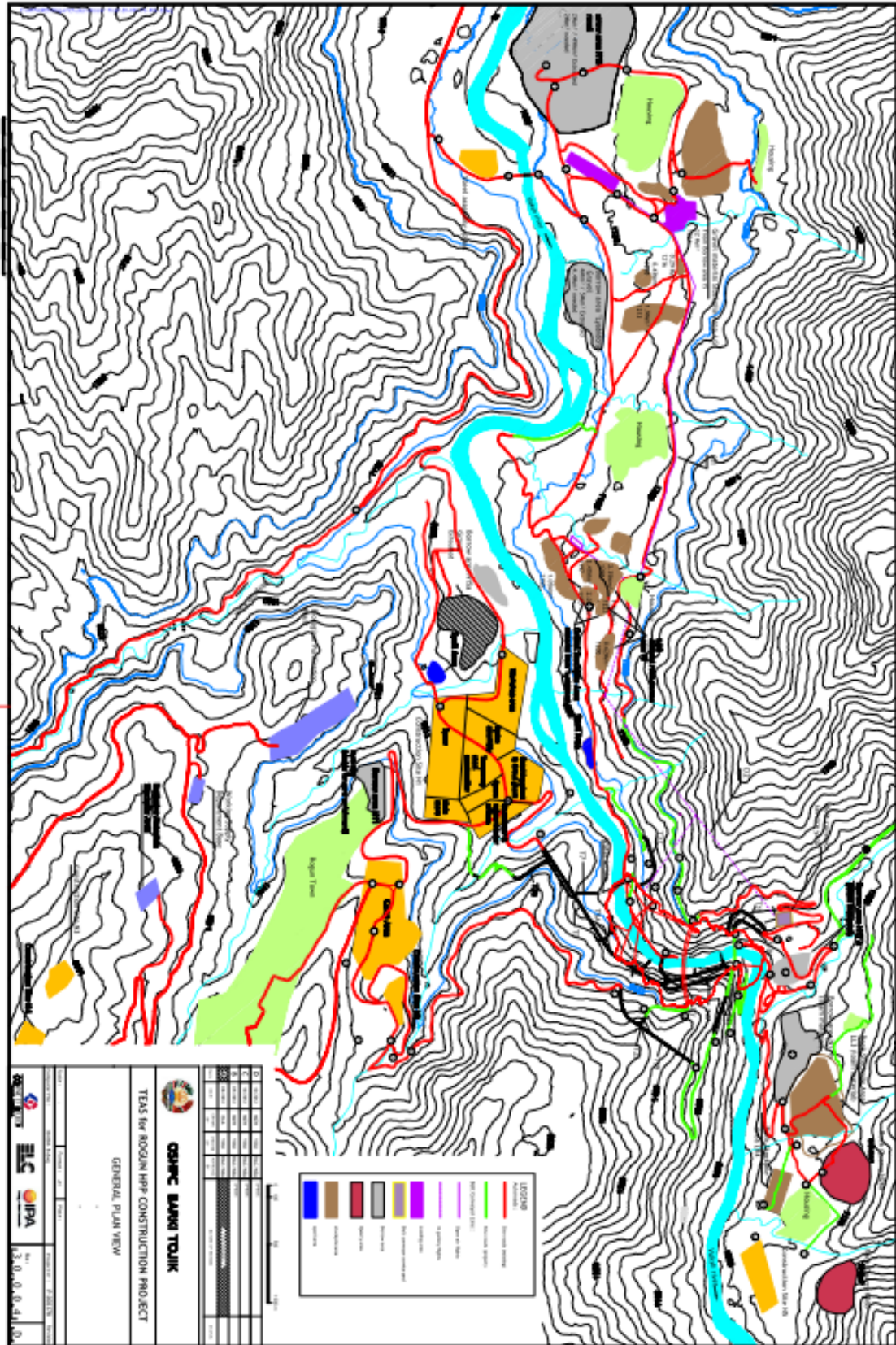


Figure 2-1: General plan View.

**Table 1: Roads identification and characteristics**

Type	Enlargement	Bank	Road Ref	Starting Point	End Point	Length	Existing Width	Final Width		
						m	m	m		
Dushanbe road	No	Right	Dushanbe road	/	/	12,000	12	15		
Existing roads - Without Excavation	No	Right	T24_23	24	23	1,100	8	8		
	No		T23_21	23	21	1,100	8	8		
	No		T23_T_24b	23	24b	1,100	10	10		
	No		T21_83	21	83	3,200	12	12		
	No		T21_22 (T3)	21	22 (T3)	1,400	11	11		
	No	Left	T66_61	66	61	500	10	10		
	No		T53_61	53	61	400	10	10		
	No		T67_53	67	53	800	11	11		
	No		T68_67	68	67	250	11	11		
	No		T72_67	72	67	250	8	8		
	No		T61_60	61	60	3,600	8	8		
	No		T63_59	63	59	3,300	8	8		
	No		T71_63a	71	63a	400	8	8		
	No		T70_71	70	71	700	8	8		
	No		T59_60	59	60	800	8	8		
	No		T63b_71	63b	71	600	15	15		
	No		T53_71	53	71	1,500	9	9		
	Existing roads - With Enlargement		Yes	Left	T42_27	42	27	900	10	12
			Yes		T72_69	72	69	300	8	15
			Yes		T69_70	69	70	1,400	8	15
Yes		T63_62	63		62	350	9	15		
Yes		T62_53	62		53	370	9	15		
Yes		T27_38	27		38	1,750	8	12		
Yes		T60_60a	60		60a	1,300	10	15		
Yes		T38_56	38		56	500	8	12		
Yes		T84_51	84		51	150	8	12		
Yes		T51_50	51		50	700	8	12		
Yes		T60a_84	60a		84	1,300	10	15		
Yes		T35_39	35		39	2,600	8	12		
Yes		Right	T25_24		25	24	3,300	11	15	
Yes			T64_65	64	65	900	10	15		



Type	Enlargement	Bank	Road Ref	Starting Point	End Point	Length	Existing Width	Final Width
						m	m	m
	Yes		T65 _ 66	65	66	300	10	15
	Yes		T21 _ 83	21	83	3,200	8	15
	Yes		T17-20-15-83	17	83	7,000	8	15
Project roads	Yes	Left	T58a _ 57	58a	57	964	0	12
	Yes		T57a _ 57	57a	57	570	0	12
	Yes		T57 _ 40	57	40	251	0	12
	Yes		T40 _ 39	40	39	390	0	12
	Yes		T90 _ 91	90	91	665	0	12
	Yes		T73 _ 74	73	74	601	0	12
	Yes		T75 _ 43	75	43	785	0	12
	Yes		T96 _ 97	96	97	1,592	0	12
	Yes		T46 _ 36	46	36	1,010	0	12
	Yes		Quarry Q26b	/	/	5,000	0	8
	Yes	Right	T94 _ 95	94	95	875	0	12

### 3 METHODOLOGY

Phase II Cost Estimate includes the improvement of part of the existing site roads and the construction of the additional roads necessary for the dam and appurtenant works. The improvement of the existing roads mainly concerns the widening of the roadway which consequently entails additional excavations, sub-bases, bases and paving works. Besides the rocky slopes of both the existing roads and the new roads excavated in very steep areas, have been protected with rock bolts and galvanized nets reinforced with galvanized steel ropes.

Therefore, various types of roads are identified for the estimation (cf. Table 1):

- Dushanbe road (Asphalt road),
- Existing roads requiring an enlargement to permit a good access,
- Existing roads without enlargement,
- New roads.

The methodology to estimate the different quantities is defined as below:

- Excavation: Road enlargement or new road construction induce excavation (cf. Figure 3-1)

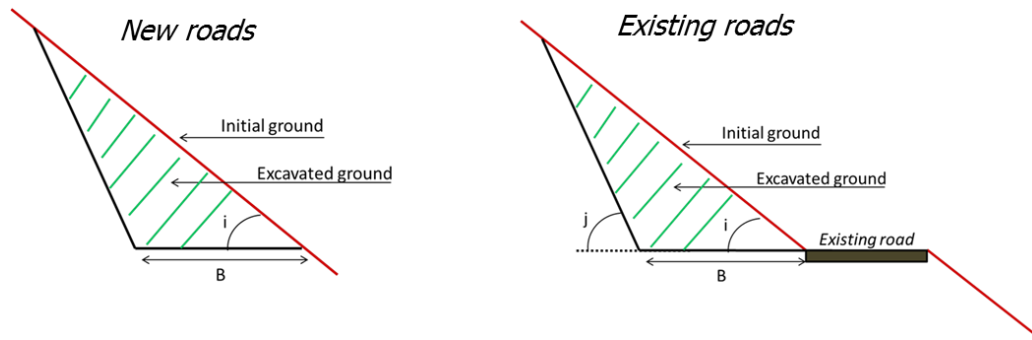


Figure 3-1: Excavation calculation

- Reinforcement and Support: considering the bank slope, the reinforcement (anchorages) and support (safety net) required are calculated as shown in Figure 3-2.

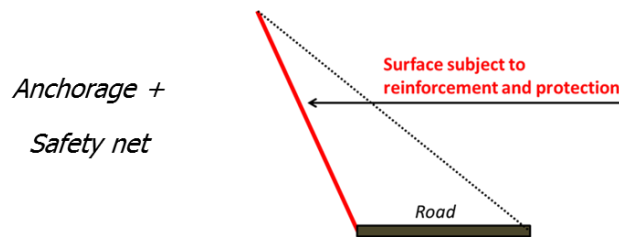


Figure 3-2: Slope reinforcement and protection

- Roadbed base or/and Asphalt:

Dushanbe road is completely rebuilt with Asphalt and crushed rock, considering that it is a key access for the transportation of equipment (cf. Figure 3-4).

Other roads are covered only with crushed rock as defined in Figure 3-5. L1 corresponds to the total width of the road, whereas L considering for roadbed base only.

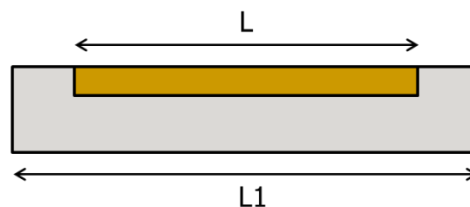


Figure 3-3: Typical road cross section

	L1 [m]	L [m]
Frequent transportation of material, equipment	15	12
Others accesses	12	9

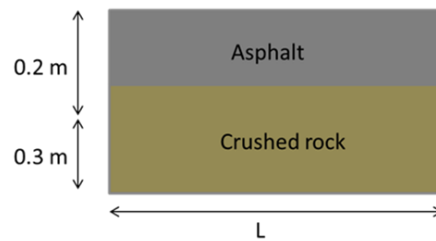


Figure 3-4: Asphalt road –Cross section

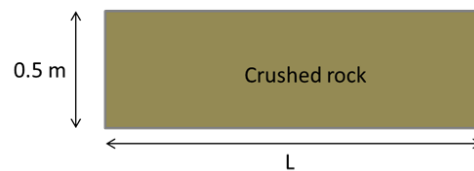
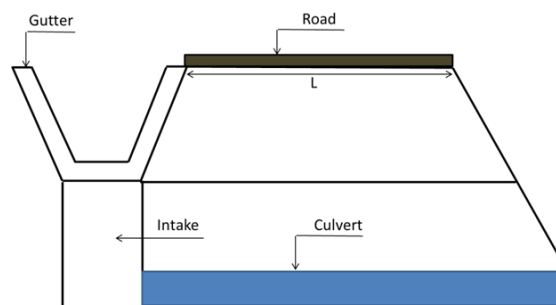


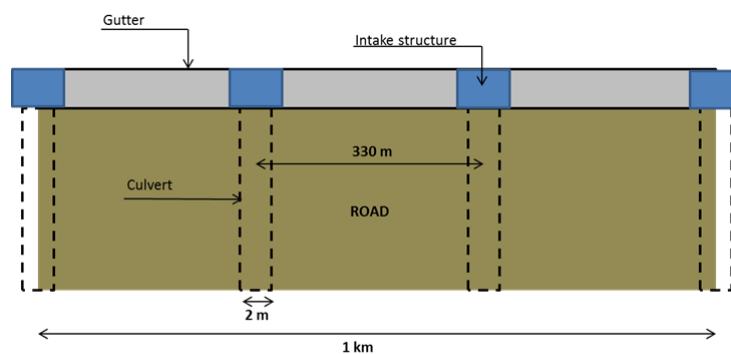
Figure 3-5: Roadbed base – Cross section

- **Drainage:** it is considered one gutter for the total linear of road; three culverts and intakes per km as defined in Figure 3-6 and Figure 3-7.



**CROSS SECTION**

Figure 3-6: Drainage system – Cross section



**PLAN VIEW**

Figure 3-7: Drainage system – Plan view

Conclusion: Table 2 gives the summary of works necessary for each type of road.

**Table 2: RoadSummary – Cost Estimation Methodology**

	Dushanbe road	Existing road (Without excavation)	Existing road (With excavation)	Project roads
Length [m]	13,083,679	5,667,776	16,074,526	17,285,361
Excavation (except for drilling)	x		x	x
Reinforcement and support			x	x
Roadbed base	x	x	x	x
Asphalt	x			
Drainage	x	x	x	x

#### 4 CALCULATION

According to the methodology defined in the previous paragraph, the items included in the estimations are detailed in Table 3. More details are given in appendix about the cost of each item for each road.

**Table 3: Items considered for road construction/rehabilitation.**

Item	Unit	Unit price (US\$ eq.)
<b><u>Excavation, supports and protections</u></b>		
General excavation, rock	m3	8.55
General excavation, common	m3	2.25
Excavation for culverts and gutters, common	m3	5.36
Excavation for culverts and gutters, rock	m3	21.73
Excavation for bridges, rock	m3	15.10
Rock bolts, 22.0 mm diameter	m	23.21
Rock bolts, 26.5 mm diameter	m	29.89
Slope protection with galvanized net and ropes	m2	48.20
<b><u>Roadbed base</u></b>		
Granular base	m3	22.47
<b><u>Concrete works:</u></b>		
Concrete, gutters	m3	66.00
Concrete, culverts	m3	56.48
Concrete, bridges (beams and slabs)	m3	66.48

Item	Unit	Unit price (US\$ eq.)
Portland cement ASTM type I or II	t	257.76
Formworks, gutters and culverts	m <sup>2</sup>	23.84
Scaffolding for slabs, max. Load 20 KN/m <sup>2</sup>	m <sup>3</sup>	5.56
Scaffolding for slabs, max. Load 50 KN/m <sup>2</sup>	m <sup>3</sup>	7.35
Reinforcing steel	t	1540.80
Welded wire fabric	kg	2.43
<b><u>Asphalt paving</u></b>		
Base-course	m <sup>3</sup>	176.80
Binder, 60 mm thick	m <sup>2</sup>	12.27
Wearing course, 40 mm thick	m <sup>2</sup>	10.14
<b><u>Sundries</u></b>		
Random backfills	m <sup>3</sup>	2.09
Miscellaneous works	%	

## 5 CONCLUSION

The total amount corresponding to road construction and rehabilitation is about 52 MUS\$. Moreover, the amount of maintenance has been calculated according to the duration of works for each alternative: it varies between 12 MUS\$ and 19 MUS\$.

Table 4 and Table 5 summarize these amounts. The mean Cost/km for each type of roads gives clear idea of their influence in the total amount.

**Table 4: Cost Summary (1)**

	Dushanbe road	Existing road (Without excavation)	Existing road (With excavation)	Project roads
Total	13,083,679	5,667,776	16,074,526	17,285,361
Excavation and support	335,846	452,448	7,114,417	12,755,071
Roadbed base	1,364,990	2,043,186	4,423,150	1,422,943
Asphalt	9,126,090	0	0	0
Concrete works	1,869,197	3,007,062	3,768,851	1,818,986
Sundries	387,556	165,081	768,109	1,288,362
Length [m]	12,000	21,000	26,320	12,703
Cost/km	1,090	270	611	1,361

**Table 5: Cost Summary (2)**

	Road construction / rehabilitation [US\$]	Maintenance [US\$]	GRAND TOTAL [US\$]
Alt. 1290	52,111,343	19,077,968	71,189,311
Alt. 1255	52,111,343	15,898,307	68,009,650
Alt. 1220	52,111,343	12,718,646	64,829,989

Type	Enlargement	Bank	Road Ref	Starting Point	End Point	Lengths	Existing Width	Final Width	Excavation for road enlargement, rock			Excavation for r	
						m	m	m	Quantity	Unit price	Amount	Quantity	Unit price
Dushanbe road	No	Right	Dushanbe road	/	/	12,000	12	15	7,232	10.3	74,204	0	2.7
Existing roads - Without Excavation	No	Right	T24_23	24	23	1,100	8	8	0	10.3	0	0	2.7
	No		T23_21	23	21	1,100	8	8	0	10.3	0	0	2.7
	No		T23_T_24b	23	24b	1,100	10	10	0	10.3	0	0	2.7
	No		T21_83	21	83	3,200	12	12	0	10.3	0	0	2.7
	No		T21_22 (T3)	21	22 (T3)	1,400	11	11	0	10.3	0	0	2.7
	No	Left	T66_61	66	61	500	10	10	0	10.3	0	0	2.7
	No		T53_61	53	61	400	10	10	0	10.3	0	0	2.7
	No		T67_53	67	53	800	11	11	0	10.3	0	0	2.7
	No		T68_67	68	67	250	11	11	0	10.3	0	0	2.7
	No		T72_67	72	67	250	8	8	0	10.3	0	0	2.7
	No		T61_60	61	60	3,600	8	8	0	10.3	0	0	2.7
	No		T63_59	63	59	3,300	8	8	0	10.3	0	0	2.7
	No		T71_63a	71	63a	400	8	8	0	10.3	0	0	2.7
	No		T70_71	70	71	700	8	8	0	10.3	0	0	2.7
	No		T59_60	59	60	800	8	8	0	10.3	0	0	2.7
No	T63b_71	63b	71	600	15	15	0	10.3	0	0	2.7		
No	T53_71	53	71	1,500	9	9	0	10.3	0	0	2.7		
Existing roads - With Enlargement	Yes	Left	T42_27	42	27	900	10	12	353	10.3	3,625	106	2.7
	Yes		T72_69	72	69	300	8	15	0	10.3	0	0	2.7
	Yes		T69_70	69	70	1,400	8	15	0	10.3	0	0	2.7
	Yes		T63_62	63	62	350	9	15	0	10.3	0	0	2.7
	Yes		T62_53	62	53	370	9	15	0	10.3	0	0	2.7
	Yes		T27_38	27	38	1,750	8	12	6,451	10.3	66,190	1,935	2.7
	Yes		T60_60a	60	60a	1,300	10	15	10,369	10.3	106,387	3,111	2.7
	Yes		T38_56	38	56	500	8	12	3,464	10.3	35,542	1,039	2.7
	Yes		T84_51	84	51	150	8	12	1,315	10.3	13,495	395	2.7
	Yes		T51_50	51	50	700	8	12	6,138	10.3	62,975	1,841	2.7
	Yes	T60a_84	60a	84	1,300	10	15	38,448	10.3	394,476	11,534	2.7	
	Yes	T35_39	35	39	2,600	8	12	49,213	10.3	504,929	14,764	2.7	
	Yes	Right	T25_24	25	24	3,300	11	15	0	10.3	0	0	2.7
	Yes		T64_65	64	65	900	10	15	0	10.3	0	0	2.7
	Yes		T65_66	65	66	300	10	15	0	10.3	0	0	2.7
Yes	T21_83		21	83	3,200	8	15	0	10.3	0	0	2.7	
Yes	T17-20-15-83		17	83	7,000	8	15	148,523	10.3	1,523,850	44,557	2.7	
Project roads	Yes	Left	T58a_57	58a	57	964	0	12	164,221	10.3	1,684,908	49,266	2.7
	Yes		T57a_57	57a	57	570	0	12	97,102	10.3	996,263	29,131	2.7
	Yes		T57_40	57	40	251	0	12	42,759	10.3	438,705	12,828	2.7
	Yes		T40_39	40	39	390	0	12	66,438	10.3	681,654	19,931	2.7
	Yes		T90_91	90	91	665	0	12	22,063	10.3	226,369	6,619	2.7
	Yes		T73_74	73	74	601	0	12	8,495	10.3	87,157	2,548	2.7
	Yes		T75_43	75	43	785	0	12	11,096	10.3	113,840	3,329	2.7
	Yes		T96_97	96	97	1,592	0	12	52,819	10.3	541,923	15,846	2.7
	Yes		T46_36	46	36	1,010	0	12	33,510	10.3	343,808	10,053	2.7
	Yes		Quarry Q26b	/	/	5,000	0	8	138,564	10.3	1,421,667	41,569	2.7
	Yes	Right	T94_95	94	95	875	0	12	54,560	10.3	559,782	16,368	2.7

Excavation, Support and protection													
Type	Enlargement	Bank	Road Ref	road enlargement, common	Excavation for culverts and gutters, common			Excavation for culverts and gutters, rock			Rock bolts, 22.0 mm diameter		
				Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount
Dushanbe road	No	Right	Dushanbe road	3,100	4,612	5.4	24,718	10,760	21.7	233,823	0	23.2	0
Existing roads - Without Excavation	No	Right	T24 _ 23	0	423	5.4	2,266	986	21.7	21,434	0	23.2	0
	No		T23 _ 21	0	423	5.4	2,266	986	21.7	21,434	0	23.2	0
	No		T23 _ T_24b	0	423	5.4	2,266	986	21.7	21,434	0	23.2	0
	No		T21 _ 83	0	1,230	5.4	6,592	2,869	21.7	62,353	0	23.2	0
	No		T21 _ 22 (T3)	0	538	5.4	2,884	1,255	21.7	27,279	0	23.2	0
	No	Left	T66 _ 61	0	192	5.4	1,030	448	21.7	9,743	0	23.2	0
	No		T53 _ 61	0	154	5.4	824	359	21.7	7,794	0	23.2	0
	No		T67 _ 53	0	307	5.4	1,648	717	21.7	15,588	0	23.2	0
	No		T68 _ 67	0	96	5.4	515	224	21.7	4,871	0	23.2	0
	No		T72 _ 67	0	96	5.4	515	224	21.7	4,871	0	23.2	0
	No		T61 _ 60	0	1,383	5.4	7,415	3,228	21.7	70,147	0	23.2	0
	No		T63 _ 59	0	1,268	5.4	6,797	2,959	21.7	64,301	0	23.2	0
	No		T71 _ 63a	0	154	5.4	824	359	21.7	7,794	0	23.2	0
	No		T70 _ 71	0	269	5.4	1,442	628	21.7	13,640	0	23.2	0
	No		T59 _ 60	0	307	5.4	1,648	717	21.7	15,588	0	23.2	0
	No		T63b _ 71	0	231	5.4	1,236	538	21.7	11,691	0	23.2	0
No	T53 _ 71	0	576	5.4	3,090	1,345	21.7	29,228	0	23.2	0		
Existing roads - With Enlargement	Yes	Left	T42 _ 27	286	346	5.4	1,854	807	21.7	17,537	68	23.2	1,578
	Yes		T72 _ 69	0	115	5.4	618	269	21.7	5,846	0	23.2	0
	Yes		T69 _ 70	0	538	5.4	2,884	1,255	21.7	27,279	0	23.2	0
	Yes		T63 _ 62	0	135	5.4	721	314	21.7	6,820	0	23.2	0
	Yes		T62 _ 53	0	142	5.4	762	332	21.7	7,210	0	23.2	0
	Yes		T27 _ 38	5,226	673	5.4	3,605	1,569	21.7	34,099	621	23.2	14,408
	Yes		T60 _ 60a	8,399	500	5.4	2,678	1,166	21.7	25,331	798	23.2	18,527
	Yes		T38 _ 56	2,806	192	5.4	1,030	448	21.7	9,743	333	23.2	7,737
	Yes		T84 _ 51	1,065	58	5.4	309	135	21.7	2,923	113	23.2	2,611
	Yes		T51 _ 50	4,972	269	5.4	1,442	628	21.7	13,640	525	23.2	12,185
	Yes		T60a _ 84	31,143	500	5.4	2,678	1,166	21.7	25,331	2,960	23.2	68,695
	Yes		T35 _ 39	39,863	999	5.4	5,356	2,331	21.7	50,662	4,736	23.2	109,912
	Yes		Right	T25 _ 24	0	1,268	5.4	6,797	2,959	21.7	64,301	0	23.2
	Yes	T64 _ 65		0	346	5.4	1,854	807	21.7	17,537	0	23.2	0
	Yes	T65 _ 66		0	115	5.4	618	269	21.7	5,846	0	23.2	0
Yes	T21 _ 83	0		1,230	5.4	6,592	2,869	21.7	62,353	0	23.2	0	
Yes		T17-20-15-83	120,304	2,690	5.4	14,419	6,277	21.7	136,397	8,167	23.2	189,548	
Project roads	Yes	Left	T58a _ 57	133,019	370	5.4	1,986	864	21.7	18,784	5,267	23.2	122,256
	Yes		T57a _ 57	78,652	219	5.4	1,174	511	21.7	11,107	3,115	23.2	72,288
	Yes		T57 _ 40	34,635	96	5.4	517	225	21.7	4,891	1,371	23.2	31,832
	Yes		T40 _ 39	53,815	150	5.4	803	350	21.7	7,599	2,131	23.2	49,461
	Yes		T90 _ 91	17,871	256	5.4	1,370	596	21.7	12,958	708	23.2	16,425
	Yes		T73 _ 74	6,881	231	5.4	1,238	539	21.7	11,711	272	23.2	6,324
	Yes		T75 _ 43	8,987	302	5.4	1,617	704	21.7	15,296	356	23.2	8,260
	Yes		T96 _ 97	42,783	612	5.4	3,279	1,428	21.7	31,021	1,694	23.2	39,322
	Yes		T46 _ 36	27,143	388	5.4	2,080	906	21.7	19,680	1,075	23.2	24,947
	Yes		Quarry Q26b	112,237	1,922	5.4	10,299	4,484	21.7	97,426	6,667	23.2	154,733
	Yes	Right	T94 _ 95	44,193	336	5.4	1,802	785	21.7	17,050	1,750	23.2	40,618



Type	Enlargement	Bank	Road Ref							Road based					
				Rock bolts, 26.5 mm diameter			Slope protection with galvanized net and ropes			AMOUNT	Surface preparation			Quantity	
				Quantity	Unit price	Amount	Quantity	Unit price	Amount		Quantity	Unit price	Amount		
Dushanbe road	No	Right	Dushanbe road	0	29.9	0	0	48.2	0	335,846	180,000	1.1	189,000	43,200	
Existing roads - Without Excavation	No	Right	T24_23	0	29.9	0	0	48.2	0	23,700	8,800	1.1	9,240	2,750	
	No		T23_21	0	29.9	0	0	48.2	0	23,700	8,800	1.1	9,240	2,750	
	No		T23_T_24b	0	29.9	0	0	48.2	0	23,700	11,000	1.1	11,550	3,850	
	No		T21_83	0	29.9	0	0	48.2	0	68,944	38,400	1.1	40,320	14,400	
	No		T21_22 (T3)	0	29.9	0	0	48.2	0	30,163	15,400	1.1	16,170	5,600	
	No	Left	T66_61	0	29.9	0	0	48.2	0	10,773	5,000	1.1	5,250	1,750	
	No		T53_61	0	29.9	0	0	48.2	0	8,618	4,000	1.1	4,200	1,400	
	No		T67_53	0	29.9	0	0	48.2	0	17,236	8,800	1.1	9,240	3,200	
	No		T68_67	0	29.9	0	0	48.2	0	5,386	2,750	1.1	2,888	1,000	
	No		T72_67	0	29.9	0	0	48.2	0	5,386	2,000	1.1	2,100	625	
	No		T61_60	0	29.9	0	0	48.2	0	77,563	28,800	1.1	30,240	9,000	
	No		T63_59	0	29.9	0	0	48.2	0	71,099	26,400	1.1	27,720	8,250	
	No		T71_63a	0	29.9	0	0	48.2	0	8,618	3,200	1.1	3,360	1,000	
	No		T70_71	0	29.9	0	0	48.2	0	15,082	5,600	1.1	5,880	1,750	
	No		T59_60	0	29.9	0	0	48.2	0	17,236	6,400	1.1	6,720	2,000	
	No		T63b_71	0	29.9	0	0	48.2	0	12,927	9,000	1.1	9,450	3,600	
No	T53_71	0	29.9	0	0	48.2	0	32,318	13,500	1.1	14,175	4,500			
Existing roads - With Enlargement	Yes	Left	T42_27	68	29.9	2,033	204	48.2	9,833	36,747	10,800	1.1	11,340	4,050	
	Yes		T72_69	0	29.9	0	0	48.2	0	6,464	4,500	1.1	4,725	1,800	
	Yes		T69_70	0	29.9	0	0	48.2	0	30,163	21,000	1.1	22,050	8,400	
	Yes		T63_62	0	29.9	0	0	48.2	0	7,541	5,250	1.1	5,513	2,100	
	Yes		T62_53	0	29.9	0	0	48.2	0	7,972	5,550	1.1	5,828	2,220	
	Yes		T27_38	621	29.9	18,555	1,862	48.2	89,763	231,845	21,000	1.1	22,050	7,875	
	Yes		T60_60a	798	29.9	23,859	2,395	48.2	115,422	300,601	19,500	1.1	20,475	7,800	
	Yes		T38_56	333	29.9	9,963	1,000	48.2	48,200	115,020	6,000	1.1	6,300	2,250	
	Yes		T84_51	113	29.9	3,363	338	48.2	16,268	40,033	1,800	1.1	1,890	675	
	Yes		T51_50	525	29.9	15,692	1,575	48.2	75,915	186,821	8,400	1.1	8,820	3,150	
	Yes		T60a_84	2,960	29.9	88,466	8,879	48.2	427,976	1,038,764	19,500	1.1	20,475	7,800	
	Yes		T35_39	4,736	29.9	141,546	14,207	48.2	684,761	1,537,028	31,200	1.1	32,760	11,700	
	Yes		Right	T25_24	0	29.9	0	0	48.2	0	71,099	49,500	1.1	51,975	19,800
	Yes			T64_65	0	29.9	0	0	48.2	0	19,391	13,500	1.1	14,175	5,400
	Yes	T65_66		0	29.9	0	0	48.2	0	6,464	4,500	1.1	4,725	1,800	
Yes	T21_83	0		29.9	0	0	48.2	0	68,944	48,000	1.1	50,400	19,200		
Yes		T17-20-15-83	8,167	29.9	244,102	24,500	48.2	1,180,900	3,409,520	105,000	1.1	110,250	42,000		
Project roads	Yes	Left	T58a_57	5,267	29.9	157,442	15,802	48.2	761,665	2,880,061	11,568	1.1	12,146	4,338	
	Yes		T57a_57	3,115	29.9	93,094	9,344	48.2	450,362	1,702,941	6,840	1.1	7,182	2,565	
	Yes		T57_40	1,371	29.9	40,994	4,114	48.2	198,317	749,891	3,012	1.1	3,163	1,130	
	Yes		T40_39	2,131	29.9	63,696	6,393	48.2	308,143	1,165,170	4,680	1.1	4,914	1,755	
	Yes		T90_91	708	29.9	21,153	2,123	48.2	102,330	398,475	7,980	1.1	8,379	2,993	
	Yes		T73_74	272	29.9	8,144	817	48.2	39,399	160,854	7,212	1.1	7,573	2,705	
	Yes		T75_43	356	29.9	10,638	1,068	48.2	51,462	210,100	9,420	1.1	9,891	3,533	
	Yes		T96_97	1,694	29.9	50,639	5,083	48.2	244,977	953,944	19,104	1.1	20,059	7,164	
	Yes		T46_36	1,075	29.9	32,126	3,224	48.2	155,419	605,203	12,120	1.1	12,726	4,545	
	Yes		Quarry Q26b	6,667	29.9	199,267	20,000	48.2	964,000	2,959,630	40,000	1.1	42,000	12,500	
	Yes	Right	T94_95	1,750	29.9	52,308	5,250	48.2	253,050	968,802	10,500	1.1	11,025	3,938	

Type	Enlargement	Bank	Road Ref				Asphalt paving									
				Granular base		AMOUNT	Base-course			Binder, 60 mm thick			Wearing course, 40 mm thick			
				Unit price	Amount		Quantity	Unit price	Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount	
Dushanbe road	No	Right	Dushanbe road	27.2	1,175,990	1,364,990	28,800	176.8	5,091,840	180,000	12.3	2,209,050	180,000	10.1	1,825,200	
Existing roads - Without Excavation	No	Right	T24 _ 23	27.2	74,861	84,101	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T23 _ 21	27.2	74,861	84,101	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T23 _ T_24b	27.2	104,805	116,355	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T21 _ 83	27.2	391,997	432,317	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T21 _ 22 (T3)	27.2	152,443	168,613	0	176.8	0	0	12.3	0	0	10.1	0	
	No	Left	T66 _ 61	27.2	47,639	52,889	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T53 _ 61	27.2	38,111	42,311	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T67 _ 53	27.2	87,110	96,350	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T68 _ 67	27.2	27,222	30,110	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T72 _ 67	27.2	17,014	19,114	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T61 _ 60	27.2	244,998	275,238	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T63 _ 59	27.2	224,582	252,302	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T71 _ 63a	27.2	27,222	30,582	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T70 _ 71	27.2	47,639	53,519	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T59 _ 60	27.2	54,444	61,164	0	176.8	0	0	12.3	0	0	10.1	0	
	No		T63b _ 71	27.2	97,999	107,449	0	176.8	0	0	12.3	0	0	10.1	0	
No	T53 _ 71	27.2	122,499	136,674	0	176.8	0	0	12.3	0	0	10.1	0			
Existing roads - With Enlargement	Yes	Left	T42 _ 27	27.2	110,249	121,589	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T72 _ 69	27.2	49,000	53,725	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T69 _ 70	27.2	228,665	250,715	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T63 _ 62	27.2	57,166	62,679	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T62 _ 53	27.2	60,433	66,260	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T27 _ 38	27.2	214,373	236,423	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T60 _ 60a	27.2	212,332	232,807	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T38 _ 56	27.2	61,250	67,550	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T84 _ 51	27.2	18,375	20,265	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T51 _ 50	27.2	85,749	94,569	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T60a _ 84	27.2	212,332	232,807	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T35 _ 39	27.2	318,497	351,257	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		Right	T25 _ 24	27.2	538,996	590,971	0	176.8	0	0	12.3	0	0	10.1	0
	Yes			T64 _ 65	27.2	146,999	161,174	0	176.8	0	0	12.3	0	0	10.1	0
	Yes			T65 _ 66	27.2	49,000	53,725	0	176.8	0	0	12.3	0	0	10.1	0
	Yes	T21 _ 83		27.2	522,662	573,062	0	176.8	0	0	12.3	0	0	10.1	0	
Yes	T17-20-15-83	27.2		1,143,324	1,253,574	0	176.8	0	0	12.3	0	0	10.1	0		
Project roads	Yes	Left	T58a _ 57	27.2	118,089	130,235	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T57a _ 57	27.2	69,824	77,006	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T57 _ 40	27.2	30,747	33,910	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T40 _ 39	27.2	47,775	52,689	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T90 _ 91	27.2	81,462	89,841	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T73 _ 74	27.2	73,622	81,194	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T75 _ 43	27.2	96,162	106,053	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T96 _ 97	27.2	195,018	215,078	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		T46 _ 36	27.2	123,724	136,450	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes		Quarry Q26b	27.2	340,275	382,275	0	176.8	0	0	12.3	0	0	10.1	0	
	Yes	Right	T94 _ 95	27.2	107,187	118,212	0	176.8	0	0	12.3	0	0	10.1	0	

Type	Enlargement	Bank	Road Ref	AMOUNT	Concrete, gutters			Concrete, culverts			Portland cement ASTM type I or II			Formworks		
					Quantity	Unit price	Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount
Dushanbe road	No	Right	Dushanbe road	9,126,090	2,286	66.0	150,876	2,446	56.5	138,161	1,704	257.8	439,118	18,850	23.8	449,392
Existing roads - Without Excavation	No	Right	T24 _ 23	0	210	66.0	13,830	224	56.5	12,665	156	257.8	40,252	1,728	23.8	41,194
	No		T23 _ 21	0	210	66.0	13,830	224	56.5	12,665	156	257.8	40,252	1,728	23.8	41,194
	No		T23 _ T_24b	0	210	66.0	13,830	224	56.5	12,665	156	257.8	40,252	1,728	23.8	41,194
	No		T21 _ 83	0	610	66.0	40,234	652	56.5	36,843	454	257.8	117,098	5,027	23.8	119,838
	No		T21 _ 22 (T3)	0	267	66.0	17,602	285	56.5	16,119	199	257.8	51,230	2,199	23.8	52,429
	No	Left	T66 _ 61	0	95	66.0	6,287	102	56.5	5,757	71	257.8	18,297	785	23.8	18,725
	No		T53 _ 61	0	76	66.0	5,029	82	56.5	4,605	57	257.8	14,637	628	23.8	14,980
	No		T67 _ 53	0	152	66.0	10,058	163	56.5	9,211	114	257.8	29,275	1,257	23.8	29,959
	No		T68 _ 67	0	48	66.0	3,143	51	56.5	2,878	35	257.8	9,148	393	23.8	9,362
	No		T72 _ 67	0	48	66.0	3,143	51	56.5	2,878	35	257.8	9,148	393	23.8	9,362
	No		T61 _ 60	0	686	66.0	45,263	734	56.5	41,448	511	257.8	131,735	5,655	23.8	134,817
	No		T63 _ 59	0	629	66.0	41,491	673	56.5	37,994	468	257.8	120,757	5,184	23.8	123,583
	No		T71 _ 63a	0	76	66.0	5,029	82	56.5	4,605	57	257.8	14,637	628	23.8	14,980
	No		T70 _ 71	0	133	66.0	8,801	143	56.5	8,059	99	257.8	25,615	1,100	23.8	26,215
	No		T59 _ 60	0	152	66.0	10,058	163	56.5	9,211	114	257.8	29,275	1,257	23.8	29,959
No	T63b _ 71	0	114	66.0	7,544	122	56.5	6,908	85	257.8	21,956	943	23.8	22,470		
No	T53 _ 71	0	286	66.0	18,860	306	56.5	17,270	213	257.8	54,890	2,356	23.8	56,174		
Existing roads - With Enlargement	Yes	Left	T42 _ 27	0	171	66.0	11,316	183	56.5	10,362	128	257.8	32,934	1,414	23.8	33,704
	Yes		T72 _ 69	0	57	66.0	3,772	61	56.5	3,454	43	257.8	10,978	471	23.8	11,235
	Yes		T69 _ 70	0	267	66.0	17,602	285	56.5	16,119	199	257.8	51,230	2,199	23.8	52,429
	Yes		T63 _ 62	0	67	66.0	4,401	71	56.5	4,030	50	257.8	12,808	550	23.8	13,107
	Yes		T62 _ 53	0	70	66.0	4,652	75	56.5	4,260	53	257.8	13,539	581	23.8	13,856
	Yes		T27 _ 38	0	333	66.0	22,003	357	56.5	20,149	248	257.8	64,038	2,749	23.8	65,536
	Yes		T60 _ 60a	0	248	66.0	16,345	265	56.5	14,967	185	257.8	47,571	2,042	23.8	48,684
	Yes		T38 _ 56	0	95	66.0	6,287	102	56.5	5,757	71	257.8	18,297	785	23.8	18,725
	Yes		T84 _ 51	0	29	66.0	1,886	31	56.5	1,727	21	257.8	5,489	236	23.8	5,617
	Yes		T51 _ 50	0	133	66.0	8,801	143	56.5	8,059	99	257.8	25,615	1,100	23.8	26,215
	Yes		T60a _ 84	0	248	66.0	16,345	265	56.5	14,967	185	257.8	47,571	2,042	23.8	48,684
	Yes		T35 _ 39	0	495	66.0	32,690	530	56.5	29,935	369	257.8	95,142	4,084	23.8	97,368
	Yes	Right	T25 _ 24	0	629	66.0	41,491	673	56.5	37,994	468	257.8	120,757	5,184	23.8	123,583
	Yes		T64 _ 65	0	171	66.0	11,316	183	56.5	10,362	128	257.8	32,934	1,414	23.8	33,704
	Yes		T65 _ 66	0	57	66.0	3,772	61	56.5	3,454	43	257.8	10,978	471	23.8	11,235
Yes	Right	T21 _ 83	0	610	66.0	40,234	652	56.5	36,843	454	257.8	117,098	5,027	23.8	119,838	
Yes		T17-20-15-83	0	1,334	66.0	88,011	1,427	56.5	80,594	994	257.8	256,152	10,996	23.8	262,145	
Project roads	Yes	Left	T58a _ 57	0	184	66.0	12,120	197	56.5	11,099	137	257.8	35,276	1,514	23.8	36,101
	Yes		T57a _ 57	0	109	66.0	7,167	116	56.5	6,563	81	257.8	20,858	895	23.8	21,346
	Yes		T57 _ 40	0	48	66.0	3,156	51	56.5	2,890	36	257.8	9,185	394	23.8	9,400
	Yes		T40 _ 39	0	74	66.0	4,903	80	56.5	4,490	55	257.8	14,271	613	23.8	14,605
	Yes		T90 _ 91	0	127	66.0	8,361	136	56.5	7,656	94	257.8	24,334	1,045	23.8	24,904
	Yes		T73 _ 74	0	114	66.0	7,556	123	56.5	6,920	85	257.8	21,992	944	23.8	22,507
	Yes		T75 _ 43	0	150	66.0	9,870	160	56.5	9,038	111	257.8	28,726	1,233	23.8	29,398
	Yes		T96 _ 97	0	303	66.0	20,016	325	56.5	18,329	226	257.8	58,256	2,501	23.8	59,619
	Yes		T46 _ 36	0	192	66.0	12,699	206	56.5	11,629	143	257.8	36,959	1,587	23.8	37,824
	Yes		Quarry Q26b	0	953	66.0	62,865	1,019	56.5	57,567	710	257.8	182,966	7,854	23.8	187,247
	Yes	Right	T94 _ 95	0	167	66.0	11,001	178	56.5	10,074	124	257.8	32,019	1,375	23.8	32,768

Concrete works																
Type	Enlargement	Bank	Road Ref	Scaffolding for slabs, max. Load 20 KN/m2			Scaffolding for slabs, max. Load 50 KN/m2			Reinforcing steel			Welded wire fabric			
				Quantity	Unit price	Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount	Quantity	Unit price	Amount	
Dushanbe road	No	Right	Dushanbe road	2,880	5.6	16,013	2,189	7.4	16,088	331	1,540.8	510,396	61,380	2.4	149,153	
Existing roads - Without Excavation	No	Right	T24 _ 23	264	5.6	1,468	201	7.4	1,475	30	1,540.8	46,786	5,627	2.4	13,672	
	No		T23 _ 21	264	5.6	1,468	201	7.4	1,475	30	1,540.8	46,786	5,627	2.4	13,672	
	No		T23 _ T_24b	264	5.6	1,468	201	7.4	1,475	30	1,540.8	46,786	5,627	2.4	13,672	
	No		T21 _ 83	768	5.6	4,270	584	7.4	4,290	88	1,540.8	136,106	16,368	2.4	39,774	
	No		T21 _ 22 (T3)	336	5.6	1,868	255	7.4	1,877	39	1,540.8	59,546	7,161	2.4	17,401	
	No	Left	T66 _ 61	120	5.6	667	91	7.4	670	14	1,540.8	21,267	2,558	2.4	6,215	
	No		T53 _ 61	96	5.6	534	73	7.4	536	11	1,540.8	17,013	2,046	2.4	4,972	
	No		T67 _ 53	192	5.6	1,068	146	7.4	1,073	22	1,540.8	34,026	4,092	2.4	9,944	
	No		T68 _ 67	60	5.6	334	46	7.4	335	7	1,540.8	10,633	1,279	2.4	3,107	
	No		T72 _ 67	60	5.6	334	46	7.4	335	7	1,540.8	10,633	1,279	2.4	3,107	
	No		T61 _ 60	864	5.6	4,804	657	7.4	4,826	99	1,540.8	153,119	18,414	2.4	44,746	
	No		T63 _ 59	792	5.6	4,404	602	7.4	4,424	91	1,540.8	140,359	16,880	2.4	41,017	
	No		T71 _ 63a	96	5.6	534	73	7.4	536	11	1,540.8	17,013	2,046	2.4	4,972	
	No		T70 _ 71	168	5.6	934	128	7.4	938	19	1,540.8	29,773	3,581	2.4	8,701	
	No		T59 _ 60	192	5.6	1,068	146	7.4	1,073	22	1,540.8	34,026	4,092	2.4	9,944	
	No		T63b _ 71	144	5.6	801	109	7.4	804	17	1,540.8	25,520	3,069	2.4	7,458	
No	T53 _ 71	360	5.6	2,002	274	7.4	2,011	41	1,540.8	63,800	7,673	2.4	18,644			
Existing roads - With Enlargement	Yes	Left	T42 _ 27	216	5.6	1,201	164	7.4	1,207	25	1,540.8	38,280	4,604	2.4	11,187	
	Yes		T72 _ 69	72	5.6	400	55	7.4	402	8	1,540.8	12,760	1,535	2.4	3,729	
	Yes		T69 _ 70	336	5.6	1,868	255	7.4	1,877	39	1,540.8	59,546	7,161	2.4	17,401	
	Yes		T63 _ 62	84	5.6	467	64	7.4	469	10	1,540.8	14,887	1,790	2.4	4,350	
	Yes		T62 _ 53	89	5.6	494	67	7.4	496	10	1,540.8	15,737	1,893	2.4	4,599	
	Yes		T27 _ 38	420	5.6	2,335	319	7.4	2,346	48	1,540.8	74,433	8,951	2.4	21,752	
	Yes		T60 _ 60a	312	5.6	1,735	237	7.4	1,743	36	1,540.8	55,293	6,650	2.4	16,158	
	Yes		T38 _ 56	120	5.6	667	91	7.4	670	14	1,540.8	21,267	2,558	2.4	6,215	
	Yes		T84 _ 51	36	5.6	200	27	7.4	201	4	1,540.8	6,380	767	2.4	1,864	
	Yes		T51 _ 50	168	5.6	934	128	7.4	938	19	1,540.8	29,773	3,581	2.4	8,701	
	Yes		T60a _ 84	312	5.6	1,735	237	7.4	1,743	36	1,540.8	55,293	6,650	2.4	16,158	
	Yes		T35 _ 39	624	5.6	3,469	474	7.4	3,486	72	1,540.8	110,586	13,299	2.4	32,317	
	Yes		Right	T25 _ 24	792	5.6	4,404	602	7.4	4,424	91	1,540.8	140,359	16,880	2.4	41,017
	Yes			T64 _ 65	216	5.6	1,201	164	7.4	1,207	25	1,540.8	38,280	4,604	2.4	11,187
	Yes			T65 _ 66	72	5.6	400	55	7.4	402	8	1,540.8	12,760	1,535	2.4	3,729
	Yes	T21 _ 83		768	5.6	4,270	584	7.4	4,290	88	1,540.8	136,106	16,368	2.4	39,774	
Yes	T17-20-15-83	1,680		5.6	9,341	1,277	7.4	9,384	193	1,540.8	297,731	35,805	2.4	87,006		
Project roads	Yes	Left	T58a _ 57	231	5.6	1,286	176	7.4	1,292	27	1,540.8	41,002	4,931	2.4	11,982	
	Yes		T57a _ 57	137	5.6	761	104	7.4	764	16	1,540.8	24,244	2,916	2.4	7,085	
	Yes		T57 _ 40	60	5.6	335	46	7.4	337	7	1,540.8	10,676	1,284	2.4	3,120	
	Yes		T40 _ 39	94	5.6	520	71	7.4	523	11	1,540.8	16,588	1,995	2.4	4,847	
	Yes		T90 _ 91	160	5.6	887	121	7.4	892	18	1,540.8	28,284	3,401	2.4	8,266	
	Yes		T73 _ 74	144	5.6	802	110	7.4	806	17	1,540.8	25,562	3,074	2.4	7,470	
	Yes		T75 _ 43	188	5.6	1,048	143	7.4	1,052	22	1,540.8	33,388	4,015	2.4	9,757	
	Yes		T96 _ 97	382	5.6	2,124	290	7.4	2,134	44	1,540.8	67,713	8,143	2.4	19,788	
	Yes		T46 _ 36	242	5.6	1,348	184	7.4	1,354	28	1,540.8	42,958	5,166	2.4	12,554	
	Yes		Quarry Q26b	1,200	5.6	6,672	912	7.4	6,703	138	1,540.8	212,665	25,575	2.4	62,147	
	Yes	Right	T94 _ 95	210	5.6	1,168	160	7.4	1,173	24	1,540.8	37,216	4,476	2.4	10,876	

Type	Enlargement	Bank	Road Ref	AMOUNT	Sundries						AMOUNT	
					Random backfills			Miscellaneous works				
					Quantity	Unit price	Amount	Ref	Ratio	Amount		
Dushanbe road	No	Right	Dushanbe road	1,869,197	3,100	2.1	6,478	12,702,601	3%	381,078	387,556	
Existing roads - Without Excavation	No	Right	T24 _ 23	157,513	0	2.1	0	265,313	3%	7,959	7,959	
	No		T23 _ 21	157,513	0	2.1	0	265,313	3%	7,959	7,959	
	No		T23 _ T_ 24b	157,513	0	2.1	0	297,567	3%	8,927	8,927	
	No		T21 _ 83	458,219	0	2.1	0	959,480	3%	28,784	28,784	
	No		T21 _ 22 (T3)	200,471	0	2.1	0	399,247	3%	11,977	11,977	
	No	Left	T66 _ 61	71,597	0	2.1	0	135,258	3%	4,058	4,058	
	No		T53 _ 61	57,277	0	2.1	0	108,206	3%	3,246	3,246	
	No		T67 _ 53	114,555	0	2.1	0	228,141	3%	6,844	6,844	
	No		T68 _ 67	35,798	0	2.1	0	71,294	3%	2,139	2,139	
	No		T72 _ 67	35,798	0	2.1	0	60,298	3%	1,809	1,809	
	No		T61 _ 60	515,496	0	2.1	0	868,297	3%	26,049	26,049	
	No		T63 _ 59	472,538	0	2.1	0	795,939	3%	23,878	23,878	
	No		T71 _ 63a	57,277	0	2.1	0	96,477	3%	2,894	2,894	
	No		T70 _ 71	100,235	0	2.1	0	168,835	3%	5,065	5,065	
	No		T59 _ 60	114,555	0	2.1	0	192,955	3%	5,789	5,789	
	No		T63b _ 71	85,916	0	2.1	0	206,292	3%	6,189	6,189	
No	T53 _ 71	214,790	0	2.1	0	383,782	3%	11,513	11,513			
Existing roads - With Enlargement	Yes	Left	T42 _ 27	128,874	192	2.1	401	287,611	3%	8,628	9,029	
	Yes		T72 _ 69	42,958	0	2.1	0	103,146	3%	3,094	3,094	
	Yes		T69 _ 70	200,471	0	2.1	0	481,349	3%	14,440	14,440	
	Yes		T63 _ 62	50,118	0	2.1	0	120,337	3%	3,610	3,610	
	Yes		T62 _ 53	52,982	0	2.1	0	127,214	3%	3,816	3,816	
	Yes		T27 _ 38	250,588	3,503	2.1	7,321	726,178	3%	21,785	29,107	
	Yes		T60 _ 60a	186,151	5,630	2.1	11,768	731,327	3%	21,940	33,707	
	Yes		T38 _ 56	71,597	1,881	2.1	3,931	258,098	3%	7,743	11,674	
	Yes		T84 _ 51	21,479	714	2.1	1,493	83,270	3%	2,498	3,991	
	Yes		T51 _ 50	100,235	3,333	2.1	6,966	388,592	3%	11,658	18,624	
	Yes		T60a _ 84	186,151	20,877	2.1	43,633	1,501,355	3%	45,041	88,674	
	Yes		T35 _ 39	372,303	26,723	2.1	55,851	2,316,439	3%	69,493	125,344	
	Yes		Right	T25 _ 24	472,538	0	2.1	0	1,134,608	3%	34,038	34,038
	Yes			T64 _ 65	128,874	0	2.1	0	309,438	3%	9,283	9,283
	Yes			T65 _ 66	42,958	0	2.1	0	103,146	3%	3,094	3,094
	Yes	T21 _ 83		458,219	0	2.1	0	1,100,226	3%	33,007	33,007	
Yes		T17-20-15-83	1,002,354	80,648	2.1	168,555	5,834,002	3%	175,020	343,575		
Project roads	Yes	Left	T58a _ 57	138,038	89,172	2.1	186,370	3,334,704	3%	100,041	286,411	
	Yes		T57a _ 57	81,620	52,726	2.1	110,198	1,971,765	3%	59,153	169,351	
	Yes		T57 _ 40	35,942	23,218	2.1	48,526	868,268	3%	26,048	74,574	
	Yes		T40 _ 39	55,845	36,076	2.1	75,398	1,349,102	3%	40,473	115,872	
	Yes		T90 _ 91	95,224	11,980	2.1	25,039	608,579	3%	18,257	43,296	
	Yes		T73 _ 74	86,059	4,613	2.1	9,641	337,748	3%	10,132	19,773	
	Yes		T75 _ 43	112,407	6,025	2.1	12,592	441,152	3%	13,235	25,827	
	Yes		T96 _ 97	227,964	28,681	2.1	59,943	1,456,928	3%	43,708	103,651	
	Yes		T46 _ 36	144,625	18,196	2.1	38,029	924,308	3%	27,729	65,758	
	Yes		Quarry Q26b	715,967	75,240	2.1	157,252	4,215,124	3%	126,454	283,706	
	Yes	Right	T94 _ 95	125,294	29,626	2.1	61,918	1,274,226	3%	38,227	100,145	

TOTAL [US\$]	US\$/km
13,083,679	1,090,307
273,272	248,429
273,272	248,429
306,494	278,631
988,265	308,833
411,225	293,732
139,316	278,631
111,452	278,631
234,985	293,732
73,433	293,732
62,107	248,429
894,346	248,429
819,817	248,429
99,372	248,429
173,901	248,429
198,743	248,429
212,481	354,135
395,295	263,530
296,239	329,155
106,241	354,135
495,789	354,135
123,947	354,135
131,030	354,135
747,964	427,408
753,267	579,436
265,841	531,681
85,768	571,785
400,249	571,785
1,546,396	1,189,535
2,385,932	917,666
1,168,646	354,135
318,722	354,135
106,241	354,135
1,133,233	354,135
6,009,022	858,432
3,434,745	3,563,014
2,030,918	3,563,014
894,316	3,563,014
1,389,575	3,563,014
626,836	942,611
347,880	578,836
454,386	578,836
1,500,636	942,611
952,037	942,611
4,341,578	868,316
1,312,452	1,499,946