

添付 -2 Pre-FS 対象小水力発電計画概要表及び図面

1. Nam Likna (Sequence No. 4)

A. Salient Features

1.General	Province	Phongsaly		District	Samphan	
	Electr. Status	Partly electrified by pico-hydros with semi-permanent structures				
2.Demand	Load Center	Samphan (District Center)		H/H Number	123	
	Peak Load	26 kW		Peak Hours	4 hours	
3.Hydrology	River	Nam Likna		Basin	Nam Ou	CA 30 km ²
	Rainfall	1,800 mm		Q _{ave}	0.731 m ³ /s	Q _{95%} 0.184 m ³ /s
4.Structures						
4.1 Intake	Type	Gabion-core concrete facing		Height	2.5 m	Length 25.5 m
				FSL	618.00 m	FWL 621.38 m
4.2 Desilting Basin	Length	10 m	Width 0.9 m	Side Spillway Length	5 m	
4.3 Headrace Channel	Shape	Trapezoidal (1:0.3)		Lining	Wet Masonry	Length 468 m
	Uniform Depth	0.53 m		Base	0.8 m	
4.4 Head Tank	Type	Surface		NWL	616.88 m	MOL 615.88 m
4.5 Penstock	Type	Exposed		Dia.	0.5 m	Length 15.6 m
4.6 Powerhouse	Type	Surface	EL 605.17 m	Turbine	Cross-Flow	Units 1 nos
5.Power and Energy	Q _{design}	0.32 m ³ /s	H _{net} 12 m	Installed Capacity	26 kW	
	Energy	117,544 kWh/yr		P.F.	52%	
6.Access Road	Length	0.5 km				
7.Transmission Line	Capacity	400 V		Length	0.5 km	
	Loss	10.0%		Energy Delivered.	105,790 kWh/yr	

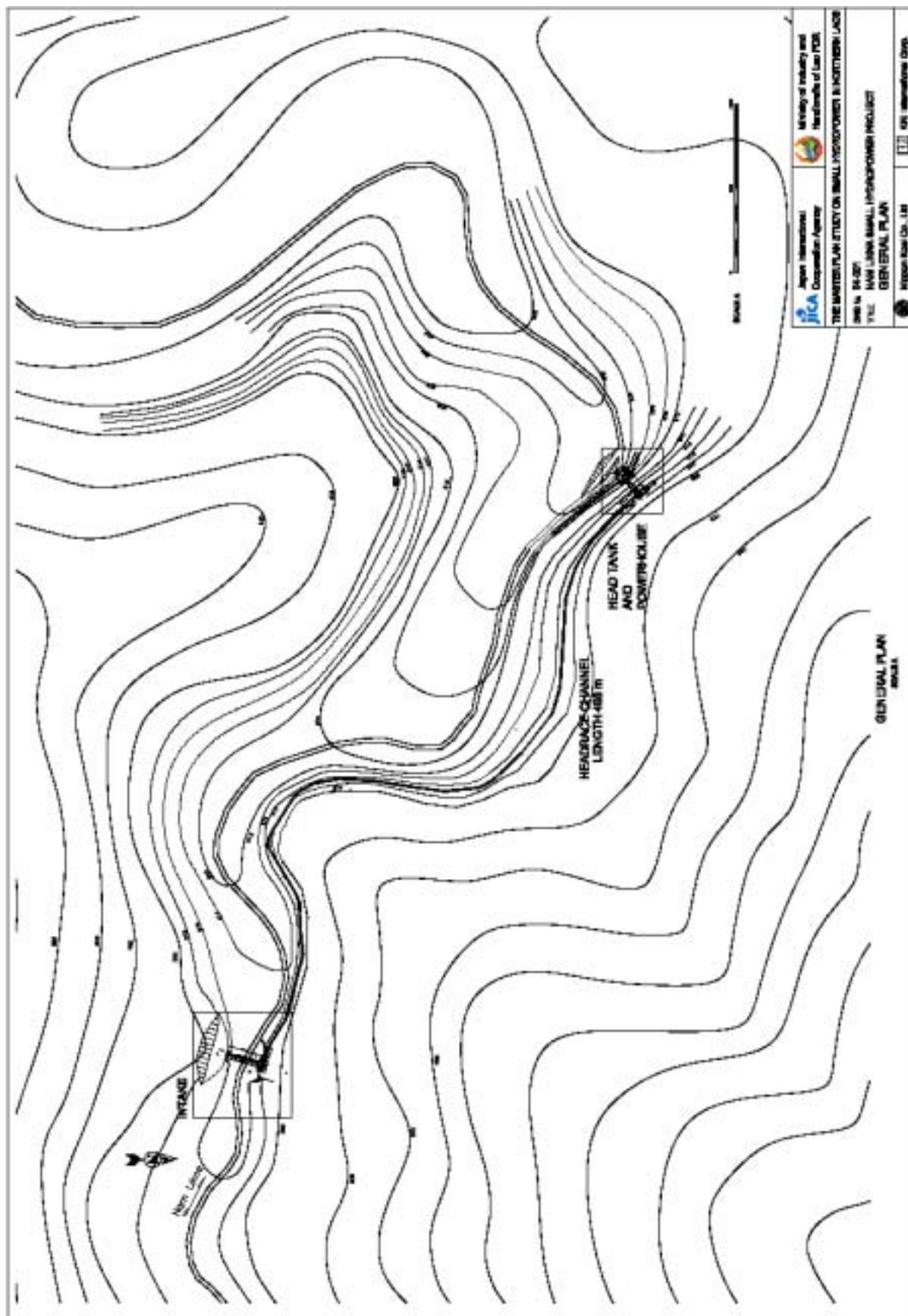
B. Construction Cost

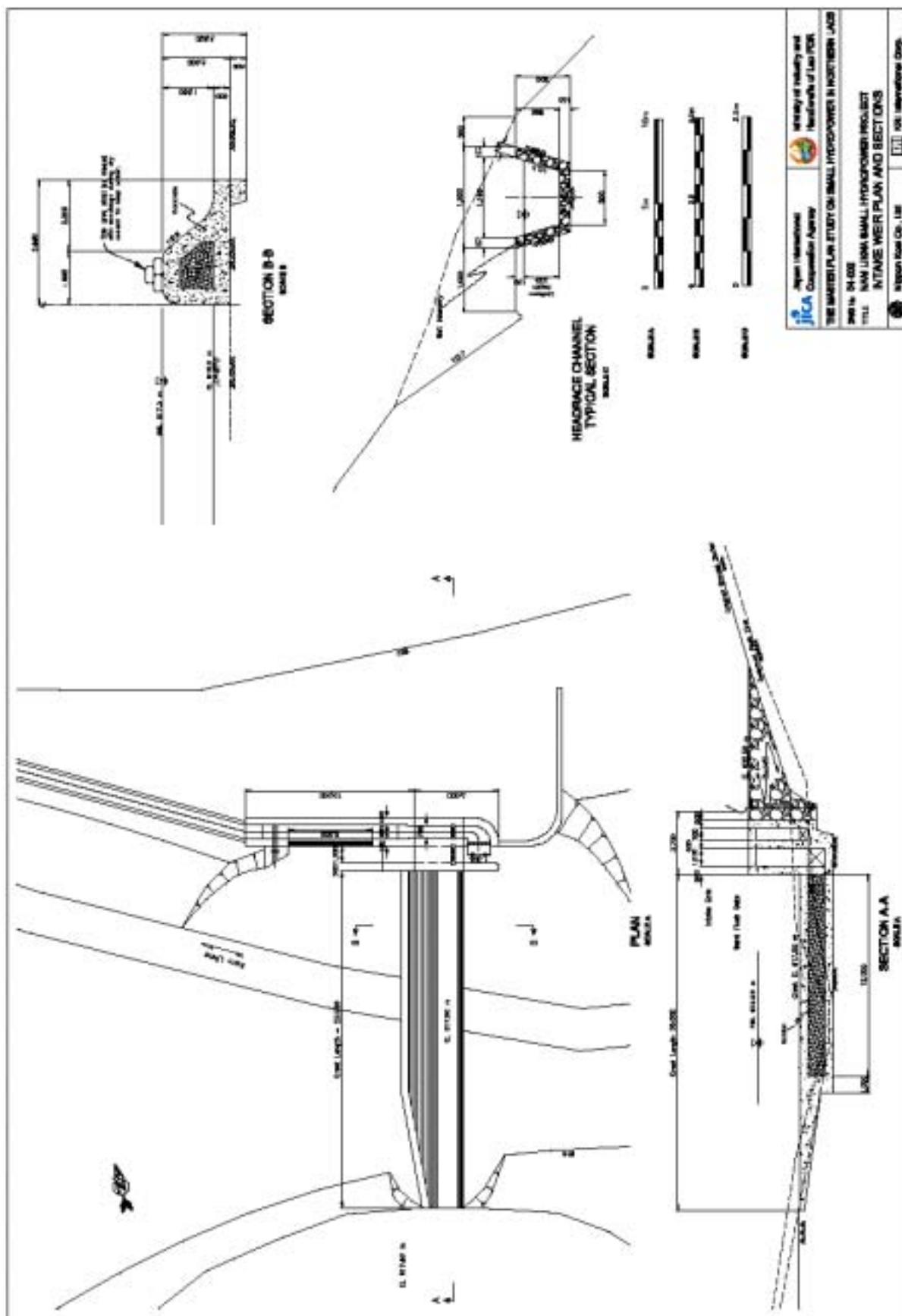
Items	Cost
1.Civil Works	
1.1 Intake	US\$ 30,853
1.2 Desilting Basin	US\$ 14,786
1.3 Headrace Channel	US\$ 15,574
1.4 Head Tank	US\$ 2,992
1.5 Penstock	US\$ 789
1.6 Powerhouse	US\$ 2,838
1.7 Tailrace	US\$ 32
1.8 Access Road	US\$ 5,000
1.9 Miscellaneous (20% of 1.1~1.11)	US\$ 14,547
Total of Civil Works	US\$ 87,437

Items	Cost
2.Steel Penstock	US\$ 3,461
3.Gate & Trashracks	US\$ 5,850
4.Turbine & Generator	US\$ 70,057
5. Transformer & Switchgear	US\$ 10,483
6. Transmission Line	US\$ 12,000
7.E&M Miscellaneous (10% of 2-6)	US\$ 8,985
Total of E&M Works	US\$ 110,836
GRAND TOTAL	US\$ 198,273

C. Economic Analysis

1.Unit Construction Cost	US\$ 6,609 /kW				
2.Unit Generation Cost	UScent	/kWh			
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %





2. Nam Ou Neua (Sequence No. 5)

A. Salient Features

1.General	Province	Phongsaly		District	Gnod Ou	
	Electr. Status	Electrified by diesel genset				
2.Demand	Load Center	Ou Tai (District Center) and Ou Neua			H/H Number	1,239
	Peak Load	259 kW			Peak Hours	4 hours
3.Hydrology	River	Nam Ou		Basin	Nam Ou	CA 593 km ²
	Rainfall	1,750 mm		Q _{ave}	14.23 m ³ /s	Q _{95%} 3.60 m ³ /s
4.Structures						
4.1 Intake	Type	Gabion-core concrete facing			Height	4.0 m
				FSL	753.0 m	FWL 759.26 m
4.2 Desilting Basin	Length	18.5 m	Width	2.5 m	Side Spillway Length	12 m
4.3 Headrace Channel	Shape	Trapezoidal (1:0.5)			Lining	Wet Masonry
	Uniform Depth	1.04 m			Base	1.3 m
4.4 Head Tank	Regulating Capacity	(None) m ³			NWL	750.77 m
				MOL	748.27 m	
4.5 Penstock	Type	Exposed			Dia.	0.9 m
				Length	102.3 m	
4.6 Powerhouse	Type	Surface	EL	490.94 m	Turbine	Cross-Flow
					Units	1 nos
5.Power and Energy	Q _{design}	1.87 m ³ /s	H _{net}	20 m	Installed Capacity	259 kW
	Energy	1,140,456 kWh/yr			P.F.	50%
6.Access Road	Length	1.0 km				
7.Transmission Line	Capacity	22 kV			Length	40 km
	Loss	10.0%			Energy Delivered.	1,026,410 kWh/yr

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 168,329
1.2 Desilting Basin	US\$ 109,825
1.3 Headrace Channel	US\$ 364,930
1.4 Head Tank	US\$ 37,016
1.5 Spillway Channel	US\$ 2,277
1.6 Penstock	US\$ 8,038
1.7 Powerhouse	US\$ 19,897
1.8 Tailrace	US\$2,015
1.9 Access Road	US\$ 10,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 144,465
Total of Civil Works	US\$ 866,792
2.Steel Penstock	US\$ 47,984

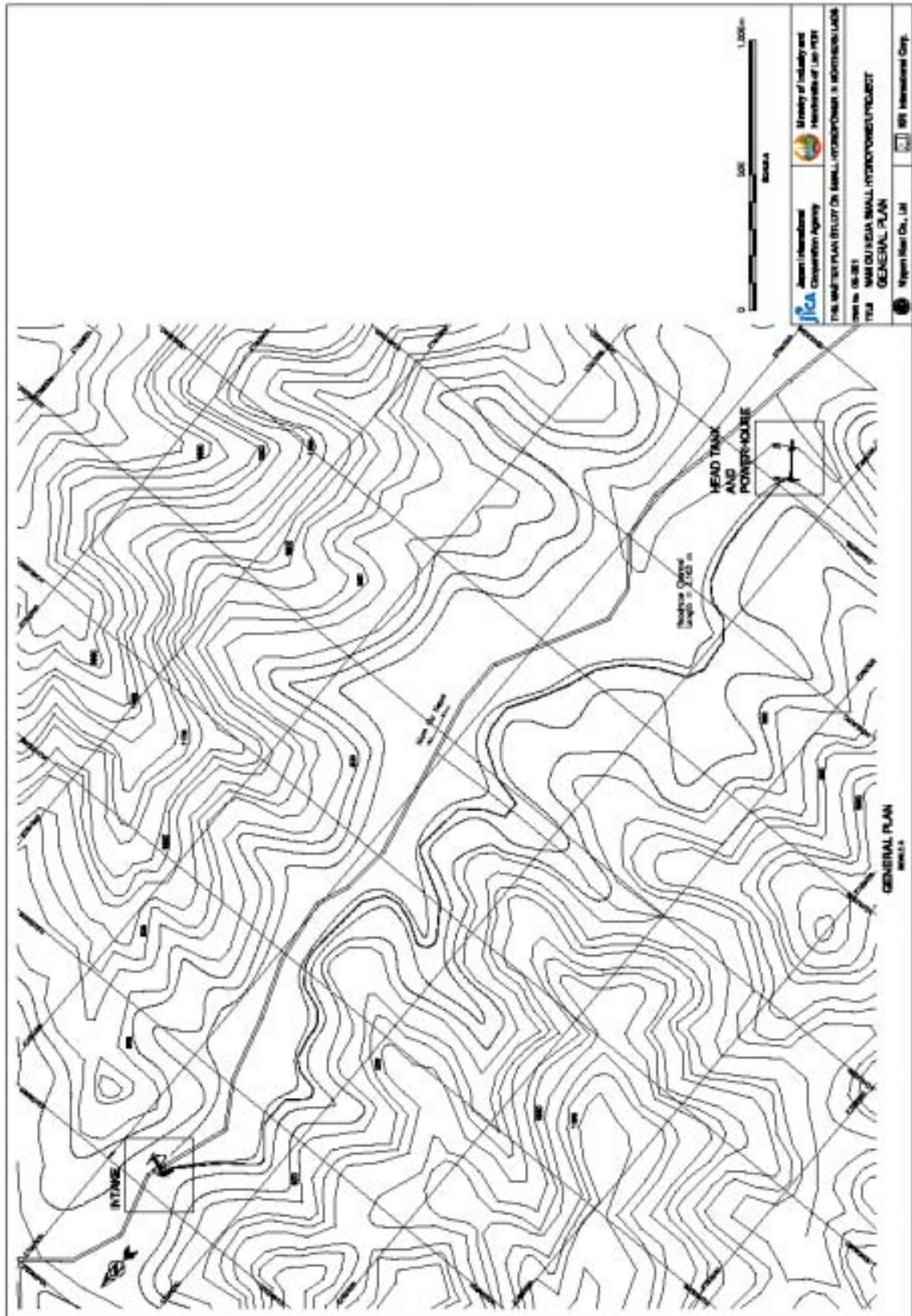
Items	Cost
3.Gate & Trashracks	US\$ 9,999
4.Turbine & Generator	US\$ 123,016
5.Transformer & Switchgear	US\$ 18,408
6.Transmission Line	US\$ 501,727
7.E&M Miscellaneous (10% of 2-5)	US\$ 19,941
Total of E&M Works	US\$ 721,075
GRAND TOTAL	US\$ 1,587,867

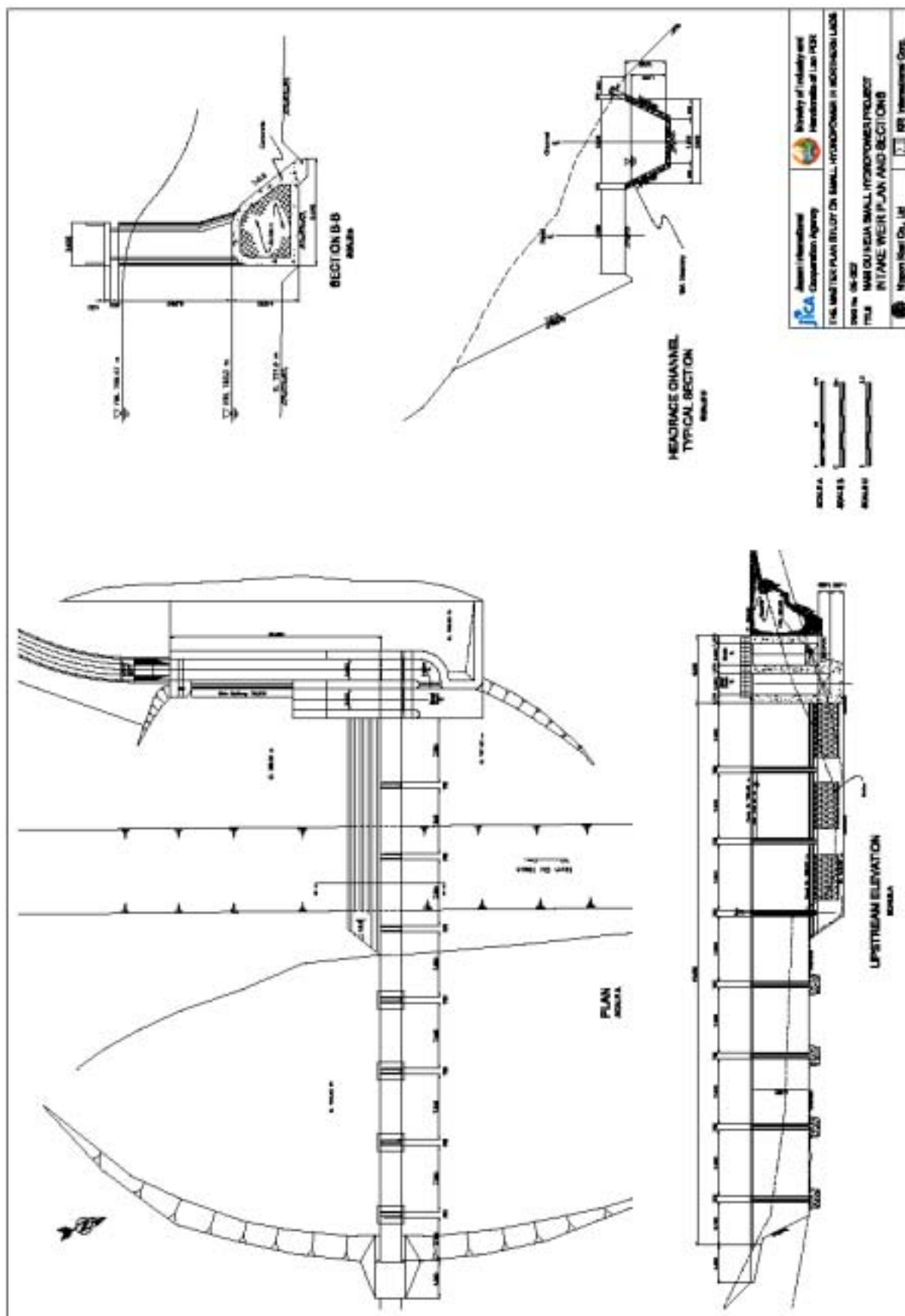
C. Economic Analysis

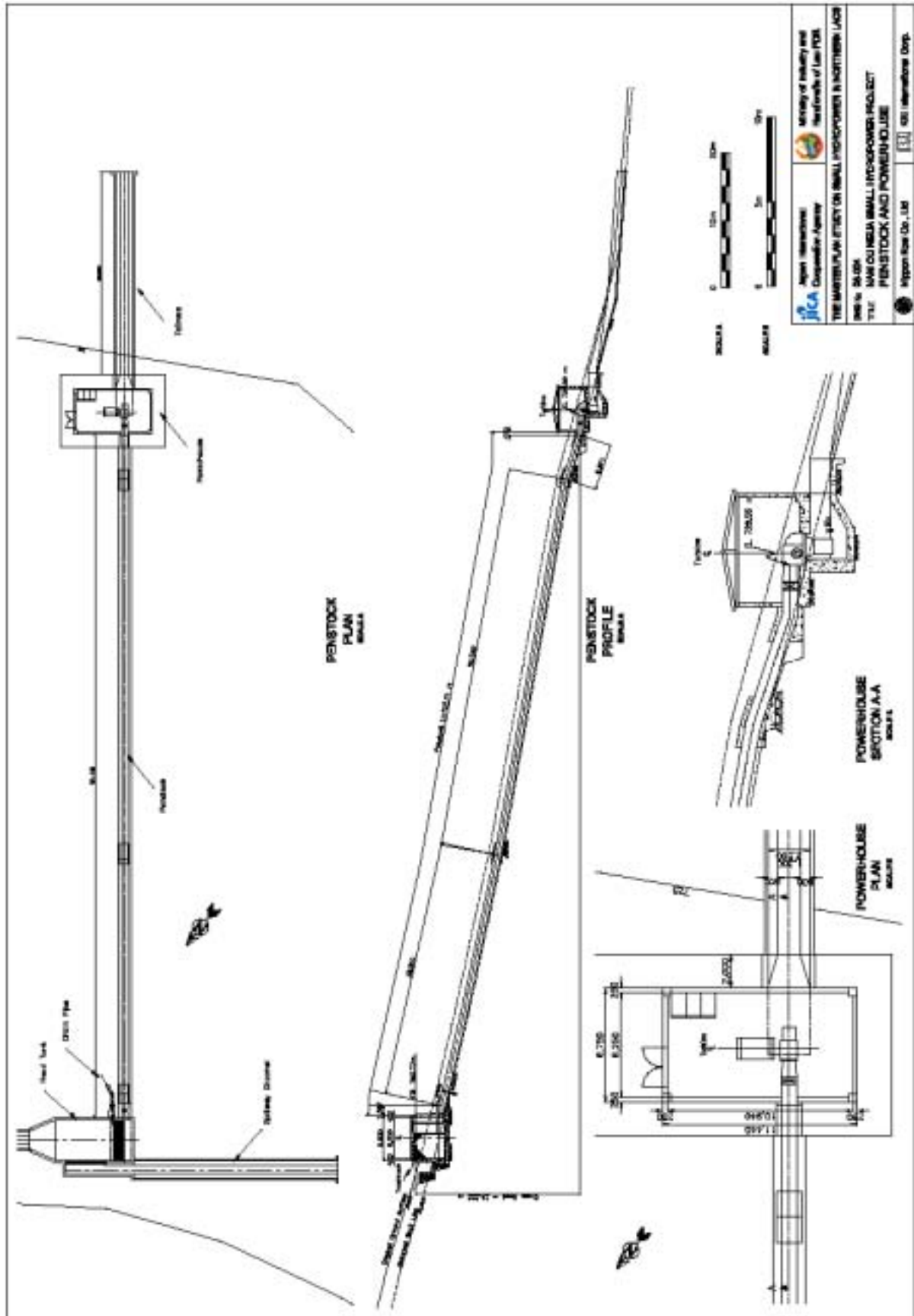
1.Unit Construction Cost	US\$ 6,107 / kW				
2.Unit Generation Cost	UScent / kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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3. Nam Boun 2 (Sequence No. 6)

A. Salient Features

1.General	Province	Phongsaly		District	Boun Nua	
	Electr. Status	Nam Boun 1 (110 kW) supplies Boun Nua and Nam Ngay (1.2 MW) supplies Phongsaly				
2.Demand	Load Center	Grid (to be extended after 2009)		H/H Number	---	
	Peak Load	---		Peak Hours	---	
3.Hydrology	River	N. Boun (divert to N. Hoy)		Basin	Nam Ou	CA 302 km ²
	Rainfall	1,800 mm		Q _{ave}	7.48 m ³ /s	Q _{95%} 1.88 m ³ /s
4.Structures						
4.1 Intake Weir	Type	Gabion-core concrete facing		Height	4.7 m	Length 30.0 m
				FSL	898.87 m	FWL 902.51m
4.2 Desilting Basin	Length	---	Width	---	Side Spillway Length ---	
4.3 Headrace Tunnel (Free-flow)	Shape	Horseshoe (r ₀ =0.91 m)		Lining	Wet Masonry	Length 3,102 m
	Uniform Depth	1.59 m		r ₀	0.91 m	
4.4 Head Tank	Regulating Capacity	(None) m ³		NWL	895.62 m	MOL 893.39 m
4.5 Penstock	Type	Exposed		Dia.	1.45 m	Length 411.8 m
4.6 Powerhouse	Type	Surface	EL 758.44 m	Turbine	Francis (H)	Units 2 nos
5.Power and Energy	Q _{design}	3.90 m ³ /s	H _{net} 129.5 m	Installed Capacity 4,000 kW		
	Energy	27,708,672 kWh/yr		P.F.	78%	
6.Access Road	Length	20 km				
7.Transmission Line	Capacity	22 kV	Length	20 km	Loss	8.0% Energy Delivered 25,499,716 kWh/yr

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake Weir	US\$ 242,920
1.2 Tunnel Portal	US\$ 138,556
1.3 Headrace Tunnel	US\$ 1,745,427
1.4 Head Tank	US\$ 94,151
1.5 Spillway Channel	US\$ 7,284
1.6 Penstock	US\$ 201,589
1.7 Powerhouse	US\$ 176,542
1.8 Tailrace	US\$ 779,082
1.9 Access Road	US\$ 200,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 717,110
Total of Civil Works	US\$ 4,302,661
2.Steel Penstock	US\$ 436,272

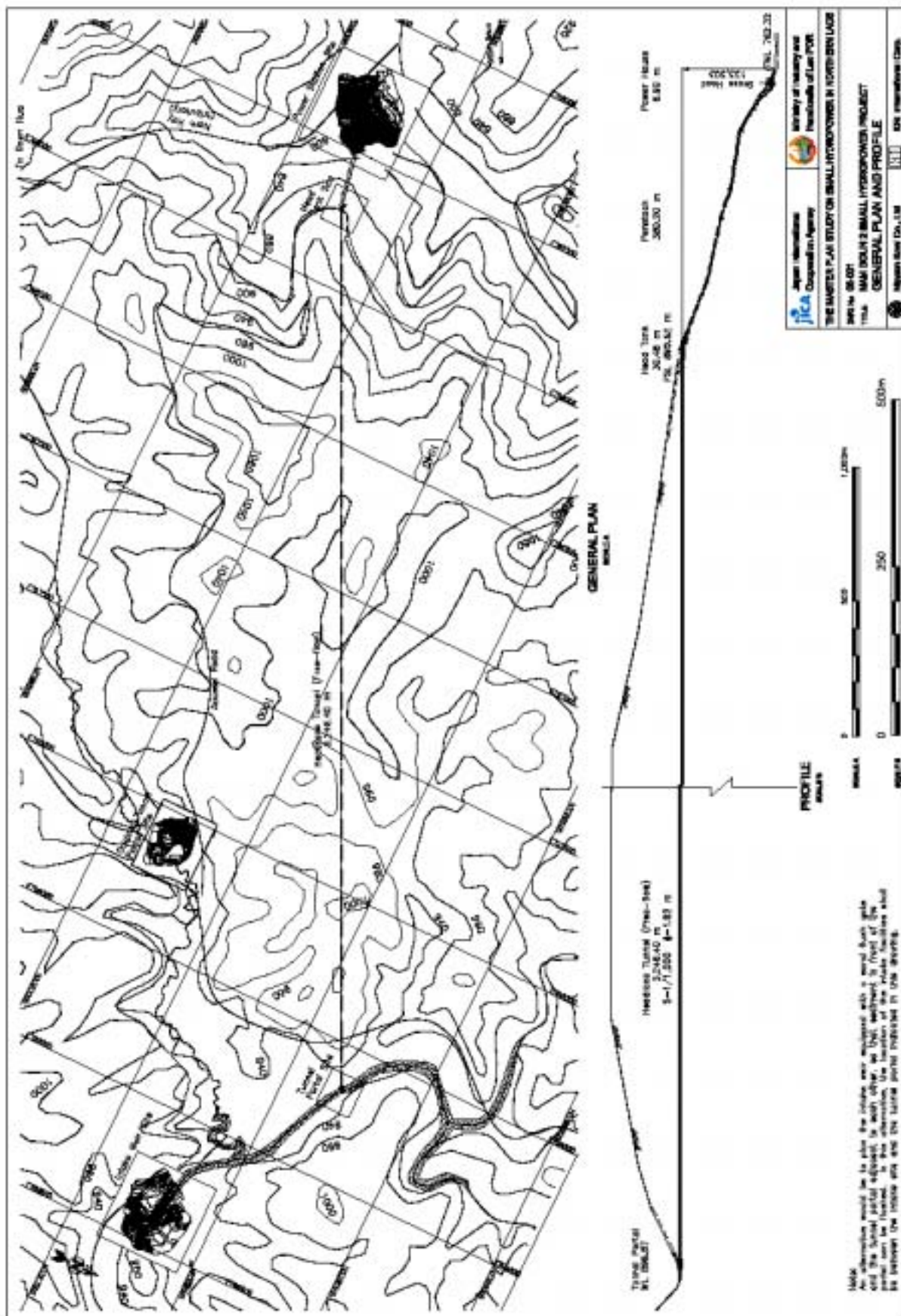
Items	Cost
3.Gate & Trashracks	US\$ 16,374
4.Turbine & Generator	US\$ 485,272
5.Transformer & Switchgear	US\$ 188,493
6.Transmission Line	US\$ 281,868
7.E&M Miscellaneous (10% of 2-5)	US\$ 122,641
Total of E&M Works	US\$ 1,520,921
GRAND TOTAL	US\$ 5,823,581

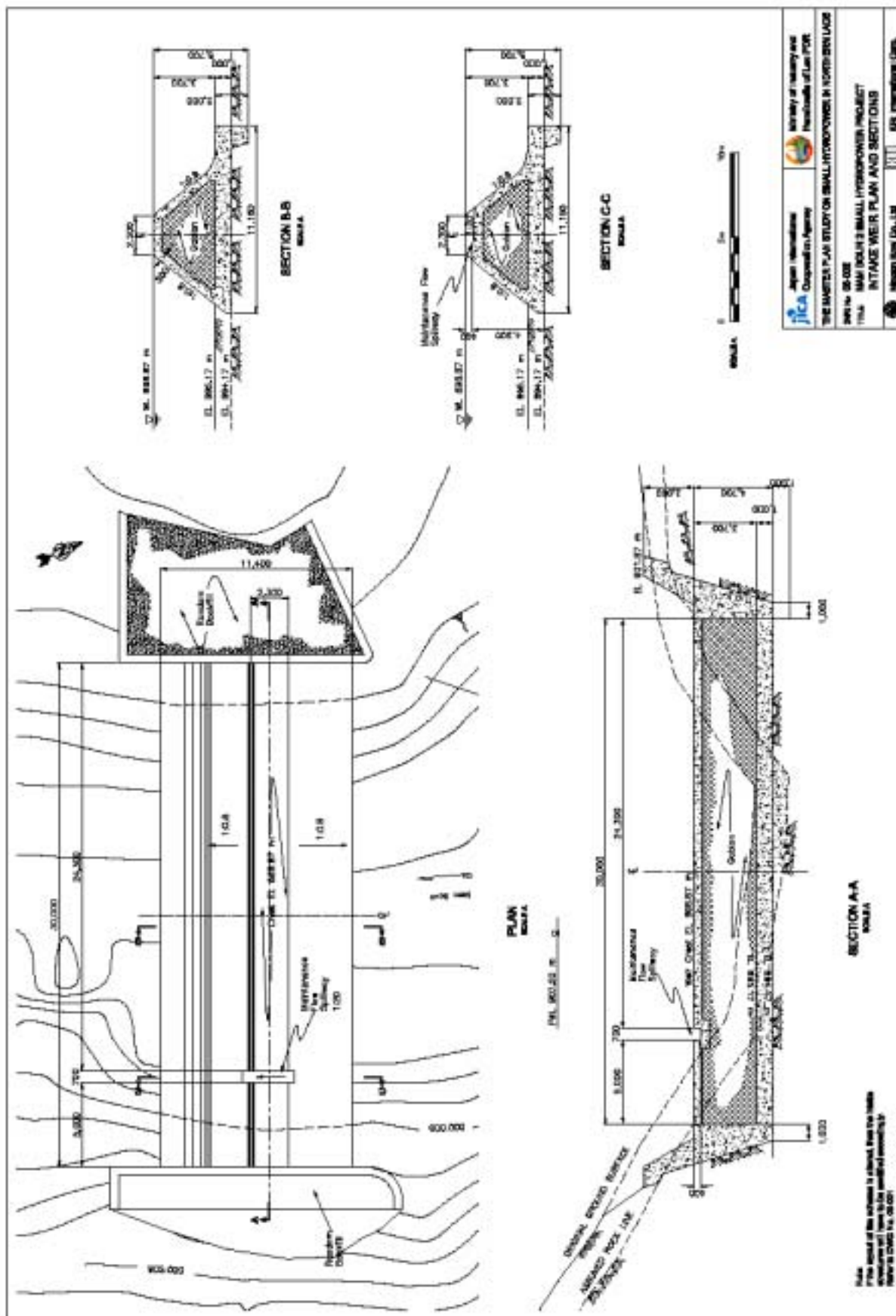
C. Economic Analysis

1.Unit Construction Cost	US\$ 1,456 / kW				
2.Unit Generation Cost	UScent / kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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4. Nam Long (Sequence No. 7)

A. Salient Features

1.General	Province	Luangnamtha	District	Long				
	Electr. Status	Diesel Power Generator (30kW) operated by District						
2.Demand	Load Center	Grid 22kV(to be extended by 2008)		H/H Number	-			
	Peak Load	-		Peak Hours	-			
3.Hydrology	River	N. Long	Basin	Nam Long	CA	156 km ²		
	Rainfall	1,730 mm	Q _{ave}	2.80 m ³ /s	Q _{95%}	0.43 m ³ /s		
4.Structures								
4.1 Intake	Type	Concrete weir		Height	3.7 m	Length	50 m	
				FSL	1014.70 m	FWL	1019.36 m	
4.2 Desilting Basin	Length	26.4 m	Width	2.50 m	Side Spillway Length	12.0 m		
4.3 Headrace Channel	Shape	Rectangle		Lining	Concrete	Length	4,220 m	
	Uniform Depth	0.77 m		Base	1.60 m			
4.4 Head Tank	Regulating Capacity	162.0 m ³		NWL	1,010.178m	MOL	1,009.27m	
4.5 Penstock	Type	Exposed		Dia.	0.80 m	Length	420.60 m	
4.6 Powerhouse	Type	Surface	EL	765.70 m	Turbine	Francis (H)	Units	2 nos
5.Power and Energy	Q _{design}	1.35 m ³ /s	H _{net}	238 m	Installed Capacity	2,500 kW		
	Energy	16,782,480 kWh/yr		P.F.	76.4 %			
6.Access Road	Length	7 km						
7.Transmission Line	Capacity	22 kV	Length	15 km	Loss	9.0%	Energy Delivered	15,269,367 kWh

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 392,385
1.2 Desilting Basin	US\$ 48,400
1.3 Headrace Channel	US\$ 1,190,200
1.4 Head Tank	US\$ 33,950
1.5 Spillway Channel	US\$ 6,600
1.6 Penstock	US\$ 108,140
1.7 Powerhouse	US\$ 91,960
1.8 Tailrace	US\$ 13,340
1.9 Access Road	US\$ 70,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 390,995
Total of Civil Works	US\$ 2,345,970
2.Steel Penstock	US\$ 270,000

Items	Cost
3.Gate & Trashracks	US\$ 10,500
4.Turbine & Generator	US\$ 273,769
5.Transformer & Switchgear	US\$ 169,397
6.Transmission Line	US\$ 373,000
7.E&M Miscellaneous (10% of 2-5)	US\$ 72,367
Total of E&M Works	US\$ 1,169,033
GRAND TOTAL	US\$ 3,515,003

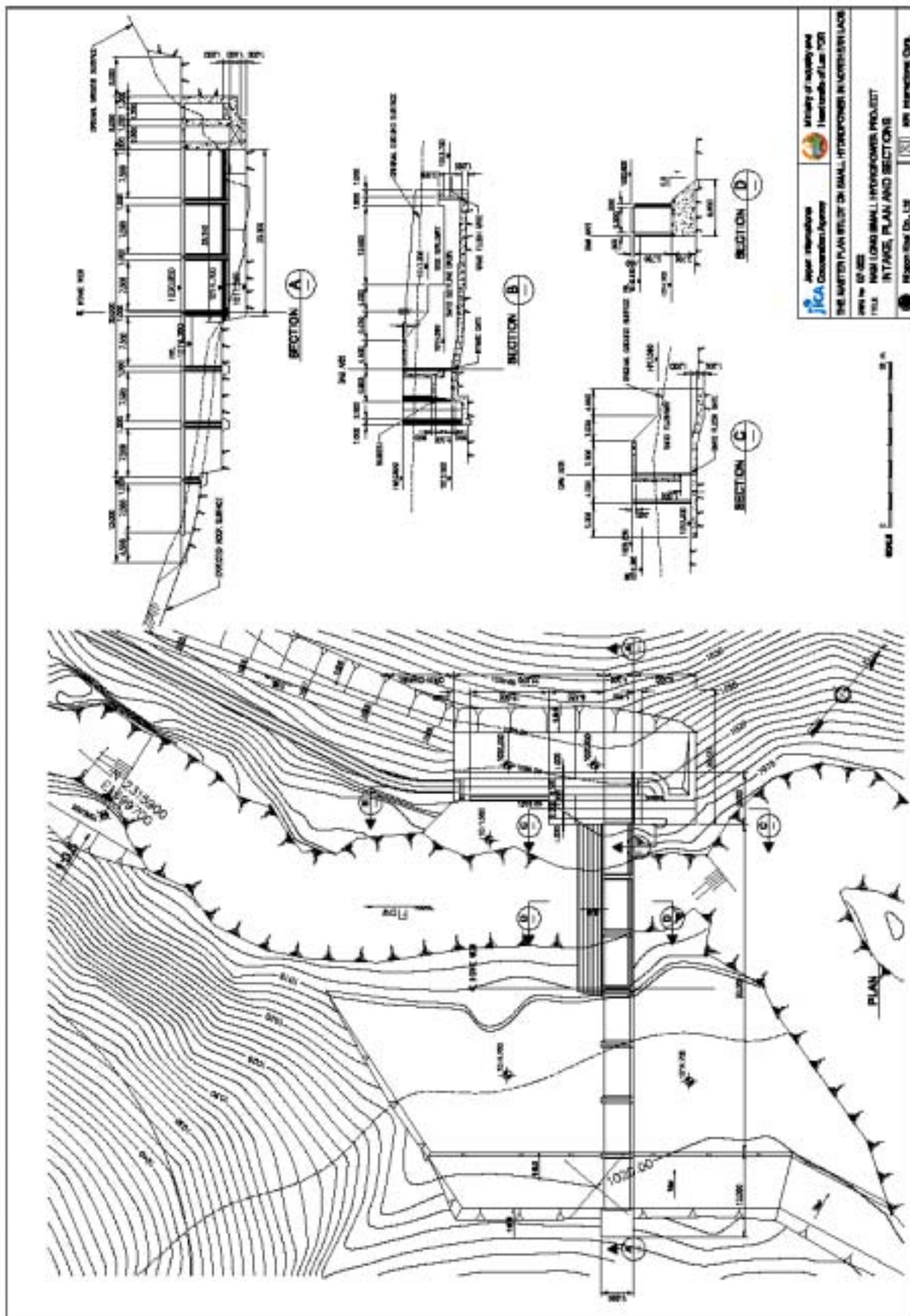
C. Economic Analysis

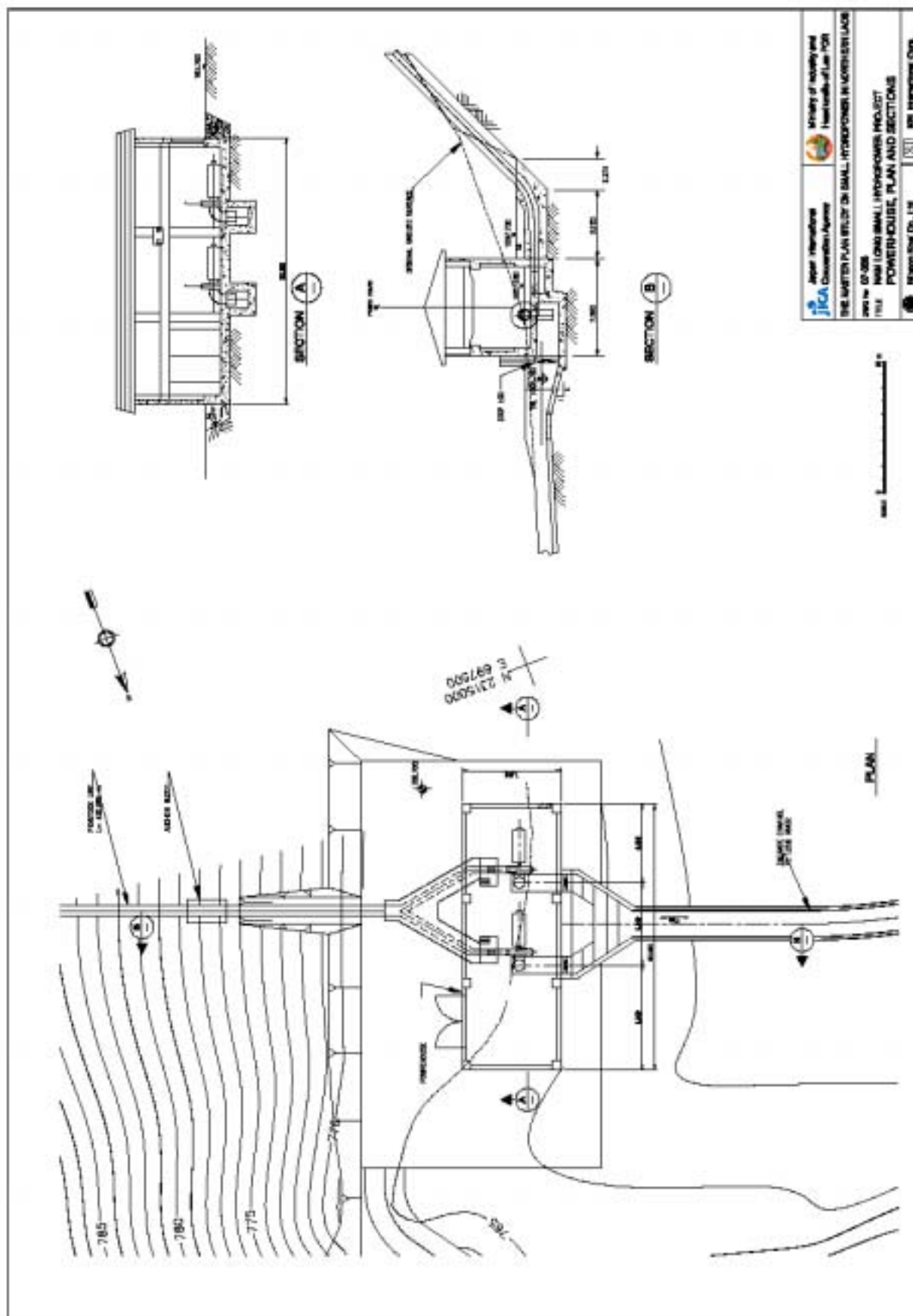
1.Unit Construction Cost	US\$ 1,406 /kW					
2.Unit Generation Cost	UScent /kWh					
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M	n/a % of construction
	Replace	n/a years			EIRR	n/a %

D. Remarks

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5. Nam Gnone (Sequence No. 15)

A. Salient Features

1.General	Province	Bokeo		District	Houaysay	
	Electr. Status	Import from Thailand by Grid Connection				
2.Demand	Load Center	Grid		H/H Number	-	
	Peak Load	-		Peak Hours	-	
3.Hydrology	River	Nam Gnone		Basin	Nam Souang	CA 121 km ²
	Rainfall	1,630 mm		Q _{ave}	2.13 m ³ /s	Q _{95%} 0.33 m ³ /s
4.Structures						
4.1 Intake	Type	Gabion-core concrete facing		Height	2.3 m	Length 20.0 m
				FSL	446.6 m	FWL 450.8 m
4.2 Desilting Basin	Length	15 m	Width	3.0 m	Side Spillway Length	9.0 m
4.3 Headrace Channel	Shape	Trapezoidal (1:0.75)		Lining	Wet Masonry	Length 2,250 m
	Uniform Depth	0.94 m		Base	0.94 m	
4.4 Head Tank	Regulating Capacity	(none) m ³		NWL	443.8 m	MOL 442.0 m
4.5 Penstock	Type	Exposed		Dia.	0.96 m	Length 100.5 m
4.6 Powerhouse	Type	Surface	TWL	401.1 m	Turbine	Francis (H) Units 1 nos
5.Power and Energy	Q _{design}	1.85 m ³ /s	H _{net}	42 m	Installed Capacity	600 kW
	Energy	2,923,992 kWh/yr		P.F.	55.5%	
6.Access Road	Length	2 km				
7.Transmission Line	Capacity	22 kV	Length	15 km	Loss	8.7% Energy Delivered 2,668,825 kWh

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 48,854
1.2 Desilting Basin	US\$ 104,453
1.3 Headrace Channel	US\$ 323,345
1.4 Head Tank	US\$ 33,186
1.5 Spillway Channel	US\$ 6,931
1.6 Penstock	US\$10,869
1.7 Powerhouse	US\$ 39,362
1.8 Tailrace	US\$ 4,855
1.9 Access Road	US\$ 20,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 118,371
Total of Civil Works	US\$ 710,227
2.Steel Penstock	US\$ 42,785

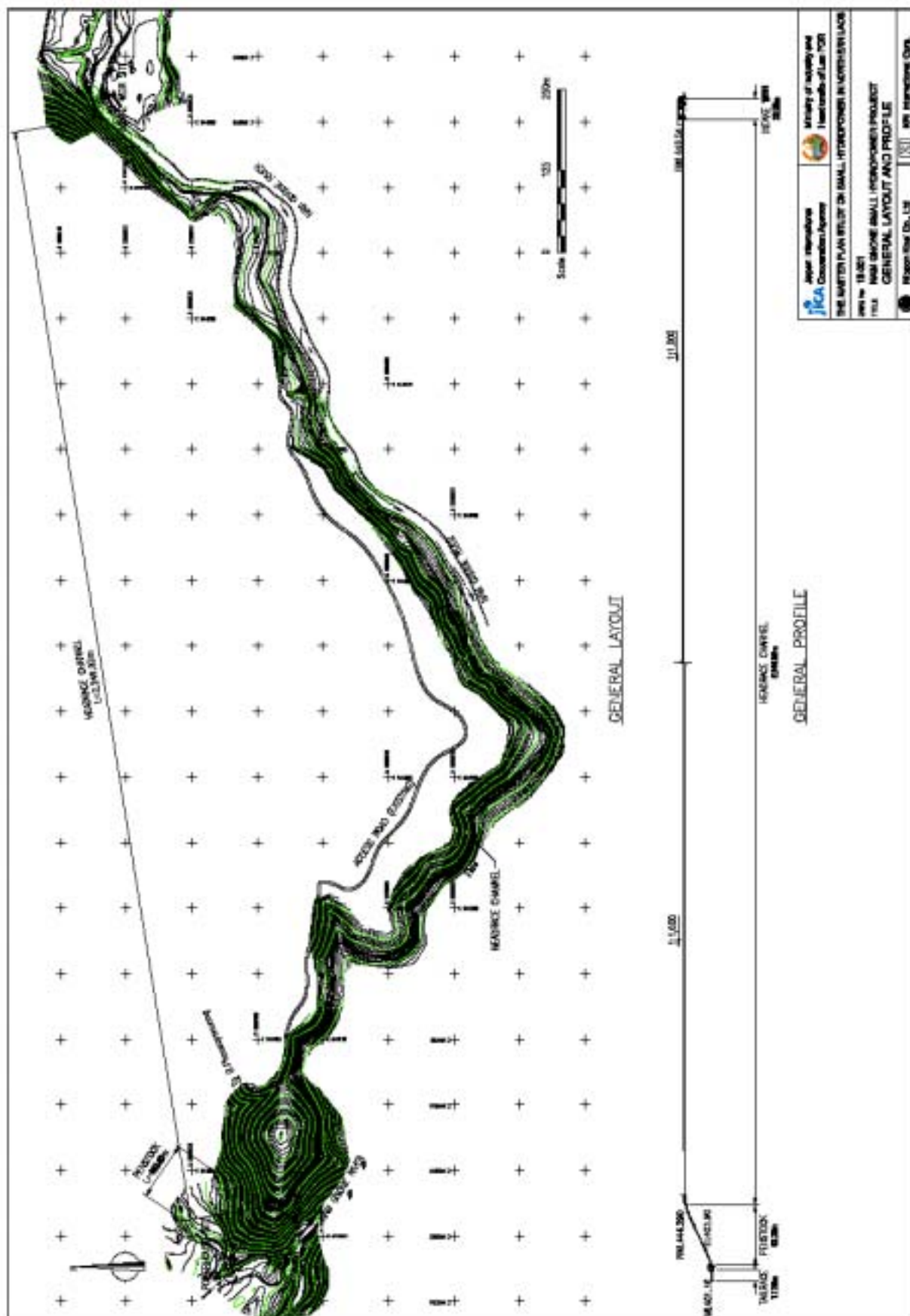
Items	Cost
3.Gate & Trashracks	US\$ 6,152
4.Turbine & Generator	US\$ 197,199
5.Transformer & Switchgear	US\$ 130,303
6.Transmission Line	US\$ 150,921
7.E&M Miscellaneous (10% of 2-5)	US\$ 37,644
Total of E&M Works	US\$ 565,005
GRAND TOTAL	US\$ 1,275,232

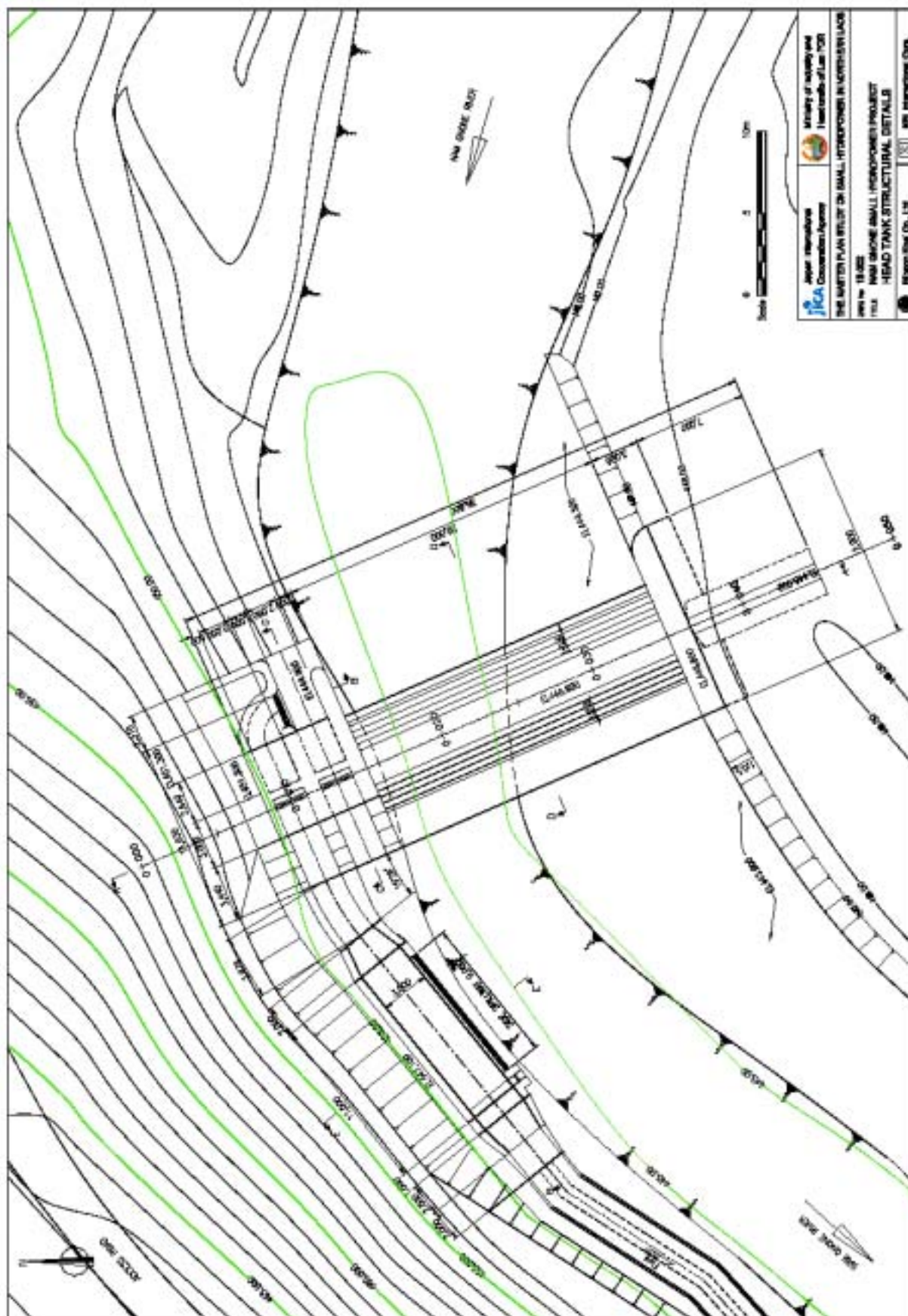
C. Economic Analysis

1.Unit Construction Cost	US\$ 2,125/kW				
2.Unit Generation Cost	UScent /kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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6. Nam Chong (Sequence No. 17)

A. Salient Features

1.General	Province	Bokeo		District	Meung	
	Electr. Status	Partly electrified by pico-hydros with semi-permanent structures				
2.Demand	Load Center	Ban Nam Meung		H/H Number	216 H/H	
	Peak Load	46 kW		Peak Hours	4 hours	
3.Hydrology	River	Nam Chong		Basin	Nam Souang	CA 4.88 km ²
	Rainfall	1,680 mm		Q _{ave}	0.085 m ³ /s	Q _{95%} 0.013 m ³ /s
4.Structures						
4.1 Intake	Type	Conc. Type using Existing Irr. Weir		Height	1.5 m	Length 19.7 m
				FSL	795.00 m	FWL 795.86 m
4.2 Desilting Basin	Length	11.0 m	Width	0.7 m	Side Spillway Length	7.5 m
4.3 Headrace Channel	Shape	Trapezoidal (1:0.5)		Lining	Wet Masonry	Length 1,002.05 m
	Uniform Depth	0.40 m		Base	0.5 m	
4.4 Head Tank	Regulating Capacity	15 m ³		NWL	792.8 m	MOL 792.05 m
4.5 Penstock	Type	Exposed		Dia.	0.24 m	Length 209.95 m
4.6 Powerhouse	Type	Surface	EL	730.25 m	Turbine	Cross Flow Units 1 nos
5.Power and Energy	Q _{design}	0.121m ³ /s	H _{net}	61.8 m	Installed Capacity	50 kW
	Energy	132,020 kWh/yr		P.F.	30.7%	
6.Access Road	Length	0.5 km				
7.Transmission Line	Capacity	22 kV		Length	5 km	
	Loss	10.0%		Energy Delivered.	118,818 kWh/yr	

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake Weir	US\$ 1,061
1.2 Intake & Desilting Basin	US\$ 6,448
1.3 Headrace Channel	US\$ 22,312
1.4 Head Tank	US\$ 1,053
1.5 Spillway Channel	US\$ 649
1.6 Penstock	US\$ 369
1.7 Powerhouse	US\$ 5,858
1.8 Tailrace	US\$ 649
1.9 Access Road	US\$ 5,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 8,680
Total of Civil Works	US\$ 52,077
2.Steel Penstock	US\$ 27,954

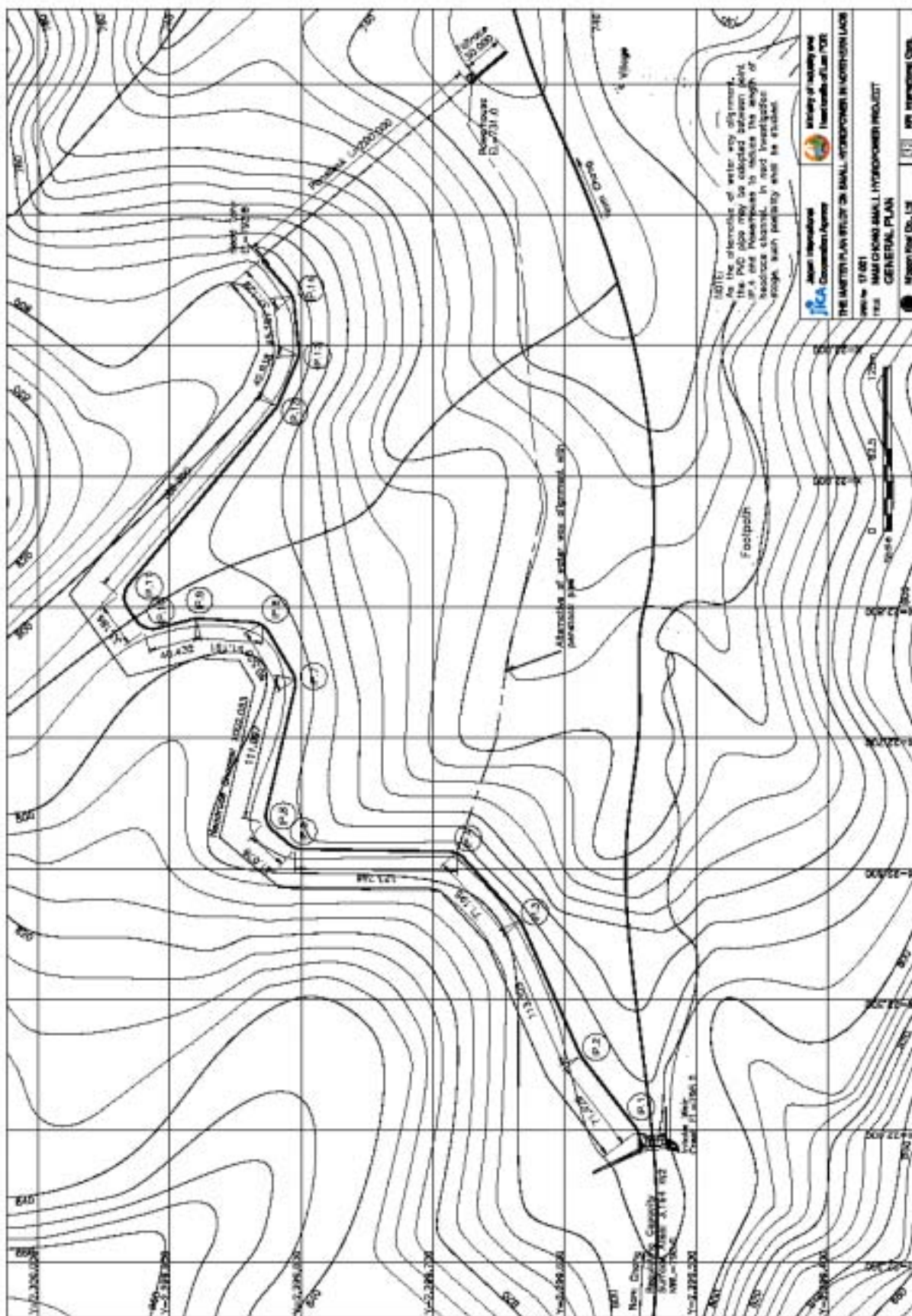
Items	Cost
3.Gate & Trashracks	US\$ 1,200
4.Turbine & Generator	US\$ 69,230
5.Transformer & Switchgear	US\$ 10,470
6.Transmission Line	US\$ 57,453
7.E&M Miscellaneous (10% of 2-6)	US\$ 10,885
Total of E&M Works	US\$ 177,282
GRAND TOTAL	US\$ 229,360

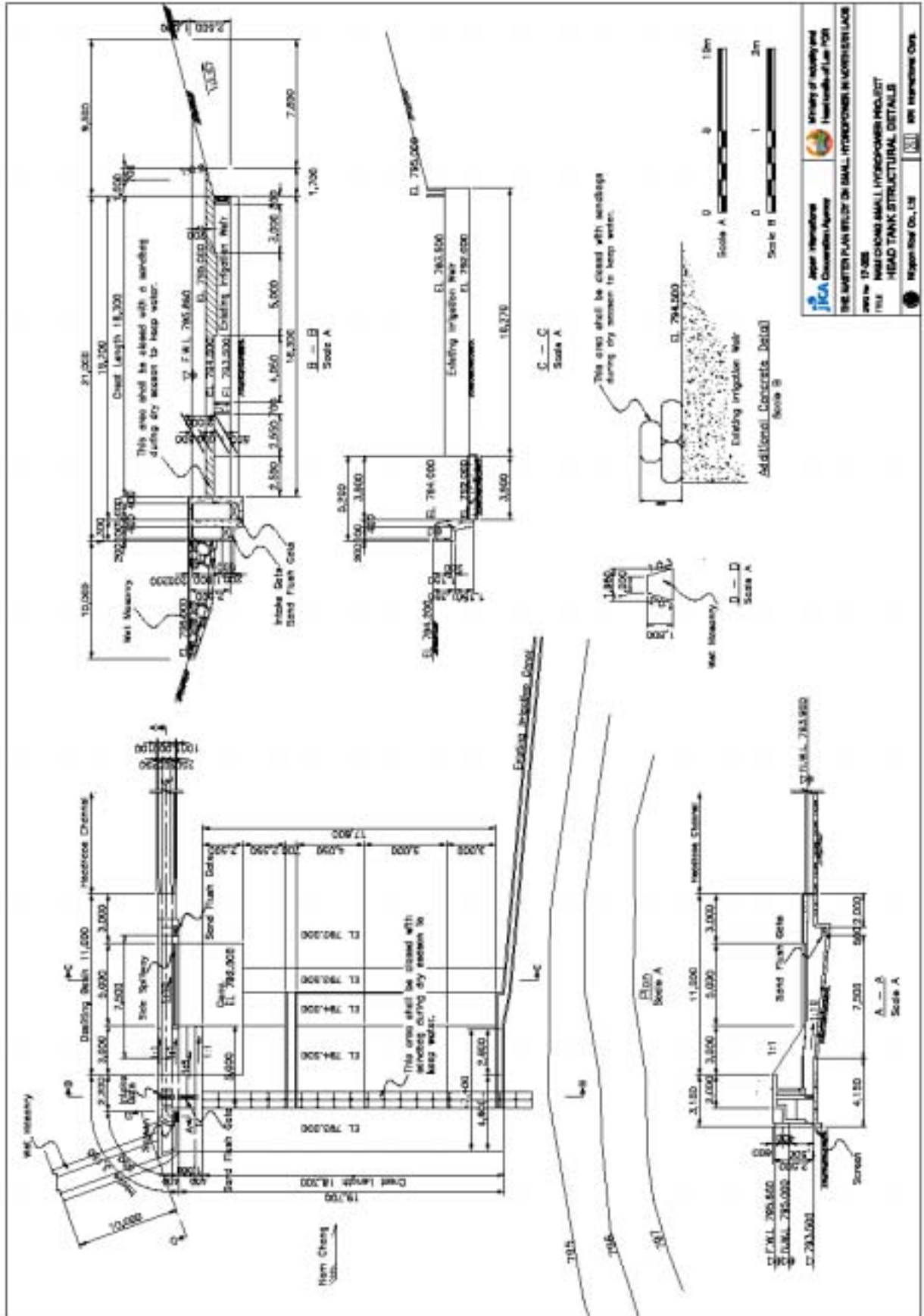
C. Economic Analysis

1.Unit Construction Cost	US\$ 4,587 /kW				
2.Unit Generation Cost	UScent /kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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7. Nam Hat 2 (Sequence No. 20)

A. Salient Features

1.General	Province	Bokeo		District	Pha Oudom	
	Electr. Status	Un-electrified				
2.Demand	Load Center	Pha Oudom District Center			H/H Number	693
	Peak Load	116 kW			Peak Hours	4 hours
3.Hydrology	River	Nam Hat		Basin	Nam Hat	CA 117 km ²
	Rainfall	1,560 mm		Q _{ave}	1.89 m ³ /s	Q _{95%} 0.29 m ³ /s
4.Structures						
4.1 Intake	Type	Gabion-core Concrete-facing			Height	2.0 m
					FSL	494.00 m
					FWL	498.65 m
4.2 Desilting Basin	Length	12.8 m	Width	1.23 m	Side Spillway Length	4.0 m
4.3 Headrace Channel	Shape	Trapezoidal (1:0.3)			Lining	Wet Masonry
	Uniform Depth	0.50 m			Base	0.75 m
4.4 Head Tank	Regulating Capacity	(none) m ³			NWL	489.22 m
					MOL	488.07 m
4.5 Penstock	Type	Exposed			Dia.	0.4 m
					Length	162 m
4.6 Powerhouse	Type	Surface	EL	438.00 m	Turbine	Cross Flow
					Units	1 nos
5.Power and Energy	Q _{design}	0.36 m ³ /s	H _{net}	48 m	Installed Capacity	116 kW
	Energy	508,244 kWh/yr			P.F.	49.9%
6.Access Road	Length	10 km				
7.Transmission Line	Capacity	22 kV			Length	24 km
	Loss	10.0%			Energy Delivered.	457,420 kWh/yr

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 74,915
1.2 Desilting Basin	US\$ 7,038
1.3 Headrace Channel	US\$ 231,360
1.4 Head Tank	US\$ 10,283
1.5 Spillway Channel	US\$ 4,012
1.6 Penstock	US\$ 4,516
1.7 Powerhouse	US\$ 16,048
1.8 Tailrace	US\$ 932
1.9 Access Road	US\$ 100,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 89,821
Total of Civil Works	US\$ 538,923
2.Steel Penstock	US\$ 35,495

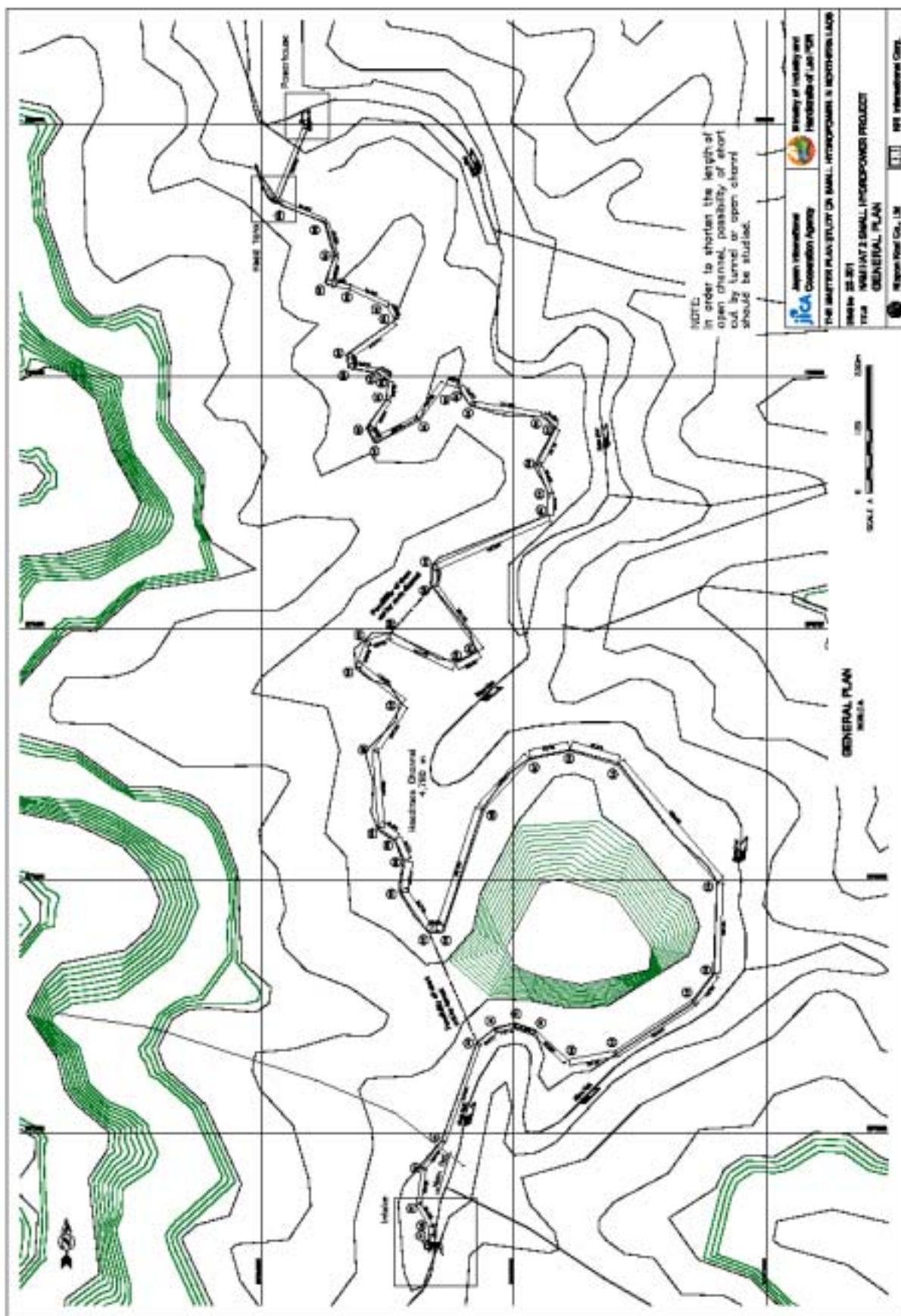
Items	Cost
3.Gate & Trashracks	US\$ 1,843
4.Turbine & Generator	US\$ 79,980
5. Transformer & Switchgear	US\$ 12,920
6.Transmission Line	US\$ 336,639
7.E&M Miscellaneous (10% of 2-5)	US\$ 13,024
Total of E&M Works	US\$ 479,900
GRAND TOTAL	US\$ 1,018,823

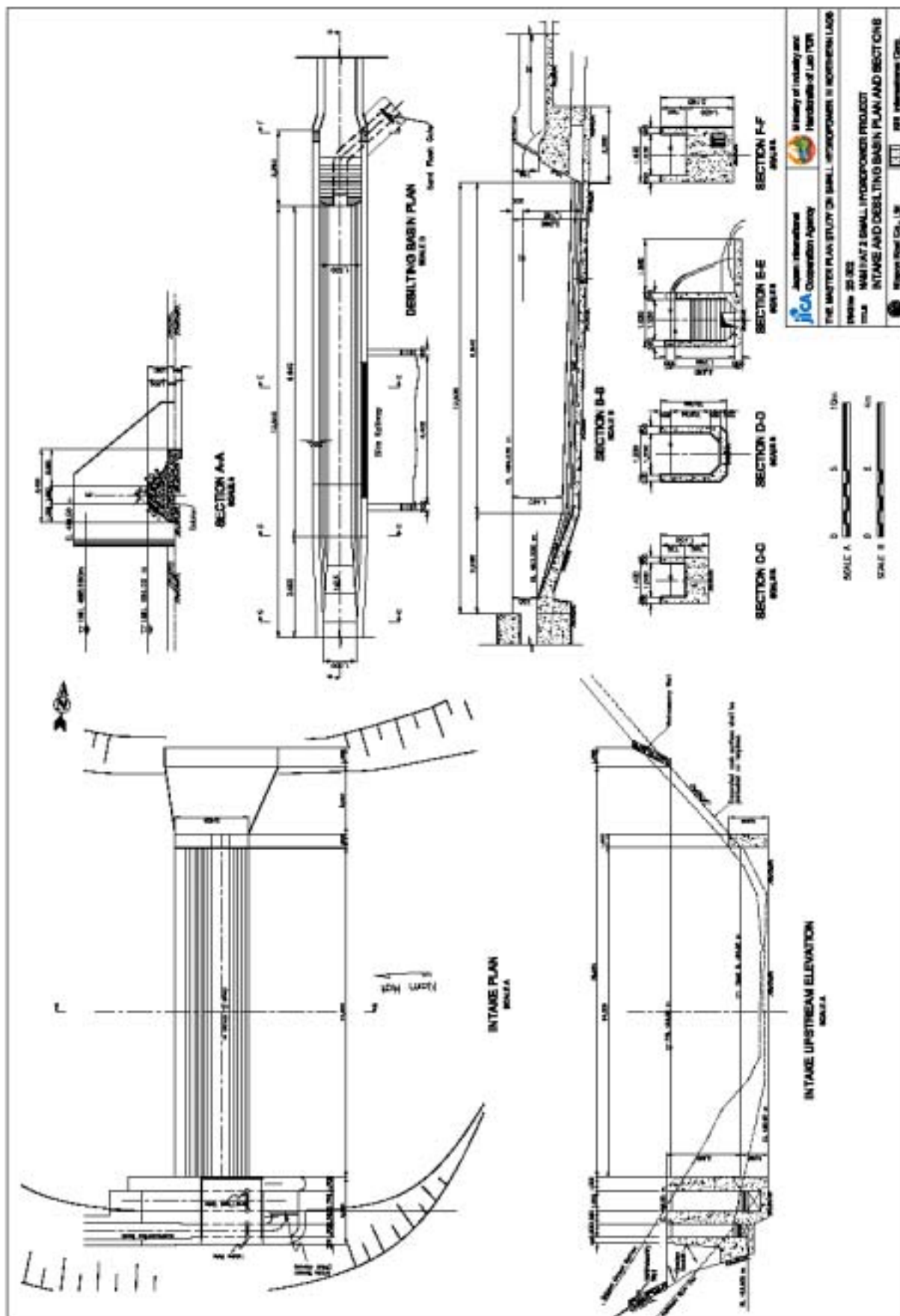
C. Economic Analysis

1.Unit Construction Cost	US\$ 8,490 /kW				
2.Unit Generation Cost	UScent /kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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8. Nam Xeng (Sequence No. 23)

A. Salient Features

1.General	Province	Luangphrabang	District	Vieng Kam				
	Electr. Status							
2.Demand	Load Center	Pak Um (New District Center)	H/H Number	503				
	Peak Load	106 kW	Peak Hours	4 hours				
3.Hydrology	River	Nam Xeng	Basin	Nam Xeng	CA	429 km ²		
	Rainfall	1,570 mm	Q _{ave}	6.98 m ³ /s	Q _{95%}	1.07 m ³ /s		
4.Structures								
4.1 Intake	Type	Gabion-core Concrete-facing	Height	4.0 m	Length	50.0 m		
	Regulating Capacity	6,168 m ³	FSL	504.00 m	FWL	509.35 m		
4.2 Desilting Basin	Length	26 m	Width	3.3 m	Side Spillway Length	10 m		
4.3 Headrace Channel	Shape	Trapezoidal (1:0.3)	Lining	Wet Masonry	Length	2,365 m		
	Uniform Depth	1.05 m	Base	1.6 m				
4.4 Head Tank	Regulating Capacity	---	NWL	502.42 m	MOL	500.42 m		
4.5 Penstock	Type	Exposed	Dia.	0.89 m	Length	17.99 m		
4.6 Powerhouse	Type	Surface	EL	490.94 m	Turbine	Cross-flow	Units	1 nos
5.Power and Energy	Q _{design}	1.50 m ³ /s	H _{net}	10.5 m	Installed Capacity	106 kW		
	Energy	461,772 kWh/yr	P.F.	50.1 %				
6.Access Road	Length	8 km						
7.Transmission Line	Capacity	22 kV	Length	17 km				
	Loss	10.0%	Energy Delivered.	415,595 kWh/yr				

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 187,113
1.2 Desilting Basin	US\$ 31,900
1.3 Headrace Channel	US\$ 152,574
1.4 Head Tank	US\$ 22,211
1.5 Spillway Channel	US\$ 2,100
1.6 Penstock	US\$ 4,035
1.7 Powerhouse	US\$ 18,392
1.8 Tailrace	US\$730
1.9 Access Road	US\$ 20,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 87,813
Total of Civil Works	US\$ 526,878
2.Steel Penstock	US\$ 6,000

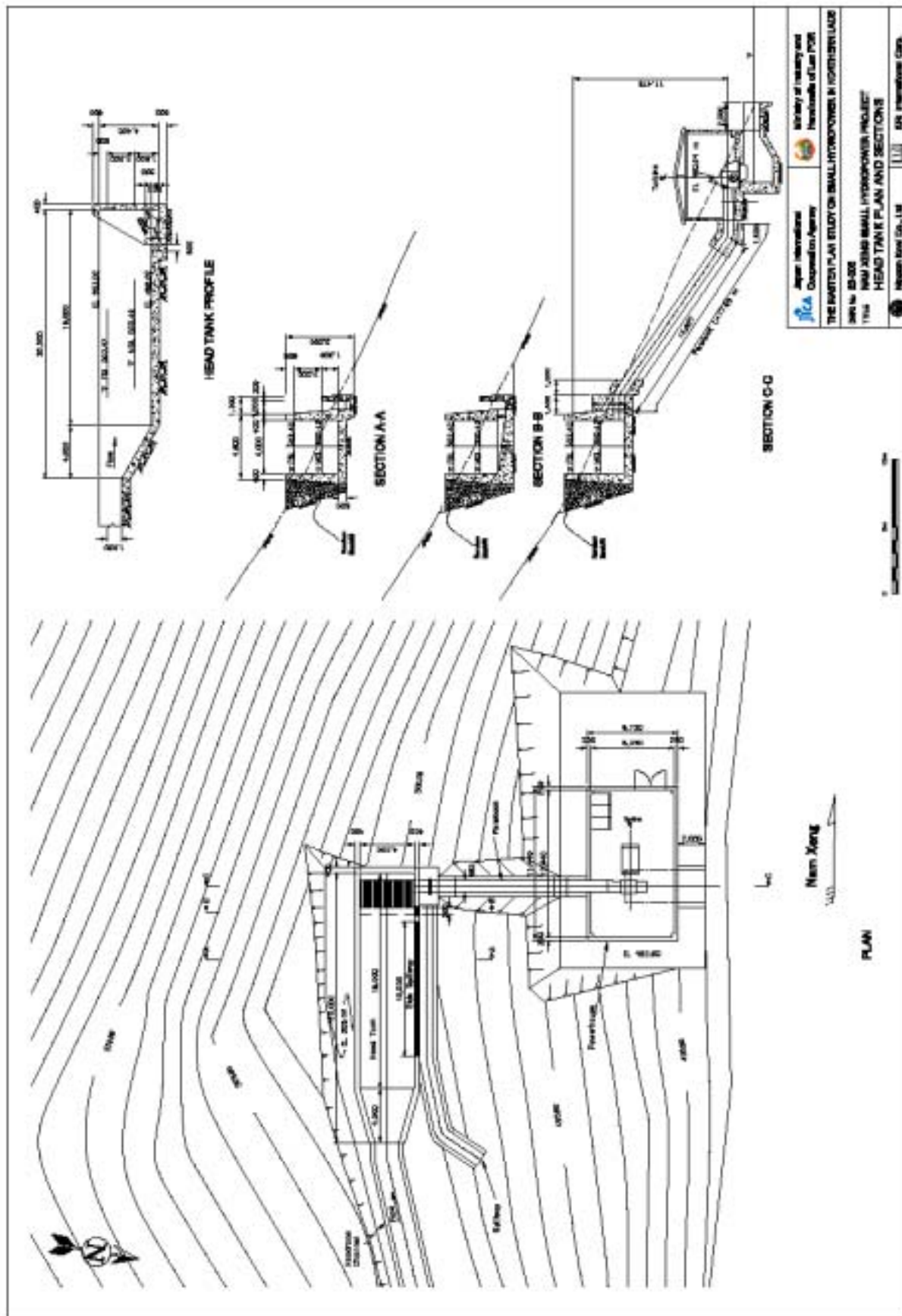
Items	Cost
3.Gate & Trashracks	US\$ 7,500
4.Turbine & Generator	US\$ 96,030
5.Transformer & Switchgear	US\$ 14,370
6.Transmission Line	US\$ 196,224
7.E&M Miscellaneous (10% of 2-5)	US\$ 12,390
Total of E&M Works	US\$ 332,514
GRAND TOTAL	US\$ 859,392

C. Economic Analysis

1.Unit Construction Cost	US\$ 7,813 /kW		
2.Unit Generation Cost	UScent /kWh		
3.Economic Analysis	Project Life n/a years	Discount Rate n/a%	O&M n/a % of construction
	Replace n/a years		EIRR n/a %

D. Remarks

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9. Nam Sim (Sequence No. 27)

A. Salient Features

1.General		Province	Houaphan		District	Viengxay	
		Electr. Status	Power import from Vietnam				
2.Demand		Load Center	Grid			H/H Number	-
		Peak Load	-			Peak Hours	-
2.Hydrology		River	Nam Sim		Basin	Nam Sim	CA 197 km ²
		Rainfall	1,750 mm		Q _{ave}	4.74 m ³ /s	Q _{95%} 1.19 m ³ /s
3.Structures							
3.1 Intake	Weir A	Type	Gabion-core Concrete-facing		Height	7.5 m	Length 30.0 m
	Weir B	Type	Gabion-core Concrete-facing		Height	5.0 m	Length 30.0 m
3.2 Desilting Basin		Length	18.5 m	Width	2.5 - 6.6 m		Side Spillway Length 12 m
3.3 Headrace Tunnel		Shape	Standard Horseshoe (Pressure)		Lining	Concrete	Length 1,186 m
3.4 Headrace Channel		Shape	Trapezoidal (1:0.5)		Lining	Wet Masonry	Length 536 m
		Uniform Depth	1.58 m		Base	2.35 m	
3.5 Head Tank		Regulating Capacity	(none) m ³		NWL	619.46 m	MOL 616.38 m
3.6 Penstock		Type	Exposed		Dia.	1.5 m	Length 452 m
3.7 Powerhouse		Type	Surface	EL	462.56 m	Turbine	Hor. Francis Units 2 nos
4.Power and Energy		Q _{design}	6.0 m ³ /s	H _{net}	165 m	Installed Capacity	8,000 kW
		Energy	34,671,744 kWh/yr		P.F.	49.3 %	
5.Access Road		Length	20 km				
6.Transmission Line		Capacity	22 kV	Length	12 km	Loss	8.7% Energy Delivered 31,672,903 kWh

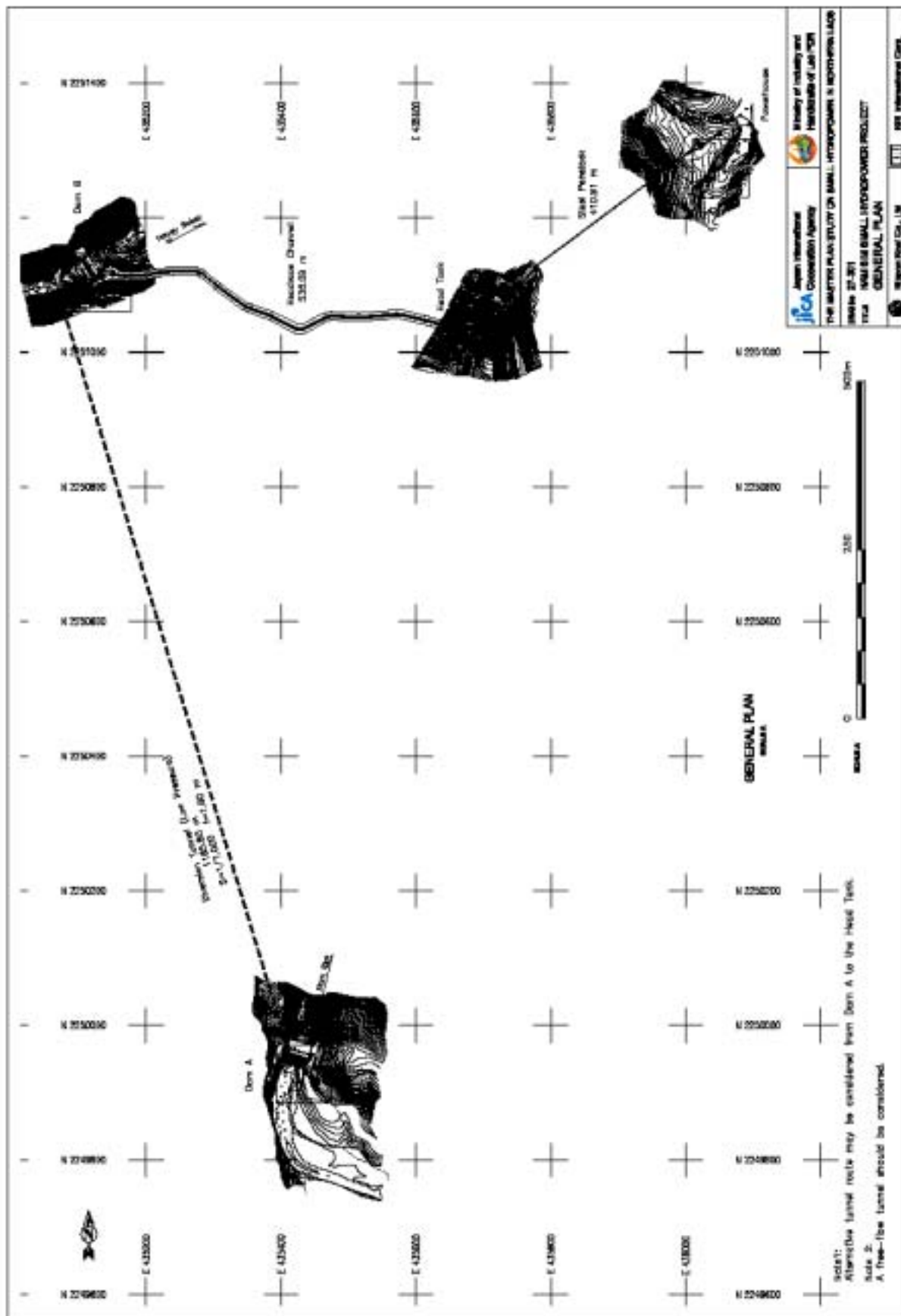
B. Construction Cost

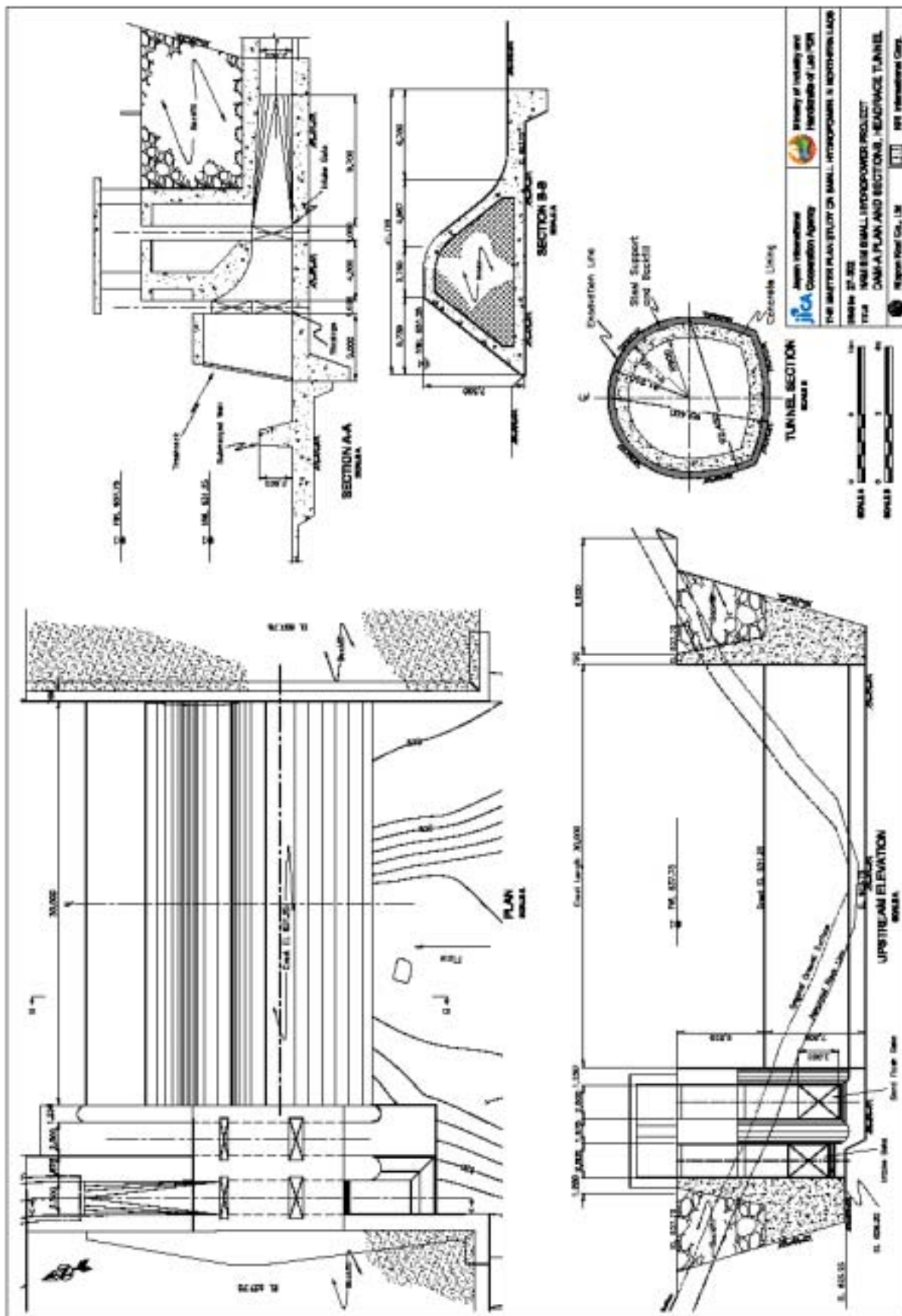
Items	Cost
1.Civil Works	
1.1 Intake Weir A	US\$ 1,338,905
1.2 Headrace Tunnel	US\$ 672,462
1.3 Intake Weir B	US\$ 612,864
1.4 Desilting Basin	US\$ 55,414
1.5 Headrace Channel	US\$ 313,027
1.6 Head Tank	US\$ 99,588
1.7 Spillway	US\$ 12,877
1.8 Penstock	US\$ 418,445
1.9 Powerhouse	US\$ 122,979
1.10 Tailrace	US\$ 6,274
1.11 Access	US\$ 200,000
1.12 Miscellaneous (20% of 1.1~1.11)	US\$ 770,567
Total of Civil Works	US\$ 4,623,403

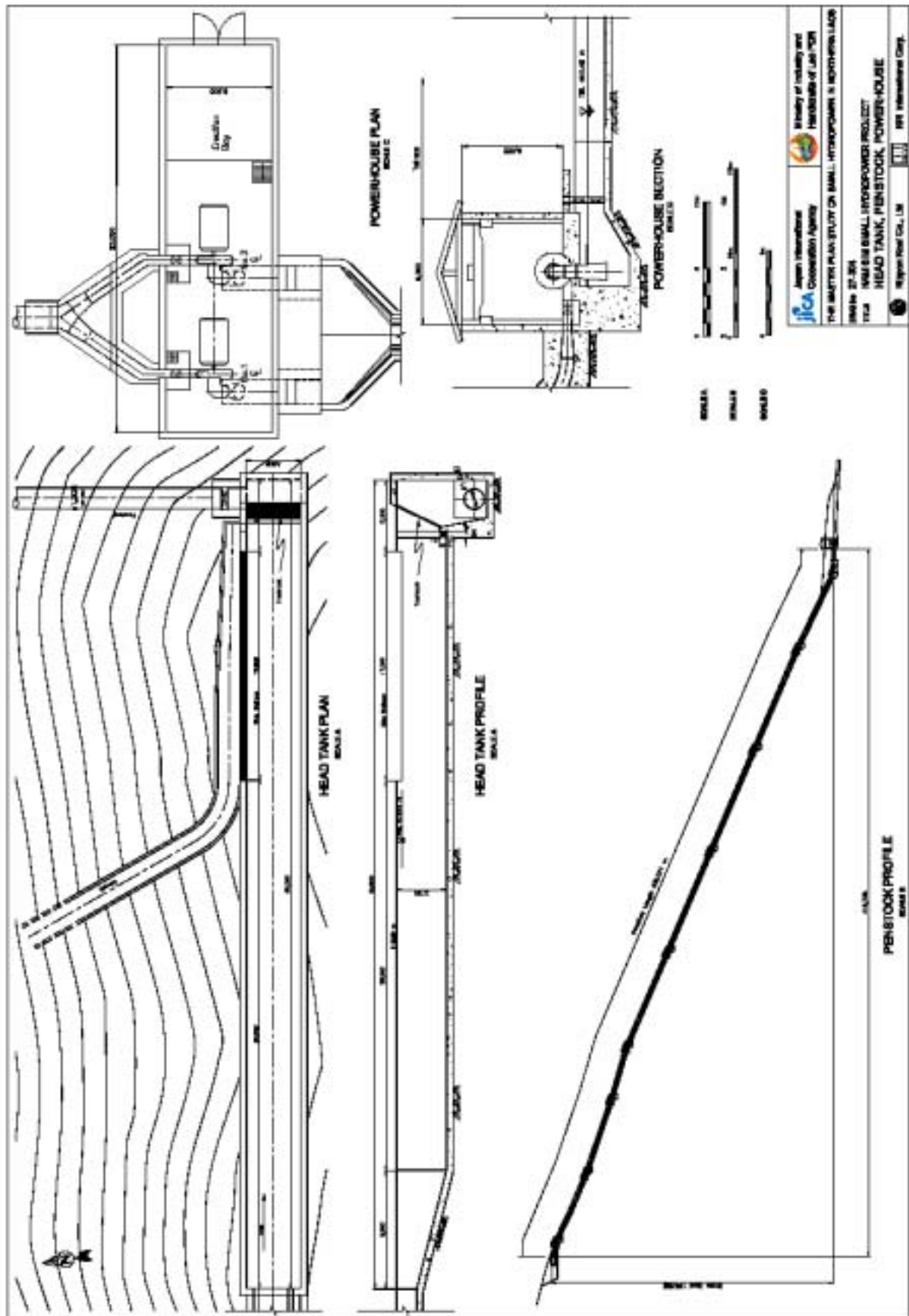
Items	Cost
2.Steel Penstock	US\$ 502,492
3.Gate & Trashracks	US\$ 34,997
4.Turbine & Generator	US\$ 783,190
5.Transformer & Switchgear	US\$ 233,945
6.Transmission Line	US\$ 169,121
7.E&M Miscellaneous (10% of 2-5)	US\$ 155,462
Total of E&M Works	US\$ 1,879,207
GRAND TOTAL	US\$ 6,502,610

C. Economic Analysis

1.Unit Construction Cost	US\$ 813/kW				
2.Unit Generation Cost	UScent /kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %







10. Nam Ham 2 (Sequence No. 31)

A. Salient Features

1.General	Province	Xayabury		District	Boten	
	Electr. Status	Imported power from Thailand				
2.Demand	Load Center	Grid			H/H Number	-
	Peak Load	-			Peak Hours	13 hours
2.Hydrology	River	Nam Ham		Basin	Nam Ham	CA 97 km ²
	Rainfall	1,350 mm		Q _{ave}	1.36 m ³ /s	Q _{95%} 0.21 m ³ /s
3.Structures						
3.1 Intake	Type	Gabion-core Concrete-facing			Height	5.0 m
					FSL	541.00 m
					FWL	545.48 m
3.2 Desilting Basin	Length	17 m	Width	2.4 m	Side Spillway Length	12.0 m
3.3 Headrace Channel	Shape	Trapezoidal (1:0.2)			Lining	Wet Masonry
	Uniform Depth	0.74 m			Base	1.2 m
3.4 Head Tank	Regulating Capacity	90 m ³		NWL	538.82 m	MOL 537.37 m
3.5 Penstock	Type	Exposed			Dia.	0.6 m
					Length	649 m
3.6 Powerhouse	Type	Surface	EL	361.3m	Turbine	Units 2 nos
4.Power and Energy	Q _{design}	0.78 m ³ /s	H _{net}	170 m	Installed Capacity	1,000 kW
	Energy	6,299,304 kWh/yr		P.F.	72.6%	
5.Access Road	Length	5 km				
6.Transmission Line	Capacity	22 kV	Length	6 km	Loss	8%
					Energy Delivered	5,793,564 kWh/yr

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 422,470
1.2 Desilting Basin	US\$ 8,303
1.3 Headrace Channel	US\$ 439,920
1.4 Head Tank	US\$ 24,249
1.5 Spillway Channel	US\$ 0
1.6 Penstock	US\$ 31,715
1.7 Powerhouse	US\$ 47,553
1.8 Tailrace	US\$ 563
1.9 Access Road	US\$ 50,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 204,955
Total of Civil Works	US\$ 1,229,729
2.Steel Penstock	US\$ 234,947

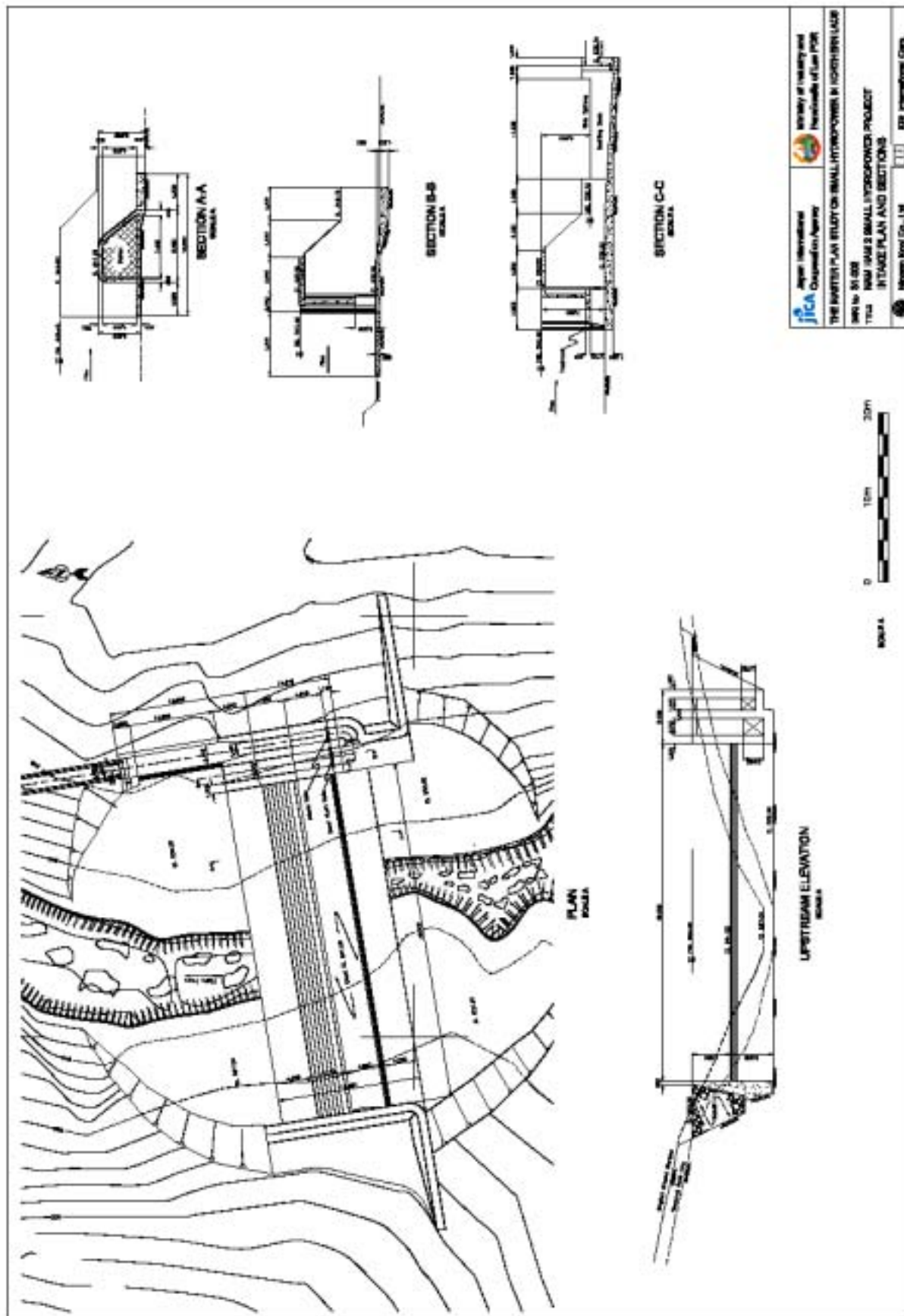
Items	Cost
3.Gate & Trashracks	US\$ 2,891
4.Turbine & Generator	US\$ 177,546
5.Transformer & Switchgear	US\$ 142,319
6.Transmission Line	US\$ 45,622
7.E&M Miscellaneous (10% of 2-6)	US\$ 55,770
Total of E&M Works	US\$ 659,095
GRAND TOTAL	US\$ 1,888,824

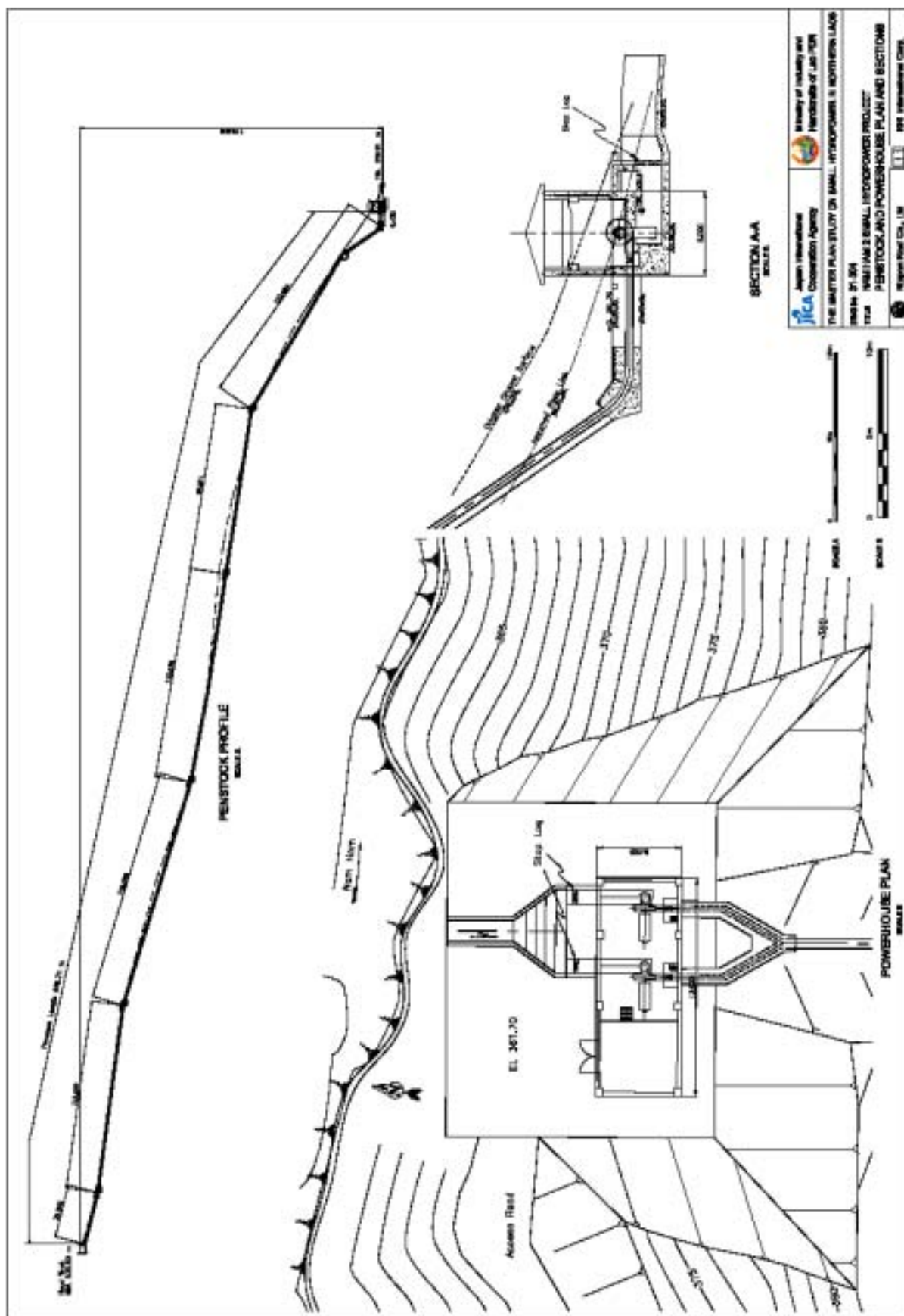
C. Economic Analysis

1.Unit Construction Cost	US\$ 1,889 /kW				
2.Unit Generation Cost	UScent/kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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11. Nam Xan 3 (Sequence No. 32)

A. Salient Features

1.General	Province	Xiengkhuang		District	Khoune	
	Electr. Status	Un-electrified				
2.Demand	Load Center	Khoune District Center		H/H Number	345	
	Peak Load	73 kW		Peak Hours	4 hours	
2.Hydrology	River	Nam Xan		Basin	Nam Xan	CA 134 km ²
	Rainfall	1,980 mm		Q _{ave}	2,75 m ³ /s	Q _{95%} 0.42 m ³ /s
3.Structures						
3.1 Intake	Type	Gabion-core Concrete-facing		Height	2.2 m	Length 27.5 m
				FSL	1,417.20 m	FWL 1,421.52 m
3.2 Desilting Basin	Length	17.0 m	Width	1.5 m	Side Spillway Length	7.0 m
3.3 Headrace Channel	Shape	Rectangular		Lining	Wet Masonry	Length 749 m
	Uniform Depth	0.43 m		Base	0.85 m	
3.4 Head Tank	Regulating Capacity	(none) m ³		NWL	1,416.45 m	MOL 1,414.40 m
3.5 Penstock	Type	Exposed		Dia.	0.45 m	Length 83 m
3.6 Powerhouse	Type	Surface	EL	1,385.12 m	Turbine	Cross Flow Units 1 nos
4.Power and Energy	Q _{design}	0.37 m ³ /s	H _{net}	29 m	Installed Capacity 73 kW	
	Energy	325,416 kWh/yr		P.F.	50.7%	
5.Access Road	Length	2 km				
6.Transmission Line	Capacity	22 kV		Length	8.5 km	
	Loss	10.0%		Energy Delivered.	292,874 kWh/yr	

B. Construction Cost

Items	Cost
1.Civil Works	
1.1 Intake	US\$ 86,319
1.2 Desilting Basin	US\$ 17,262
1.3 Headrace Channel	US\$ 24,444
1.4 Head Tank	US\$ 5,297
1.5 Spillway Channel	US\$ 848
1.6 Penstock	US\$ 2,866
1.7 Powerhouse	US\$ 27,699
1.8 Tailrace	US\$ 3,507
1.9 Access Road	US\$ 20,000
1.10 Miscellaneous (20% of 1.1~1.9)	US\$ 37,648
Total of Civil Works	US\$ 225,888
2.Steel Penstock	US\$ 19,966

Items	Cost
3.Gate & Trashracks	US\$ 1,174
4.Turbine & Generator	US\$ 77,179
5.Transformer & Switchgear	US\$ 11,549
6.Transmission Line	US\$ 115,890
7.E&M Miscellaneous (10% of 2-5)	US\$ 10,987
Total of E&M Works	US\$ 236,745
GRAND TOTAL	US\$ 462,633

C. Economic Analysis

1.Unit Construction Cost	US\$ 5,783 /kW				
2.Unit Generation Cost	UScent /kWh				
3.Economic Analysis	Project Life	n/a years	Discount Rate	n/a%	O&M n/a % of construction
	Replace	n/a years			EIRR n/a %

D. Remarks

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