

SUSITNA HYDROELECTRIC PROJECT

EBASCO ESTIMATING PACKAGE

NOVEMBER 20, 1981

Prepared by:



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT
Ebasco Estimating Package

November 20, 1981

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- 3.4 - List of Assumptions

SUSITNA HYDROELECTRIC PROJECT
Cost Estimate General Guidelines

The following guidelines are being used in the preparation of cost estimates:

1. All costs are in January 1982 dollars. No allowance is being made for escalation.
2. The summary cost estimate lists all the accounts applicable for hydroelectric power development. We have indicated those accounts under which we do not plan to make entries for this estimate.
3. Contingency is being assessed and applied to each group, that is Production Plant, Transmission Plant, etc., rather than to the project as a whole.
4. Generally, items include both direct and indirect construction costs. The construction camp including maintenance and operation is carried as a project indirect cost under Account 63.

SUSITNA HYDROELECTRIC PROJECT
Computer Code of Accounts and Quantity Listing

The computer listing of quantities for Devil Canyon and Watana reflect the present level of preliminary quantity development. The listing is based upon the FERC Code of Accounts and has been adapted to fit the specific requirements of the Susitna Project. A summary of the principle account headings is attached.

The finalized detailed estimate will be developed from the present computer listing. As final quantity takeoffs are completed, some of the line items will be expanded. Similarly, some of the items listed may be deleted. Also most quantities will be revised.

As drawings are completed, on a structure-by-structure basis, Acres will update the quantity takeoffs. The present package will then be updated by transmittal to Ebasco of the following:

1. Copy of the new or revised drawings used
2. Listing of takeoff quantities on a revised computer printout
3. Listing of any revised assumptions
4. Additional information as might be relevant.

There are several points which should be noted:

1. Most quantities are based upon very preliminary arrangement drawings. Quantities will be reviewed and updated as the final drawings are developed.
2. Concrete quantities and prices are being developed as being all inclusive except for reinforcing steel which is being estimated on a lb/cy basis. Concrete quantities will be presented based upon the location and the level of forming effort required, for example, concrete walls formed on one face, concrete walls formed on two faces, etc.
3. Construction roads will generally be applied on a per mile basis to the associated structure. The present computer listing carries a line item for total mileage which will be distributed on future updates.
4. Grouting requirements will be listed by the length of drilling and the grout take estimated.
5. The mechanical and electrical items in Accounts 333, 334, and 335 will be developed in more detail as the engineering design progresses.

6. Rock quantities have been divided into two categories. Generally, it is presently assumed that the top 10 feet of rock is weathered and not suitable for use as dam fill. This rock quantity is labeled "rock waste." All rock below 10 feet in depth is assumed to be suitable for use as dam fill material and is labeled "rock usable." It is presently assumed that underground excavation spoil is completely wasted.
7. Foundation treatment quantities have been developed for the major structures. The extent and type of treatment will be specified at a later date.
8. An item for safety protection has been included in areas involving large rock cuts. The extent and method of worker protection will be specified at a later date.
9. The computer listing has been coded with an "A" or "B" code. This indicates that the quantity for the listed item is presently included as part of the quantity for the item immediately above "A" or immediately below "B". An item with simply a "0" (zero) quantity indicates that the item may or may not be included in future revisions as the engineering design develops.

Included is a summary of estimating assumptions made for development of the quantities for the various structures. These should be used as a guide towards the present level of quantity development. Slight discrepancies with the project drawings may exist due to changes in design or assumptions.



ESTIMATE SUMMARY

PRELIMINARY FERC CODE OF ACCOUNTS

CLIENT ALASKA POWER AUTHORITY

TYPE OF ESTIMATE Preliminary

PROJECT SUSITNA HYDROELECTRIC PROJECT

APPROVED BY _____

JOB NUMBER P5700.00
FILE NUMBER P5700.06
SHEET 1 OF 5
BY _____ DATE _____
CHKD _____ DATE _____

No.	DESCRIPTION	AMOUNT	TOTALS	REMARKS
	<u>INTANGIBLE PLANT</u>			
301	Organization			No Entry
302	Franchise & Consents			No Entry
303	Miscellaneous Intangible Plant			No Entry
	Total Intangible Plant			



ESTIMATE SUMMARY

PRELIMINARY FERC CODE OF ACCOUNTS

CLIENT ALASKA POWER AUTHORITY

TYPE OF ESTIMATE Preliminary

PROJECT SUSITNA HYDROELECTRIC PROJECT

APPROVED BY _____

JOB NUMBER P5700.00

FILE NUMBER P5700.06

SHEET 2 OF 6

BY _____ DATE _____

CHKD _____ DATE _____

No.

DESCRIPTION

AMOUNT

TOTALS

REMARKS

PRODUCTION PLANT

330

Land & Land Rights

331

Power Plant Structures & Improvements

332

Reservoir, Dams & Waterways

333

Waterwheels, Turbines & Generators

334

Accessory Electrical Equipment

335

Miscellaneous Power Plant Equipment (Mechanical)

336

Roads & Railroads

Subtotal Production Plant

Contingency

Total Production Plant



ESTIMATE SUMMARY

PRELIMINARY FERC CODE OF ACCOUNTS

CLIENT ALASKA POWER AUTHORITY

TYPE OF ESTIMATE Preliminary

PROJECT SUSITNA HYDROELECTRIC PROJECT

APPROVED BY _____

JOB NUMBER 85700.00

FILE NUMBER 85700.06

SHEET 3 OF 6

BY _____ DATE _____

CHKD _____ DATE _____

No.	DESCRIPTION	AMOUNT	TOTALS	REMARKS
	<u>TRANSMISSION PLANT</u>			
350	Land & Land Rights			
352	Substation & Switching Station Structures & Improvements			
353	Substation & Switching Station Equipment			
354	Steel Towers & Fixtures			
356	Overhead Conductors & Devices			
359	Roads & Trails			
	Subtotal Transmission Plant			
	Contingency			
	Total Transmission Plant			



ESTIMATE SUMMARY

PRELIMINARY FERC CODE OF ACCOUNTS

CLIENT ALASKA POWER AUTHORITY

TYPE OF ESTIMATE Preliminary

PROJECT SUSITNA HYDROELECTRIC PROJECT

APPROVED BY _____

JOB NUMBER P5700.00
FILE NUMBER P5700.06
SHEET 4 OF 6
BY _____ DATE _____
CHKD _____ DATE _____

No.	DESCRIPTION	AMOUNT	TOTALS	REMARKS
	<u>GENERAL PLANT</u>			
389	Land & Land Rights			Under 330
390	Structures & Improvements			
391	Office Furniture/Equipment			
392	Transportation Equipment			
393	Stores Equipment			
394	Tools Shop & Garage Equipment			
395	Laboratory Equipment			
396	Power Operated Equipment			
397	Communications Equipment			
398	Miscellaneous Equipment			
399	Other Tangible Property			
	Subtotal General Plant			
	Contingency			
	Total General Plant			



ESTIMATE SUMMARY

PRELIMINARY FERC CODE OF ACCOUNTS

CLIENT ALASKA POWER AUTHORITY

TYPE OF ESTIMATE Preliminary

PROJECT SUSITNA HYDROELECTRIC PROJECT

APPROVED BY _____

JOB NUMBER PS700.00

FILE NUMBER PS700.06

SHEET 5 OF 6

BY _____ DATE _____

CHKD _____ DATE _____

No.

DESCRIPTION

AMOUNT

TOTALS

REMARKS

INDIRECT COSTS

61 Temporary Construction Facilities

See Note

62 Construction Equipment

See Note

63 Camp & Commissary

64 Labor Expense

See Note

65 Superintendence

See Note

66 Insurance

See Note

69 Fees

See Note

Note: Costs under accounts 61, 62, 64, 65, 66, and 69 are included in the appropriate direct costs listed above.

Subtotal Indirect Costs

Contingency

Total Indirect Costs



ESTIMATE SUMMARY

PRELIMINARY FERC CODE OF ACCOUNTS

CLIENT ALASKA POWER AUTHORITY

TYPE OF ESTIMATE Preliminary

PROJECT SUSITNA HYDROELECTRIC PROJECT

APPROVED BY _____

JOB NUMBER IP5700.00
FILE NUMBER IP5700.06
SHEET 6 OF 6
BY _____ DATE _____
CHKD _____ DATE _____

No.	DESCRIPTION	AMOUNT	TOTALS	REMARKS
	<u>OVERHEAD CONSTRUCTION COSTS (PROJECT INDIRECTS)</u>			
71	Engineering			
72	Legal Expenses			
75	Taxes			
76	Administrative & General Expenses			
77	Interest			
80	Earnings/Expenses During Construction			
	Subtotal Overhead Construction Costs			
	Contingency			
	Total Overhead Construction Costs			
	TOTAL ESTIMATED PROJECT COST			

SUSITNA HYDROELECTRIC PROJECT
LIST OF DRAWINGS - WATANA

November 20, 1981

<u>DRAWING NUMBER</u>	<u>TITLE</u>
SK-5700-C6-218	Watana - Valve Type Spillway Alternative General Arrangement
SK-5700-C6-220	Watana - Valve Type Spillway Alternative Main Dam and Diversion
SK-5700-C6-222	Watana - Valve Type Spillway Alternative Power Facilities and Spillway
SK-5700-C6-225	Watana - Underground Powerhouse 6 x 165 MW Units - Section
SK-5700-C6-226	Watana - Diversion - Plan at Intake
SK-5700-C6-236	Watana - Underground Powerhouse 6 x 165 MW Units - General Arrangement and Section
SK-5700-C6-237	Watana - Underground Powerhouse 6 x 165 MW Units - Plans and Section

SUSITNA HYDROELECTRIC PROJECT
List of Estimating Assumptions-Watana

1 - MAIN DAM

1.1 - Dam

- o Neat volumes increased by one percent for settlement caused by seismic event.
- o Excavation - Ten feet into weathered rock under shell; 40 feet into weathered rock under dam core.

1.2 - Grouting and Drainage

- o Consolidation grouting under core and filter area - Pattern is 10 foot by 10 foot grid with holes 40 feet deep. Grout take is 4 cf/lf.
- o Curtain grouting under dam and abutments - Main curtain from top of abutment to top of abutment is 4,600 feet in length. Curtain also extends 600 feet on top of left abutment and 400 feet along top of right. Double row grout curtain with five foot hole spacing assumed. Main dam average hole depth is 200 feet; right abutment hole depth is 200 feet, and left abutment hole depth is 50 feet. Grout take is 2 cf/lf.
- o Three inch diameter drain holes assumed.

1.3 - Grouting and Drainage Tunnels

- o Shafts are ten feet in diameter.
- o Shafts have two inch shotcrete lining full length.
- o Shafts are rockbolted 25 percent of tunnel length; bolts are four feet long with three bolts/six linear feet of shaft.
- o Tunnels are 10 feet in diameter, horseshoe shape with a two inch shotcrete lining on crown, and one foot thick concrete base slab.
- o Rockbolts for tunnels are four feet long, one inch in diameter, and spaced in 2 1/2 foot by 2 1/2 foot pattern for 50 percent of the tunnel length.

2 - POWERHOUSE AND ASSOCIATED ITEMS

2.1 - Powerhouse, Surge Chambers, Transformer Gallery, and Associated Tunnels

- o Concrete reinforced at 100 lbs/cy.
- o Entire crown and 10 percent of wall area rockbolted with a five foot by five foot pattern, 20 bolts/ton.

2.2 - Shafts & Tunnels

2.2.1 - Cable Shafts

- o Diameter is 7.5 feet.
- o Reinforcing steel 80 lbs/cy.
- o One foot thick lining.
- o Fifty percent rockbolted with a five foot by five foot pattern.

2.2.2 - Main Access Shaft

- o Twenty feet in diameter.
- o Two foot concrete lining.
- o Fifty percent rockbolted with a five foot by five foot pattern.

2.2.3 - Access Tunnel

- o Concrete base slab one foot thick with 80 lbs/cy reinforcing steel.
- o Twenty-five percent steel supported.
- o Twenty-five percent rockbolted with a five foot by five foot pattern.
- o Thirty-three feet wide and 28 feet high horseshoe.

2.2.4 - Secondary Access Tunnel

- o Nine inch base slab with 80 lbs/cy reinforcing steel.
- o Twelve foot horseshoe unlined.
- o Twenty-five percent rockbolted with a five foot by five foot pattern.
- o Twenty-five percent steel supported.

3 - POWER INTAKES & SPILLWAY INTAKES

3.1 - Structures

- o Structure reinforced at 100 lbs/cy.
- o Mass concrete poured behind structure to top of rock.
- o Concrete contact area bolted with five foot by five foot pattern and 20 bolts/ton.
- o Backslopes cut at 1:10.

3.2 - Approach

- o Approach channel side slopes cut at 1:4.

3.3 - Consolidation Grout

- o Consolidation grout under structure in 10 foot by 10 foot pattern, with holes 40 feet deep. Grout take is 4 cf/lf.

4 - PENSTOCKS

- o Fifteen foot inside diameter.
- o Two foot thick concrete liner.
- o Reinforcing steel 80 lbs/cy.
- o Two inch thick steel liner for lower 150 feet of penstocks.
- o Rockbolted in a five foot by five foot pattern, 20 bolts/ton for 50 percent of penstock length.

5 - TAILRACE

- o Nine inch thick shotcrete lining.
- o Total length is 2,500 linear feet.
- o Thirty-four foot wide horseshoe tunnel.
- o Twenty-five percent length supported by rockbolts (five foot by five foot bolt pattern, 20 bolts/ton).
- o Twenty-five percent length supported by steel.
- o Mesh for shotcrete 60 lbs/cy, 80 lbs/cy reinforcing steel in concrete.

6 - SERVICE/AUXILIARY SPILLWAY

6.1 - Service Intake

- o Assumptions the same as for power intake.

6.2 - Spillway Tunnel

- o Spillway tunnel is 2,040 feet in length, two foot thick concrete lining, and six inch overbreak.
- o Reinforcing steel 80 lbs/cy.
- o Steel support 25 percent of length.
- o Rockbolts in a five foot by five foot pattern, 20 bolts/ton, and 50 percent of length.

6.3 - Auxiliary Spillway

- o Auxiliary spillway reinforcing steel for gate structure, 80 lbs/cy for slab and 120 lbs/cy for walls.
- o Reinforcing steel for chute, 40 lbs/cy in wall and 80 lbs/cy in slab.
- o Spillway rockbolted in five foot by five foot pattern, 20 bolts/ton for entire length.

7 - EMERGENCY SPILLWAY

- o Unlined rock channel.
- o Excavated a minimum of 40 feet into weathered rock.

8 - DIVERSION

- o Two diversion tunnels each 4,200 feet in length, 35 foot inside diameter.
- o Fully lined with concrete one and one-half feet thick, steel support included for 25 percent of length.
- o Rockbolts 25 percent of tunnel with a five foot by five foot pattern, 20 bolts/ton.

9 - COFFERDAMS

9.1 - Upstream Cofferdam

- o Slurry wall extends to top of rock, approximately 70 feet.

9.2 - Downstream Cofferdam

- o Slurry wall extends through filters into alluvium and to top of rock; no core section in dam.

10 - SADDLE DAM & RELICT CHANNEL CUTOFF

10.1 - Saddle Dam

- o Crest elevation is 2,240 feet.
- o Ten feet excavation under entire dam.

10.2 - Cutoff Wall

- o Trench is 4,800 feet in length and three feet wide; maximum depth is 100 feet.

10.3 - Grout Curtain

- o Length is 9,400 feet with a ten foot by ten foot hole pattern.
- o Two thousand one hundred feet of grout curtain is five holes wide with an average depth of 313 feet. The remainder is three holes wide with an average depth of 180 feet deep.

SUSITNA HYDROELECTRIC PROJECT
LIST OF DRAWINGS - DEVIL CANYON

November 20, 1981

<u>DRAWING NUMBER</u>	<u>TITLE</u>
SK-5700-C6-305	Devil Canyon - Thin Arch Dam Geometry
SK-5700-C6-312	Devil Canyon - Scheme I - Sections
SK-5700-C6-313	Devil Canyon - Scheme I
SK-5700-C6-314	Devil Canyon - Scheme I
SK-5700-C6-621	Devil Canyon - Scheme I

SUSITNA HYDROELECTRIC PROJECT
List of Estimating Assumptions - Devil Canyon

1 - MAIN DAM

1.1 - Dam

- o Ten percent additional concrete added to takeoff quantities due to revised rock topography. Final quantities are to be determined.
- o Forty feet of rock excavation assumed.
- o Reinforcing steel in dam and thrust block assumed at 7 lbs/cy.

1.2 - Grouting and Drainage

- o Grout curtain under main dam consists of two rows of holes with a five foot spacing, 250 feet average depth for main dam, and 200 feet average depth for the abutments. Average grout take will be 2 cf/lf of drilled hole.
- o Consolidation grouting consists of a ten foot by ten foot hole pattern with an average depth of 40 feet. Grout take will be 4 cf/lf of hole. Area grouted is the contact area and 100 feet upstream and 100 feet downstream of dam.
- o Three inch diameter drainage holes under main dam with an average depth of 300 feet and 10 foot spacing assumed.

1.3 - Grouting and Drainage Tunnels

- o Shafts will be 10 feet in diameter.
- o Shafts have a two inch shotcrete lining the entire length.
- o Shafts are rockbolted 25 percent of tunnel length; bolts are four feet long with a pattern of 6 bolts/3 lf of shaft.
- o Tunnels are 10 feet in diameter, horseshoe shaped with a two inch shotcrete lining on crown, and a one foot thick base slab.
- o Rockbolts for tunnels are four feet long, one inch in diameter, and spaced in a 7 1/2 foot by 2 1/2 foot pattern for 50 percent of tunnel length (crown only).

2 - POWERHOUSE AND ASSOCIATED ITEMS

- o Same assumptions as at Watana for a 4-unit power facility including a powerhouse, surge chamber, transformer, gallery, fire protection tank, and bus tunnels.

3 - POWER INTAKES

- o One hundred foot high structure.
- o Same assumptions as Watana.

4 - PENSTOCKS

- o Same assumptions as Watana.

5 - TAILRACE TUNNELS

5.1 - One Thousand Four Hundred Linear Foot Tunnel

- o Eighteen feet in diameter circular horseshoe tunnel, two foot lining.
- o Steel support 25 percent of length.
- o Rockbolted 25 percent of length (five foot by five foot bolt pattern, 20 bolts/ton)
- o Reinforcing steel 40 lbs/cy.

5.2 - Six Thousand Eight Hundred Linear Foot Tunnel

- o Thirty-two feet in diameter circular horseshoe tunnel, two foot lining.
- o Steel support 25 percent of length.
- o Rockbolted 25 percent of length (five foot by five foot bolt pattern, 20 bolts/ton)
- o Reinforcing steel 40 lbs/cy.

6 - AUXILIARY (CHUTE) - SPILLWAY

- o Same assumptions as Watana.

7 - EMERGENCY SPILLWAY

- o Unlined rock channel.
- o Same assumptions as Watana.

8 - DIVERSION TUNNELS/COFFERDAMS

8.1 - Tunnel

- o One diversion tunnel 2,130 feet in length.
- o Horseshoe shaped with 26 feet in diameter, and 1.5 foot concrete lining.
- o Mass concrete plug 100 feet long with a 36 foot outside diameter.
- o Rockbolts support 25 percent of tunnel length with a five foot by five foot bolt pattern and 20 bolts/ton.
- o Twenty-five percent steel supported.

8.2 - Portals

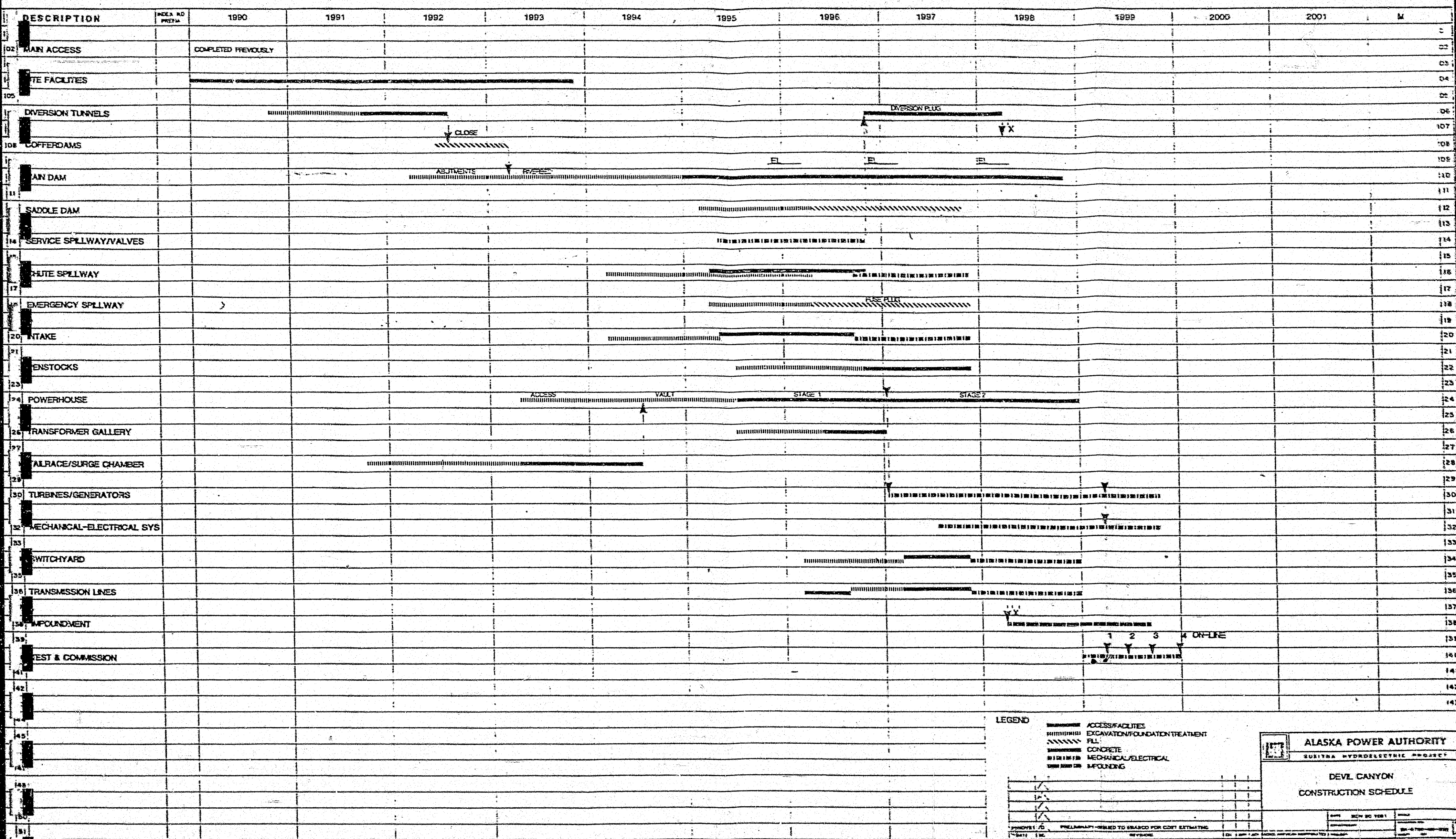
- o Alluvium assumed to be 50 feet deep at portals.
- o Top 20 feet of surface excavation assumed to be wasted rock.
- o Rockbolts used for 100 percent of concrete contact area (pattern 25 sf/1 bolt, 20 bolts/ton).
- o Reinforcing steel 40 lbs/cy.

8.3 - Cofferdams

- o Cutoff by grouting and pumping.
- o Grout take is 2 cf/lf.
- o Grout holes 20 feet on-center spacing.
- o Grout holes extend to top of rock.

9 - SADDLE DAM

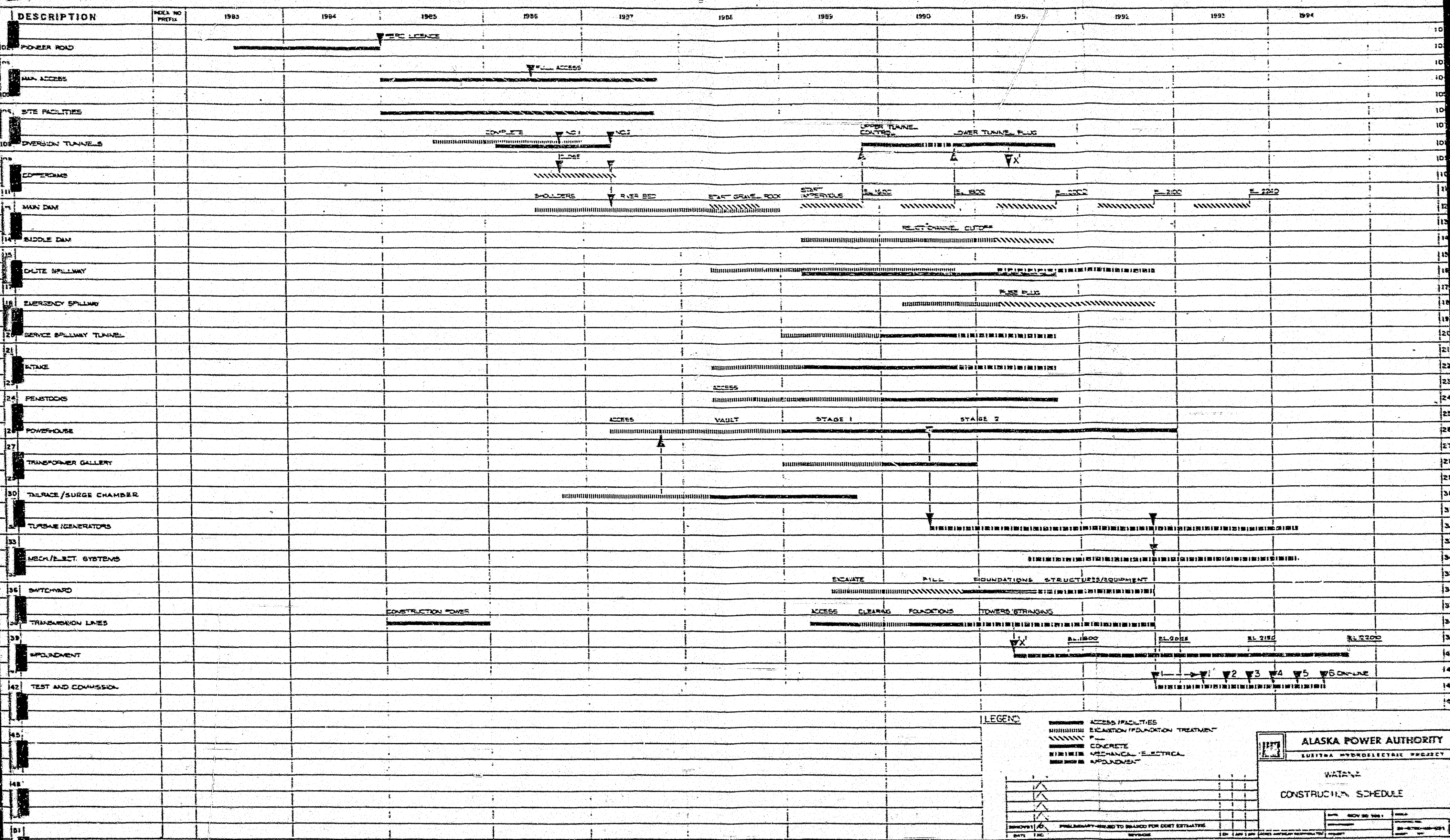
- o Crest elevation is 1,470 feet and 35 feet wide.
- o Dam slopes are 2.25:1 (upstream) and 2:1 (downstream).
- o Rock excavation is 10 feet under shell and 20 feet deep under core.
- o Grout gallery - Ten foot by ten foot horseshoe tunnel, rockbolted 50 percent of length (crown only, four foot long bolts, 2'-6" by 2'-6" pattern), shotcrete 25 percent of crown area.
- o Grout curtain - Two rows with a five foot hole spacing, average depth of 130 feet.
- o Drainage - Hole spacing ten feet, depth 150 feet.
- o Consolidation grouting - Area of core and filters ten foot by ten foot hole pattern, 30 foot hole depth, and 160 cf/lf grout take.



LEGEND

- ACCESS/FACILITIES
- EXCAVATION/FOUNDATION TREATMENT
- FILL
- CONCRETE
- MECHANICAL/ELECTRICAL
- IMPOUNDING

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVEL CANYON	
CONSTRUCTION SCHEDULE	
DATE: 10/1/90	BY: [Signature]
PROJECT: SUSITNA HYDROELECTRIC PROJECT	REVISION: 1
PREPARED BY: [Signature]	APPROVED BY: [Signature]



LEGEND

- ACCESS/FACILITIES
- EXCAVATION/FOUNDATION/TREATMENT
- CONCRETE
- MECHANICAL/ELECTRICAL
- FOUNDAMENT

ALASKA POWER AUTHORITY
SUTINA HYDROELECTRIC PROJECT

WATANE
CONSTRUCTION SCHEDULE

DATE: NOV 20 1981
BY: [Signature]
CHECKED: [Signature]
APPROVED: [Signature]

SUSITHA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
WATANA

EBASCO "O"
SAVE

page 1

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
INTANGIBLE PLANT							
301	ORGANIZATION						
302	FRANCHISE & CONSENTS						
303	MISC INTANGIBLE PLANT						
PRODUCTION PLANT							
330	LAND & LAND RIGHTS						
.1	LAND						
	LAND	1	LS				
.2	LAND RIGHTS						
	LAND RIGHTS	A	0	LS			
.3	MISC CHARGES & CREDITS						
	MISC CHARGES AND CREDITS	A	0	LS			
331	POWERPLANT STRUCTURE IMPROVEMENTS						
.1	POWERHOUSE						
.11	POWERHOUSE & DRAFT TUBE						
.111	EXCAVATION						
	POWERHOUSE VAULT ROCK	102,200	CY				
	DRAFT TUBE ROCK	34,000	CY				

SUSITNA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
WATANA

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.113	FOUNDATION PREPARATION						
	POWERHOUSE						
	FOUNDATION PREPARATION	31,000	SF				
	DENTAL CONCRETE	0	CY				
	DRAFT TUBE						
	FOUNDATION PREPARATION	0	SF				
	DENTAL CONCRETE	0	CY				
.114	CONCRETE						
	POWERHOUSE						
	CONCRETE	27,300	CY				
	REINFORCING STEEL	1,400	TON				
	DRAFT TUBE						
	CONCRETE	14,200	CY				
	REINFORCING STEEL	710	TON				
.115	SUPPORT						
	POWERHOUSE						
	ROCKBOLTS	80	TON				
	DRAFT TUBE						
	ROCKBOLTS	0	TON				
.116	SAFETY PROTECTION						
	POWERHOUSE						
	STEEL MESH	0	TON				
	ROCK BOLTS	0	TON				
	SHOTCRETE	0	SF				
.118	STEEL/METALWORK						
	POWERHOUSE						
	STRUCTURAL STEEL/CRANE RAILS	1	LS				
	METAL FABRICATIONS	0	TON				
	MISC	0	LS				
.119	ARCHITECTURAL						
	POWERHOUSE						
	INTERIOR PARTITIONS	1	LS				
	METAL DOORS/FRAMES	0	LS				
	PAINTING	0	LS				
	MISC	0	LS				

SUSITNA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
WATANA

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.11B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.11C	MECHANICAL						
	DRAFT TUBE GATES	1	LS				
.12	ACCESS TUNNELS & PORTALS						
.121	EXCAVATION						
	TUNNELS [MAIN]						
	ROCK	99,000	CY				
	TUNNELS [SECONDARY]						
	ROCK	2,400	CY				
	PORTALS						
	OVERBURDEN	6,000	CY				
	ROCK USEABLE	3,000	CY				
	ROCK WASTE	0	CY				
.123	FOUNDATION PREPARATION						
	PORTALS						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.124	CONCRETE & SHOTCRETE						
	TUNNELS [MAIN]						
	CONCRETE LINING	3,800	CY				
	CONCRETE SLAB	0	CY				
	REINFORCING STEEL	150	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
	TUNNELS [SECONDARY]						
	CONCRETE LINING	120	CY				
	CONCRETE SLAB	0	CY				
	REINFORCING STEEL	5	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
	PORTALS						
	CONCRETE BASE SLAB	4,350	CY				
	CONCRETE WALLS	0	CY				
	REINFORCING STEEL	130	TON				

SUSITNA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
WATANA

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.125	SUPPORT						
	TUNNELS [MAIN]						
	ROCKBOLTS	120	TON				
	STEEL SUPPORT	350	TON				
	TUNNELS [SECONDARY]						
	ROCKBOLTS	7	TON				
	STEEL SUPPORT	25	TON				
	PORTALS						
	ROCKBOLTS	5	TON				
.126	SAFETY PROTECTION						
	PORTALS						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.129	ARCHITECTURAL						
	PORTAL DOORS	0	LS				
.128	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.13	ACCESS SHAFTS						
.131	EXCAVATION						
	ROCK	11,000	CY				
.134	CONCRETE & SHOTCRETE						
	CONCRETE LINING	6,500	CY				
	REINFORCING STEEL	70	TON				
	SHOTCRETE	0	SF				
	STEEL MESH	0	TON				
.135	SUPPORT						
	ROCKBOLTS	50	TON				

SUSITNA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
WATANA

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NOV 21 1981

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.138	STEEL/METAL WORK LADDERS, ETC. STRUCTURAL STEEL	0 40	LS TON				
.139	ARCHITECTURAL ENCLOSURES	0	LS				
.13C	MECHANICAL ELEVATORS	1	LS				
.14	FIRE PROTECTION HEADTANK						
.141	EXCAVATION ROCK	2,000	CY				
.144	CONCRETE & SHOTCRETE CONCRETE BASE SLAB CONCRETE WALLS CONCRETE ROOF REINFORCING STEEL STEEL MESH SHOTCRETE	340 0 0 17 0 0	CY CY CY TON TON SF				
.145	SUPPORT ROCKBOLTS STEEL SUPPORT	3 10	TON TON				
.148	STEEL/METAL WORK LADDERS, ETC.	0	LS				
.14C	MECHANICAL PIPING & VALVES	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.15	BUS TUNNELS & SHAFTS						
.151	EXCAVATION						
	ROCK HORIZONTAL	7,200	CY				
	ROCK INCLINED	0	CY				
	ROCK VERTICAL	0	CY				
.154	CONCRETE						
	BASE SLAB HORIZONTAL	2,000	CY				
	BASE SLAB INCLINED	0	CY				
	WALLS	0	CY				
	ROOF SLAB	0	CY				
	REINFORCING STEEL	100	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.155	SUPPORT						
	ROCKBOLTS	26	TON				
	STEEL SUPPORT	0	TON				
.16	TRANSFORMER GALLERY						
.161	EXCAVATION						
	ROCK	39,000	CY				
.164	CONCRETE & SHOTCRETE						
	CONCRETE BASE SLAB	2,700	CY				
	CONCRETE WALLS	0	CY				
	CONCRETE ROOF	0	CY				
	REINFORCING STEEL	135	TON				
	SHOTCRETE	0	SF				
	STEEL MESH	0	TON				
.165	SUPPORT						
	ROCKBOLTS	64	TON				
	STEEL SUPPORT	0	TON				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.17	CABLE SHAFTS						
.171	EXCAVATION ROCK	3,000	CY				
.174	CONCRETE & SHOTCRETE						
	CONCRETE LINING	1,900	CY				
	REINFORCING STEEL	95	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.175	SUPPORT ROCKBOLTS	50	TON				
.178	STEEL/METALWORK STRUCTURAL STEEL	9	TON				
.179	ARCHITECTURAL ENCLOSURES	0	LS				
.17C	MECHANICAL ELEVATOR	1	LS				
.2	MISC. BUILDINGS & STRUCTURES						
	MISC. BUILDINGS & STRUCTURES	1	LS				
.3	PERMANENT VILLAGE						
	PERMANENT VILLAGE	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
332	RESERVOIR, DAMS & WATERWAYS						
.1	RESERVOIR						
.11	CLEARING						
	CLEARING	1	LS				
.2	DIVERSION TUNNELS/COFFERDAMS						
.21	DIVERSION TUNNELS/PORTALS						
.211	EXCAVATION						
	TUNNELS						
	ROCK	382,000	CY				
	REMOVE CONCRETE/PLUGS	2,500	CY				
	PORTAL UPSTREAM						
	OVERBURDEN-DRY	0	CY				
	ROCK USEABLE	240,000	CY				
	ROCK WASTE	172,000	CY				
	PORTAL DOWNSTREAM						
	OVERBURDEN-DRY	27,000	CY				
	UN SOUND ROCK WASTE	24,000	CY				
	UN SOUND ROCK USE	50,000	CY				
	SOUND ROCK USE	0	CY				
.213	FOUNDATION PREPARATION						
	PORTAL UPSTREAM						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
	PORTAL DOWNSTREAM						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.214	CONCRETE & SHOTCRETE						
	TUNNELS						
	CONCRETE LINING	74,900	CY				
	CONCRETE SLAB	0	CY				
	STEEL LINING	1,200	TON				
	REINFORCING STEEL	0	TON				
	STEEL MESH	0	SF				
	SHOTCRETE	0					
	PORTAL UPSTREAM						
	CONCRETE HEADWALL	4,800	CY				
	CONCRETE LINING	0	CY				
	CONCRETE SLAB	0	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	CONCRETE PIER	600	CY				
	REINFORCING STEEL	195	TON				
	PORTAL DOWNSTREAM						
	CONCRETE HEADWALL	4,100	CY				
	REINFORCING STEEL	90	TON				
	CONCRETE PLUGS						
	CONCRETE PLUGS	5,200	CY				
.215	SUPPORT TUNNELS						
	ROCKBOLTS	395	TON				
	STEEL SUPPORT	1,067	TON				
	PORTAL UPSTREAM						
	ROCKBOLTS	100	TON				
	TIEBACKS	0	TON				
	PORTAL DOWNSTREAM						
	ROCKBOLTS	90	TON				
	TIEBACKS	0	TON				
.216	SAFETY PROTECTION						
	PORTAL UPSTREAM						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
	PORTAL DOWNSTREAM						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.21B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.21C	MECHANICAL						
	GATES & RACKS						
	UPSTREAM	1	LS				
	DOWNSTREAM	1	LS				
	LOW LEVEL RELEASES	1	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.22	UPSTREAM COFFERDAM						
.221	EXCAVATION						
	OVERBURDEN	0	CY				
	ROCK	0	CY				
	REMOVAL OF COFFERDAM	0	CY				
.222	FILL						
	CORE	80,000	CY				
	FINE/FILTER	39,000	CY				
	COARSE FILTER	54,000	CY				
	ROCK SHELL	77,000	CY				
	CLOSURE DIKE	43,000	CY				
	RIP RAP	14,000	CY				
.223	FOUNDATION PREP/GROUTING						
	CONSOLIDATION GROUT						
	HOLES	0	LF				
	GROUT	0	CF				
	GROUT CURTAIN						
	DRILL HOLES	0	LF				
	GROUT	0	CF				
	SLURRY WALL						
	SLURRY WALL	54,900	SY				
.22B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.22D	DEWATERING						
	DEWATERING	1	LS				
.23	DOWNSTREAM COFFERDAM						
.231	EXCAVATION						
	OVERBURDEN	0	CY				
	ROCK	0	CY				
	REMOVAL OF COFFERDAM	89,000	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.232	FILL						
	FINE FILTER	35,000	CY				
	COARSE FILTER	12,000	CY				
	CLOSURE DIKE	42,000	CY				
.233	FOUNDATION PREP/GROUTING						
	CONSOLIDATION GROUT						
	HOLES	0	LF				
	GROUT	0	CF				
	GROUT CURTAIN						
	DRILL HOLES	0	LF				
	GROUT	0	CF				
	SLURRY WALL						
	SLURRY WALL	27,800	SF				
.23B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.23D	DEWATERING						
	DEWATERING	0	LS				
.3	MAIN DAM						
.31	MAIN DAM						
.311	EXCAVATION						
	OVERBURDEN	8,373,000	CY				
	ROCK USEABLE	4,840,000	CY				
	ROCK WASTE	A 0	CY				
.312	FILL						
	IMPERVIOUS CORE	9,090,001	CY				
	FINE FILTER	2,929,000	CY				
	COARSE FILTER	3,030,000	CY				
	GRAVEL DOWNSTREAM SHELL	26,072,000	CY				
	ROCK FILL UPSTREAM SHELL	28,284,000	CY				
	RIP RAP	1,515,000	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.313	FOUNDATION PREP/GROUTING						
	FOUNDATION PREP						
	HORIZONTAL	6,408,000	SF				
	INCLINED	0	SF				
	DENTAL CONCRETE	0	CY				
	DENTAL CONCRETE	0	CY				
	CONSOL. GROUT [SURFACE]						
	DRILL HOLES	890,000	LF				
	GROUT	3,560,000	CF				
	GROUT CURTAIN						
	DRILL HOLES	408,000	LF				
	GROUT	816,000	CF				
.315	SUPPORT						
	ROCKBOLTS	0	TON				
	TIEDACKS	0	TON				
.316	SAFETY PROTECTION						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.317	DRAINAGE						
	HOLES	130,000	LF				
.318	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.32	GROUT GALLERIES/PORTALS						
.321	EXCAVATION						
	TUNNELS/SHAFTS						
	ROCK HORIZONTAL	18,400	CY				
	ROCK INCLINED	0	CY				
	ROCK VERTICAL	2,200	CY				
	PORTALS						
	OVERBURDEN	0	CY				
	ROCK	0	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.323	FOUNDATION PREPARATION						
	PORTALS						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.324	CONCRETE & SHOTCRETE						
	TUNNELS						
	CONCRETE LINING	2,100	CY				
	CONCRETE SLAB	0	CY				
	REINFORCING STEEL	55,000	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
	SHAFTS						
	CONCRETE LINING	300	CY				
	REINFORCING STEEL	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
	PORTALS						
	CONCRETE SLAB	0	CY				
	CONCRETE WALLS	0	CY				
	REINFORCING STEEL	0	TON				
.325	SUPPORT						
	TUNNELS						
	ROCKBOLTS	22	TON				
	STEEL SUPPORT	350	TON				
	SHAFTS						
	ROCKBOLTS	0	TON				
	PORTALS						
	ROCKBOLTS	0	TON				
.326	SAFETY PROTECTION						
	PORTALS						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.329	ARCHITECTURAL						
	PORTAL DOORS	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.32B	CONSTRUCTION ROADS CONSTRUCTION ROADS	0	MILE				
.32C	MECHANICAL ELEVATORS	0	LS				
.4	SADDLE DAM & CUTOFFS						
.41	MAIN SADDLE DAM						
.411	EXCAVATION						
	OVERBURDEN	258,000	CY				
	ROCK USEABLE	0	CY				
	ROCK WASTE	0	CY				
.412	FILL						
	IMPERVIOUS CORE	176,000	CY				
	FILTER	46,000	CY				
	SHELL	193,000	CY				
	RIP RAP	53,000	CY				
	HEEL ROCK	83,300	CY				
	SHORE PROTECTION						
	RIP RAP	93,000	CY				
	WASTE ROCK	93,000	CY				
.413	FOUNDATION PREP & GROUTING						
	FOUNDATION PREPARATION						
	HORIZONTAL	149,000	SF				
	INCLINED	0	SF				
.41B	CONSTRUCTION ROADS CONSTRUCTION ROADS	0	MILE				
.44	CHANNEL CUTOFF						
.442	FILL						
	RIP RAP	0	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.444	GROUTING/CUTOFF						
	GROUT						
	DRILL HOLES	980,000	LF				
	GROUT	0	CF				
	SLURRY TRENCH						
	SLURRY TRENCH	525,000	SF				
.44B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.5	SERVICE SPILLWAY VALVES						
.51	SERVICE SPILLWAY VALVES						
.511	EXCAVATION						
	INLET						
	OVERBURDEN	21,000	CY				
	ROCK USEABLE	167,000	CY				
	ROCK WASTE	0	CY				
	OUTLET						
	OVERBURDEN [DRY]	0	CY				
	OVERBURDEN [WET]	0	CY				
	ROCK USEABLE	0	CY				
	ROCK WASTE	0	CY				
	TUNNELS						
	ROCK HORIZONTAL	61,000	CY				
	ROCK INCLINED	0	CY				
.512	FILL						
	BACKFILL	3,200	CY				
.513	FOUNDATION PREP/GROUTING						
	FOUNDATION PREP						
	INLET						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
	OUTLET						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.514	CONCRETE & SHOTCRETE						
	INLET						
	CONCRETE BASE SLAB	6,300	CY				
	CONCRETE STRUCTURE	28,200	CY				
	REINFORCING STEEL	1,380	TON				
	OUTLET						
	CONCRETE BASE SLAB	0	CY				
	CONCRETE STRUCTURE	0	CY				
	REINFORCING STEEL	0	TON				
	TUNNELS						
	CONCRETE LINING	18,000	CY				
	CONCRETE SLAB	0	CY				
	REINFORCING STEEL	720	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.515	SUPPORT						
	INLET						
	ROCKBOLTS	28	TON				
	OUTLET						
	ROCKBOLTS	0	TON				
	TUNNELS						
	ROCKBOLTS	215	TON				
	STEEL SUPPORT	120	TON				
.516	SAFETY PROTECTION						
	INLET						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
	OUTLET						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.518	STEEL/METALWORK						
	STEEL MANIFOLD LINER	2,300	TON				
.51B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.51C	MECHANICAL						
	INLET GATES & RACKS	1	LS				
	SERVICE VALVES	1	LS				
.52	AUXILIARY SPILLWAY CHUTE						
.521	EXCAVATION						
	APPROACH						
	OVERBURDEN	1,724,000	CY				
	ROCK USEABLE	2,537,000	CY				
	ROCK WASTE	A 0	CY				
	STRUCTURE & CHUTE						
	OVERBURDEN [DRY]	A 0	CY				
	ROCK USEABLE	A 0	CY				
	ROCK WASTE	A 0	CY				
	DRAIN TUNNEL						
	ROCK	0	CY				
	RIVER CHANNEL						
	ALLUVIUM EXCAVATION	760,000	CY				
	PLUNGE POOL EXCAVATION	860,000	CY				
.523	FOUNDATION PREP/GROUTING						
	FOUNDATION PREP						
	APPROACH						
	HORIZONTAL	B 0	SF				
	INCLINED	B 0	SF				
	STRUCTURE CHUTE						
	ROCK HORIZONTAL	285,000	SF				
	ROCK INCLINED	177,000	SF				
	DENTAL CONCRETE	24,000	CY				
	CONSOL. GROUT [SURFACE]						
	DRILL HOLES	37,400	LF				
	GROUT	149,600	CF				
	GROUT [DRAIN TUNNEL]						
	DRILL HOLES	A 0	LF				
	GROUT	A 0	CF				
	GROUT CURTAIN						
	DRILL HOLES	A 0	LF				
	GROUT	A 0	CF				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.524	CONCRETE & SHOTCRETE						
	CONCRETE WALLS						
	ONE FORM	59,600	CY				
	TWO FORM	35,600	CY				
	CONCRETE SLAB						
	APPROACH	9,600	CY				
	NO FORM	44,100	CY				
	ONE FORM	5,700	CY				
	TWO FORM	0	CY				
	CONCRETE GATE CHUTE						
	ONE FORM	2,200	CY				
	TWO FORM	4,700	CY				
	CONCRETE STRUCTURE						
	NO FORM	0	CY				
	ONE FORM	10,100	CY				
	TWO FORM	3,400	CY				
	CONCRETE TOP SLAB						
	BRIDGE	1,800	CY				
	REINFORCING STEEL						
	REINFORCING STEEL	5,310	TON				
.525	SUPPORT						
	APPROACH						
	ROCKBOLTS	790	TON				
	TIEBACKS	0	TON				
	STRUCTURE & CHUTE						
	ROCKBOLTS	0	TON				
	TIEBACKS	0	TON				
.526	SAFETY PROTECTION						
	APPROACH						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
	STRUCTURE & CHUTE						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.527	DRAINAGE						
	DRILL HOLES	0	LF				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.51A	WINTERIZATION WINTERIZATION	1	LS				
.52B	CONSTRUCTION ROADS CONSTRUCTION ROADS	0	MILE				
.52C	MECHANICAL GATES & BACKS	1	LS				
.52D	DEWATERING & COFFERDAM DEWATERING & COFFERDAM	1	LS				
.53	EMERGENCY SPILLWAY						
.531	EXCAVATION						
	OVERBURDEN	3,551,000	CY				
	ROCK USEABLE	1,383,000	CY				
	ROCK WASTE	0	CY				
.532	FILL						
	FUSE PLUG	54,200	CY				
.536	SAFETY PROTECTION						
	ROCKBOLTS	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.53B	CONSTRUCTION ROADS						
	SERVICE BRIDGE	1	LS				
	CONSTRUCTION ROADS	0	MILE				
.6	INTAKES						
.61	INTAKE STRUCTURE						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.611	EXCAVATION						
	OVERBURDEN	131,000	CY				
	ROCK USEABLE	1,158,000	CY				
	ROCK WASTE	0	CY				
		A					
.612	FILL						
	BACKFILL	14,400	CY				
.613	FOUNDATION PREPARATION						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.614	CONCRETE & SHOTCRETE						
	STRUCTURE						
	CONCRETE STRUCTURE	126,400	CY				
	CONCRETE MASS	28,000	CY				
	REINFORCING STEEL	6,320	TON				
	APPROACH						
	CONCRETE	0	CY				
	REINFORCING STEEL	0	TON				
.615	SUPPORT						
	APPROACH						
	ROCKBOLTS	0	TON				
	TIERACKS	0	TON				
	STRUCTURE						
	ROCKBOLTS	125	TON				
	TIERACKS	0	TON				
		A					
.616	SAFETY PROTECTION						
	ROCKBOLTS	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.61A	WINTERIZATION						
	WINTERIZATION	0	LS				
.61B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.61C	MECHANICAL GATES & RACKS	1	LS				
.7	SURGE CHAMBER						
.71	SURGE CHAMBER						
.711	EXCAVATION ROCK	75,000	CY				
.714	CONCRETE & SHOTCRETE CONCRETE CHAMBER REINFORCING STEEL	2,000 100	CY TON				
.715	SUPPORT ROCKBOLTS	55	TON				
.71C	MECHANICAL GATES	1	LS				
.8	PENSTOCKS						
.81	PENSTOCKS						
.811	EXCAVATION TUNNELS ROCK	58,500	CY				
.814	CONCRETE & SHOTCRETE CONCRETE LINER REINFORCING STEEL	29,400 1,200	CY TON				
.815	SUPPORT ROCKBOLTS SUPPORT STEEL	290 0	TON TON				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.818	STEEL/METALWORK STEEL LINER	1,600	TON				
.9	TAILRACE WORKS						
.91	TAILRACE TUNNELS/PORTALS						
.911	EXCAVATION TUNNELS						
	ROCK	96,000	CY				
	PORTALS						
	OVERBURDEN [DRY]	42,000	CY				
	OVERBURDEN [WET]	0	CY				
	ROCK USEABLE	0	CY				
	ROCK WASTE	15,000	CY				
.913	FOUNDATION PREPARATION PORTALS						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.914	CONCRETE & SHOTCRETE TUNNELS						
	CONCRETE LINING	2,200	CY				
	CONCRETE SLAB	3,400	CY				
	CONCRETE PIERS	0	CY				
	REINFORCING STEEL	225	TON				
	STEEL MESH	5	TON				
	SHOTCRETE	5,400	SF				
	PORTALS						
	CONCRETE BASE SLAB	100	CY				
	CONCRETE WALLS	650	CY				
	REINFORCING STEEL	30	TON				
.915	SUPPORT TUNNELS						
	ROCKBOLTS	A 100	TON				
	STEEL SUPPORT	270	TON				
	PORTALS						
	ROCKBOLTS	15	TON				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.916	SAFETY PROTECTION PORTALS						
	ROCKBOLTS	A	0	TON			
	STEEL MESH		0	TON			
	SHOTCRETE		0	SF			
.91B	CONSTRUCTION ROADS CONSTRUCTION ROADS		0	MILE			
.91C	MECHANICAL GATES		1	LS			
333	WATERWHEELS, TURBINES, GENERATORS						
.1	TURBINES GOVERNORS						
.11	TURBINES GOVERNORS TURBINES GOVERNORS		1	LS			
.2	GENERATORS EXCITERS						
.21	GENERATORS EXCITERS GENERATORS & EXCITERS		1	LS			
.3	MISCELLANEOUS MECHANICAL						
.31	MISCELLANEOUS MECHANICAL MISCELLANEOUS MECHANICAL		1	LS			

SUSITNA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
WATANA

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
334	ACCESSORY ELECTRICAL EQUIPMENT						
.1	CONNECTORS, SUPPORTS, STRUCTURES						
.11	STRUCTURES						
	STRUCTURES	0	LS				
.12	CONDUCTORS & INSULATORS						
	CONDUCTORS & INSULATORS	0	LS				
.13	CONDUITS						
	CONDUITS	0	LS				
.2	SWITCHGEAR & CONTROL EQUIPMENT						
.21	SEPARATE EXCITERS						
	SEPARATE EXCITERS	0	LS				
.22	TRANSFORMERS						
	TRANSFORMERS	1	LS				
.23	CIRCUIT BREAKERS						
	CIRCUIT BREAKERS	0	LS				
.24	SURGE PROTECTION						
	SURGE PROTECTION	0	LS				
.25	SWITCHBOARDS						
	SWITCHBOARDS	0	LS				
.26	AUX. POWER EQUIPMENT						
	AUX. POWER EQUIPMENT	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.3	CUBICLES & APPURTENANCES						
.31	CUBICLES & APPURTENANCES						
	CUBICLES & APPURTENANCES	1	LS				
.4	TESTING						
.41	TESTING						
	TESTING	1	LS				
.5	ELECTRICAL & ASSOCIATED						
.51	ELECTRICAL & ASSOCIATED						
	ELECTRICAL & ASSOCIATED	1	LS				
335	MISC. POWERPLANT EQUIPMENT						
.1	AUX. EQUIPMENT						
.11	UNWATERING						
	UNWATERING	0	LS				
.12	GAUGE/INDICATING DEVICES						
	GAUGE/INDICATING DEVICES	0	LS				
.13	AIR & COOLING SYSTEM						
	AIR & COOLING SYSTEM	0	LS				
.14	COMPRESSOR AIR						
	COMPRESSOR AIR	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.15	FIRE PROTECTION SYSTEM FIRE PROTECTION SYSTEM	0	LS				
.16	CRANES CRANES	1	LS				
.19	OTHER OTHER	1	LS				
.2	GENERAL STATION EQUIPMENT						
.21	GENERAL STATION EQUIPMENT GENERAL STATION EQUIPMENT	0	LS				
.3	COMMUNICATION SYSTEM						
.31	COMMUNICATION SYSTEM COMMUNICATION SYSTEM	0	LS				
336	ROADS						
.1	ROADS						
.11	MAIN ACCESS						
	DENALI-WATANA	1	LS				
	DEVIL CANYON-WATANA N/S	1	LS				
	GOLD CREEK-DEVIL CANYON	1	LS				
	DEVIL CANYON BRIDGE	1	LS				
	MAINTENANCE	1	LS				
.12	SITE ROADS SITE ROADS	26	MILE				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	MAINTENENCE	26	MILE				
.3	AIRSTRIP						
.31	AIRSTRIP						
	AIRSTRIP	1	LS				
	TRANSHISSION PLANT						
350	LAND & LAND RIGHTS						
	LAND & LAND RIGHTS						
352	SUBSTATION & SWITCHING STATION						
	SUBSTATION & SWITCHING STATION						
	STRUCTURES & IMPROVEMENTS						
.1	SWITCHYARD						
.11	SWITCHYARD	1	LS				
353	SUBSTATION/SWITCHING STA EQUIP						
	SUBSTATION/SWITCHING STA EQUIP						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
354	STEEL TOWERS & FIXTURES STEEL TOWERS & FIXTURES						
356	OVERHEAD CONDUCTORS & DEVICES OVERHEAD CONDUCTORS & DEVICES						
359	ROADS & TRAILS ROADS & TRAILS	0					
	GENERAL PLANT						
389	LAND & LAND RIGHTS LAND & LAND RIGHTS						
390	STRUCTURES & IMPROVEMENTS STRUCTURES & IMPROVEMENTS						
391	OFFICE FURNITURE/EQUIPMENT OFFICE FURNITURE/EQUIPMENT						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
392	TRANSPORTATION EQUIPMENT TRANSPORTATION EQUIPMENT						
393	STORES EQUIPMENT STORES EQUIPMENT						
394	TOOLS SHOP & GARAGE EQUIPMENT TOOLS SHOP & GARAGE EQUIPMENT						
395	LABORATORY EQUIPMENT LABORATORY EQUIPMENT						
396	POWER OPERATED EQUIPMENT POWER OPERATED EQUIPMENT						
397	COMMUNICATIONS EQUIPMENT COMMUNICATIONS EQUIPMENT						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
398	MISCELLANEOUS EQUIPMENT MISCELLANEOUS EQUIPMENT						
399	OTHER TANGIBLE PROPERTY OTHER TANGIBLE PROPERTY						
	INDIRECT COSTS						
61	TEMPORARY CONSTRUCTION FACILITIES TEMPORARY CONSTRUCTION FACILITIES						
62	CONSTRUCTION EQUIPMENT CONSTRUCTION EQUIPMENT						
63	CAMP & COMMISSARY CAMP & COMMISSARY						
	.1 MAIN CAMP MAIN CAMP	5,600	UNITS				
	.2 VILLAGE VILLAGE	500	UNITS				

SUSITNA HYDROELECTRIC PROJECT
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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.3	PERMANENT TOWN PERMANENT TOWN	1	LS				
.4	CATERING & SUPPORT CATERING & SUPPORT	6,500,000	M-DAY				
.5	CONSTRUCTION POWER CONSTRUCTION POWER	1	LS				
64	LABOR EXPENSE LABOR EXPENSE						
65	SUPERINTENDENCE SUPERINTENDENCE						
66	INSURANCE INSURANCE						
69	FEES FEES						
	SUBTOTAL						

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WATANA

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	CONTINGENCY		%				
71	ENGINEERING		%				
72	LEGAL EXPENSES		%				
75	TAXES		%				
76	ADMINISTRATIVE & GEN. EXPENSES		%				
77	INTEREST		%				
80	EARNINGS/EXPENSES DURING CONTR.		%				
	TOTAL PROJECT COST						

SUSITNA HYDROELECTRIC PROJECT
PRELIMINARY ESTIMATE
DEVIL CANYON

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	INTANGIBLE PLANT						
301	ORGANIZATION						
302	FRANCHISE & CONSENTS						
303	MISC INTANGIBLE PLANT						
	PRODUCTION PLANT						
330	LAND & LAND RIGHTS						
.1	LAND						
	LAND	1	LS				
.2	LAND RIGHTS						
	LAND RIGHTS	A 0	LS				
.3	MISC CHARGES & CREDITS						
	MISC CHARGES & CREDITS	A 0	LS				
331	POWERPLANT STRUCTURE IMPROVEMENTS						
.1	POWERHOUSE						
.11	POWERHOUSE & DRAFT TUBE						
.111	EXCAVATION						
	POWERHOUSE VAULT ROCK	104,000	CY				

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DEVIL CANYON

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	DRAFT TUBE ROCK	33,000	CY				
.113	FOUNDATION PREPARATION POWERHOUSE						
	FOUNDATION PREPARATION	30,000	SF				
	DENTAL CONCRETE A	0	CY				
	DRAFT TUBE						
	FOUNDATION PREPARATION A	0	SF				
	DENTAL CONCRETE A	0	CY				
.114	CONCRETE POWERHOUSE						
	CONCRETE	25,000	CY				
	REINFORCING STEEL	1,250	TON				
	DRAFT TUBE						
	CONCRETE	13,200	CY				
	REINFORCING STEEL	660	TON				
.115	SUPPORT POWERHOUSE						
	ROCKBOLTS	60	TON				
	DRAFT TUBE						
	ROCKBOLTS A	0	TON				
.116	SAFETY PROTECTION POWERHOUSE						
	STEEL MESH	0	SF				
	ROCK BOLTS	0	TON				
	SHOTCRETE	0	SF				
.118	STEEL/METALWORK POWERHOUSE						
	STRUCTURAL STEEL/CRANE RAILS	1	LS				
	METAL FABRICATIONS A	0	TON				
	DRAFT TUBE LINER A	0	TON				
	MISC A	0	LS				
.119	ARCHITECTURAL POWERHOUSE						
	INTERIOR PARTITIONS	1	LS				

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PRELIMINARY ESTIMATE
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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	METAL DOORS/FRAMES	A	0	EA			
	PAINTING	A	0	LS			
	MISC	A	0	LS			
.11B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.11C	MECHANICAL						
	DRAFT TUBE GATES	1	LS				
.12	ACCESS TUNNELS & PORTALS						
.121	EXCAVATION						
	TUNNELS [MAIN]						
	ROCK	45,500	CY				
	TUNNELS [SECONDARY]						
	ROCK	2,900	CY				
	PORTALS						
	OVERBURDEN	6,000	CY				
	ROCK USEABLE	3,000	CY				
	ROCK WASTE	A	0	CY			
.123	FOUNDATION PREPARATION						
	PORTALS						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.124	CONCRETE & SHOTCRETE						
	TUNNELS [MAIN]						
	CONCRETE LINING	1,750	CY				
	CONCRETE SLAB	A	0	CY			
	REINFORCING STEEL	70	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
	TUNNELS [SECONDARY]						
	CONCRETE LINING	150	CY				
	CONCRETE SLAB	A	0	CY			
	REINFORCING STEEL	6	TON				
	STEEL MESH	0	TON				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	SHOTCRETE						
	PORTALS	0	SF				
	CONCRETE BASE SLAB	3,175	CY				
	CONCRETE WALLS	0	CY				
	REINFORCING STEEL	65	TON				
.125	SUPPORT						
	TUNNELS (CHAIN)						
	ROCKBOLTS	55	TON				
	STEEL SUPPORT	160	TON				
	TUNNELS (SECONDARY)						
	ROCKBOLTS	10	TON				
	STEEL SUPPORT	30	TON				
	PORTALS						
	ROCKBOLTS	5	TON				
.126	SAFETY PROTECTION						
	PORTALS						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.129	ARCHITECTURAL						
	PORTAL DOORS	0	LS				
.128	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.13	ACCESS SHAFTS						
.131	EXCAVATION						
	ROCK	14,000	CY				
.134	CONCRETE & SHOTCRETE						
	CONCRETE LINING	7,850	CY				
	REINFORCING STEEL	90	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				

SUSITHA HYDROELECTRIC PROJECT
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DEVIL CANYON

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.135	SUPPORT ROCKBOLTS	65	TON				
.138	STEEL/METAL WORK LADDERS, ETC. STRUCTURAL STEEL	0 50	LS TON				
.139	ARCHITECTURAL ENCLOSURES	0	LS				
.13C	MECHANICAL ELEVATORS	1	LS				
.14	FIRE PROTECTION HEADTANK						
.141	EXCAVATION ROCK	2,000	CY				
.144	CONCRETE & SHOTCRETE CONCRETE BASE SLAB CONCRETE WALLS CONCRETE ROOF REINFORCING STEEL STEEL MESH SHOTCRETE	340 0 0 17 0 0	CY CY CY TON TON SF				
.145	SUPPORT ROCKBOLTS STEEL SUPPORT	3 10	TON TON				
.148	STEEL/METAL WORK LADDERS, ETC.	0	LS				
.14C	MECHANICAL PIPING & VALVES	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.15	BUS TUNNELS & SHAFTS						
.151	EXCAVATION						
	ROCK HORIZONTAL	3,000	CY				
	ROCK INCLINED	2,000	CY				
	ROCK VERTICAL	0	CY				
.154	CONCRETE						
	BASE SLAB HORIZONTAL	1,950	CY				
	BASE SLAB INCLINED	0	CY				
	WALLS	0	CY				
	ROOF SLAB	0	CY				
	REINFORCING STEEL	100	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.155	SUPPORT						
	ROCKBOLTS	16	TON				
	STEEL SUPPORT	0	TON				
.16	TRANSFORMER GALLERY						
.161	EXCAVATION						
	ROCK	32,000	CY				
.164	CONCRETE & SHOTCRETE						
	CONCRETE BASE SLAB	2,200	CY				
	CONCRETE WALLS	0	CY				
	CONCRETE ROOF	0	CY				
	REINFORCING STEEL	110	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.165	SUPPORT						
	ROCKBOLTS	55	TON				
	STEEL SUPPORT	0	TON				

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DEVIL CANYON

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.17	CABLE SHAFTS						
.171	EXCAVATION ROCK	4,290	CY				
.174	CONCRETE & SHOTCRETE						
	CONCRETE LINING	2,800	CY				
	REINFORCING STEEL	135	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.175	SUPPORT ROCKBOLTS	72	TON				
.178	STEEL/METALWORK STRUCTURAL STEEL	13	TON				
.179	ARCHITECTURAL ENCLOSURES	0	LS				
.17C	MECHANICAL ELEVATOR	1	LS				
.2	MISC. BUILDINGS & STRUCTURES						
	MISC. BUILDINGS & STRUCTURES	1	LS				
.3	PERMANENT VILLAGE						
	PERMANENT VILLAGE	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
332	RESERVOIR, DAMS & WATERWAYS						
.1	RESERVOIR						
.11	CLEARING						
	CLEARING	1	LS				
.2	DIVERSION TUNNELS/COFFERDAMS						
.21	DIVERSION TUNNELS/PORTALS						
.211	EXCAVATION						
	TUNNELS						
	ROCK	57,000	CY				
PORTAL	UPSTREAM						
	OVERBURDEN-DRY	14,000	CY				
	ROCK USEABLE	4,000	CY				
	ROCK WASTE	9,000	CY				
PORTAL	DOWNSTREAM						
	OVERBURDEN-DRY	14,000	CY				
	ROCK USEABLE	49,000	CY				
	ROCK WASTE	29,000	CY				
.213	FOUNDATION PREPARATION						
	PORTAL UPSTREAM						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
	PORTAL DOWNSTREAM						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.214	CONCRETE & SHOTCRETE						
	TUNNELS						
	CONCRETE LINING	10,800	CY				
	CONCRETE BASE SLAB	0	CY				
	REINFORCING STEEL	550	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
PORTAL	UPSTREAM						
	CONCRETE PIER	500	CY				
	CONCRETE LINING	0	CY				
	CONCRETE BASE SLAB	0	CY				
	CONCRETE HEADWALL	3,000	CY				
	REINFORCING STEEL	60	TON				
PORTAL	DOWNSTREAM						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	CONCRETE HEADWALL	2,400	CY				
	REINFORCING STEEL	48	TON				
	CONCRETE PLUGS						
	CONCRETE PLUGS	4,000	CY				
.215	SUPPORT TUNNELS						
	ROCKBOLTS	80	TON				
	STEEL SUPPORT	220	TON				
	PORTAL UPSTREAM						
	ROCKBOLTS	10	TON				
	TIEBACKS	0	TON				
	PORTAL DOWNSTREAM						
	ROCKBOLTS	15	TON				
	TIEBACKS	0	TON				
.216	SAFETY PROTECTION						
	PORTAL UPSTREAM						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
	PORTAL DOWNSTREAM						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.21B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.21C	MECHANICAL						
	GATES & RACKS	0	LS				
	UPSTREAM	1	LS				
	DOWNSTREAM	0	LS				
.22	UPSTREAM COFFERDAM						
.221	EXCAVATION						
	OVERBURDEN	0	CY				
	ROCK	0	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	REMOVAL OF COFFERDAM	0	CY				
.222	FILL						
	CORE	9,000	CY				
	FINE/FILTER	9,000	CY				
	COARSE FILTER	52,000	CY				
	ROCK SHELL	80,000	CY				
	RIP RAP	5,000	CY				
	CLOSURE DIKE	0	CY				
.223	FOUNDATION PREP/GROUTING						
	CUTOFF & GROUT						
	HOLES	4,200	LF				
	GROUT	672,000	CF				
	CURTAIN						
	CURTAIN	0	SF				
.22B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	FILE				
.22D	DEWATERING						
	DEWATERING	1	LS				
.23	DOWNSTREAM COFFERDAM						
.231	EXCAVATION						
	OVERBURDEN	0	CY				
	ROCK	0	CY				
	REMOVAL OF COFFERDAM	40,000	CY				
.232	FILL						
	CLOSURE DIKE & FILL	51,000	CY				
.233	FOUNDATION PREP/GROUTING						
	CUTOFF & GROUT						
	HOLES	4,700	LF				
	GROUT	732,000	CF				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	CURTAIN						
	CURTAIN	A	0	SF			
.23B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS		0	MTLE			
.23D	DEWATERING						
	DEWATERING		0	LS			
.3	MAIN DAM						
.31	MAIN DAM						
.311	EXCAVATION						
	OVERBURDEN [DRY]		122,000	CY			
	ROCK USEABLE		854,000	CY			
	ROCK WASTE	A	0	CY			
.313	FOUNDATION PREP/GROUTING						
	FOUNDATION PREP						
	HORIZONTAL		171,000	SF			
	INCLINED	A	0	SF			
	DENTAL CONCRETE		0	CY			
	DENTAL CONCRETE		0	CY			
	CONSOL. GROUT [SURFACE]						
	DRILL HOLES		215,000	LF			
	GROUT		860,000	CF			
	GROUT CURTAIN [GALLERIES]						
	DRILL HOLES		142,000	LF			
	GROUT		284,000	CF			
.314	CONCRETE & SHOTCRETE						
	DAM						
	CONCRETE		1,676,000	CY			
	REINFORCING STEEL		5,900	TON			
	THRUSTBLOCKS						
	CONCRETE	A	0	CY			
	REINFORCING STEEL	A	0	TON			
	JOINT GROUTING						
	HOLES		1	LS			

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	GROUT	0	CF				
.315	SUPPORT ROCKBOLTS TIEBACKS	0	TON				
		0	TON				
.316	SAFETY PROTECTION STEEL MESH ROCKBOLTS SHOTCRETE	0	TON				
		0	TON				
		0	SF				
.317	DRAINAGE HOLES	120,000	LF				
.31A	WINTERIZATION WINTERIZATION	1	LS				
.31B	CONSTRUCTION ROADS CONSTRUCTION ROADS	0	MILE				
.32	GROUT GALLERIES/PORTALS						
.321	EXCAVATION TUNNELS/SHAFTS						
	ROCK HORIZONTAL	2,300	CY				
	ROCK INCLINED	3,700	CY				
	ROCK VERTICAL	1,500	CY				
	PORTALS						
	OVERBURDEN	0	CY				
	ROCK	0	CY				
.323	FOUNDATION PREPARATION PORTALS						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.324	CONCRETE & SHOTCRETE TUNNELS						
	CONCRETE LINING	700	CY				
	CONCRETE SLAB	A 0	CY				
	REINFORCING STEEL	A 0	TON				
	STEEL MESH	18,000	TON				
	SHOTCRETE	0	SF				
	SHAFTS						
	CONCRETE LINING	200	CY				
	REINFORCING STEEL	A 0	TON				
	STEEL MESH	3,900	TON				
	SHOTCRETE	0	SF				
	PORTALS						
	CONCRETE BASE SLAB	0	CY				
	CONCRETE WALLS	0	CY				
	REINFORCING STEEL	0	TON				
.325	SUPPORT TUNNELS						
	ROCKBOLTS	22	TON				
	STEEL SUPPORT	0	TON				
	SHAFTS						
	ROCKBOLTS	1	TON				
	PORTALS						
	ROCKBOLTS	A 0	TON				
.326	SAFETY PROTECTION PORTALS						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.329	ARCHITECTURAL PORTAL DOORS	0	LS				
.32B	CONSTRUCTION ROADS CONSTRUCTION ROADS	0	MILE				
.32C	MECHANICAL ELEVATORS	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.4	SADDLE DAM & CUTOFFS						
.41	MAIN SADDLE DAM						
.411	EXCAVATION						
	OVERBURDEN (DRY)	810,000	CY				
	ROCK USEABLE	126,000	CY				
	ROCK WASTE	0	CY				
.412	FILL						
	IMPERVIOUS CORE	226,000	CY				
	FINE FILTER	151,000	CY				
	COARSE FILTER	163,000	CY				
	ROCK SHELL	1,203,000	CY				
	RIP RAP	113,000	CY				
	UNCLASSIFIED (BACKFILL)	0	CY				
.413	FOUNDATION PREP & GROUTING						
	FOUNDATION PREPARATION						
	HORIZONTAL	560,000	SF				
	INCLINED	0	SF				
	DENTAL CONCRETE	0	CY				
	DENTAL CONCRETE	0	CY				
	CONSOL. GROUT (SURFACE)	0	CY				
	DRILL HOLES	46,900	LF				
	GROUT	187,600	CF				
	GROUT (GALLERIES)	0	LF				
	DRILL HOLES	0	LF				
	GROUT	0	CF				
	GROUT CURTAIN	0	CF				
	DRILL HOLES	70,200	LF				
	GROUT	140,400	CF				
.417	DRAINAGE						
	HOLES	16,000	LF				
	PIPES	0	LF				
.418	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.42	GROUT GALLERIES/PORTALS						
.421	EXCAVATION						
	TUNNELS/SHAFTS						
	ROCK HORIZONTAL	3,600	CY				
	ROCK INCLINED	1,800	CY				
	ROCK VERTICAL	0	CY				
	PORTALS						
	OVERBURDEN	0	CY				
	ROCK	0	CY				
.423	FOUNDATION PREPARATION						
	PORTALS						
	HORIZONTAL	0	SF				
	INCLINED	0	SF				
.424	CONCRETE & SHOTCRETE						
	TUNNELS						
	CONCRETE LINING	500	CY				
	CONCRETE SLAB	0	CY				
	REINFORCING STEEL	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	25	CY				
	SHAFTS						
	CONCRETE LINING	0	CY				
	REINFORCING STEEL	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
	PORTALS						
	CONCRETE BASE SLAB	0	CY				
	CONCRETE WALLS	0	CY				
	REINFORCING STEEL	0	TON				
.425	SUPPORT						
	TUNNELS						
	ROCKBOLTS	22	TON				
	STEEL SUPPORT	0	TON				
	SHAFTS						
	ROCKBOLTS	0	TON				
	PORTALS						
	ROCKBOLTS	0	TON				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS.
				\$	\$ 000	\$ 000	
.426	SAFETY PROTECTION PORTALS						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.429	ARCHITECTURAL PORTAL DOORS	0	LS				
.42B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.42C	MECHANICAL ELEVATORS	0	LS				
.5	SERVICE SPILLWAY VALVES						
.51	SERVICE SPILLWAY VALVES						
.51C	MECHANICAL SERVICE VALVES	1	LS				
.52	AUXILLARY SPILLWAY CHUTE						
.521	EXCAVATION						
	APPROACH						
	OVERBURDEN	108,000	CY				
	ROCK USEABLE	772,000	CY				
	ROCK WASTE	0	CY				
	STRUCTURE & CHUTE						
	OVERBURDEN (DRY)	0	CY				
	OVERBURDEN (WET)	0	CY				
	ROCK USEABLE	0	CY				
	ROCK WASTE	0	CY				
	DRAIN TUNNEL						
	ROCK	0	CY				
	RIVER CHANNEL						
	ALLUVIUM EXCAVATION-DRY	54,000	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	PLUNGE POOL EXCAVATION-WET	398,000	CY				
.523	FOUNDATION PREP/GROUTING						
	FOUNDATION PREP						
	APPROACH						
	ROCK HORIZONTAL	87,500	SF				
	ROCK INCLINED	33,000	SF				
	STRUCTURE CHUTE						
	ROCK HORIZONTAL	0	SF				
	ROCK INCLINED	0	SF				
	DENTAL CONCRETE	10,000	CY				
	CONSOL. GROUT (SURFACE)						
	DRILL HOLES	17,300	LF				
	GROUT	49,200	CF				
	GROUT (DRAIN TUNNEL)						
	DRILL HOLES	0	LF				
	GROUT	0	CF				
	GROUT CURTAIN						
	DRILL HOLES	0	LF				
	GROUT	0	CF				
.524	CONCRETE & SHOTCRETE						
	CONCRETE WALLS						
	ONE FORM	12,200	CY				
	TWO FORM	10,900	CY				
	CONCRETE SLAB						
	APPROACH	0	CY				
	NO FORM	14,900	CY				
	ONE FORM	0	CY				
	TWO FORM	0	CY				
	CONCRETE GATE CHUTE						
	ONE FORM	8,700	CY				
	TWO FORM	3,400	CY				
	CONCRETE STRUCTURE						
	NO FORM	9,700	CY				
	ONE FORM	0	CY				
	TWO FORM	4,100	CY				
	REINFORCING STEEL						
	REINFORCING STEEL	2,500	TON				
	STEEL MESH						
	STEEL MESH	0	TON				
	SHOTCRETE						
	SHOTCRETE	0	SF				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.525	SUPPORT APPROACH						
	ROCKBOLTS	284	TON				
	TIE BACKS	0	TON				
.526	SAFETY PROTECTION APPROACH						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
	STRUCTURE & CHUTE						
	STEEL MESH	0	TON				
	ROCKBOLTS	0	TON				
	SHOTCRETE	0	SF				
.527	DRAINAGE DRILL HOLES	0	LF				
.52A	WINTERIZATION WINTERIZATION	1	LS				
.52B	CONSTRUCTION ROADS CONSTRUCTION ROADS	1	MILE				
.52C	MECHANICAL GATES & RACKS	1	LS				
.52D	DEWATERING & COFFERDAM DEWATERING & COFFERDAM AUX. COFFERDAM & REMOVAL	1 36,000	LS CY				
.53	EMERGENCY SPILLWAY						
.531	EXCAVATION						
	OVERBURDEN	0	CY				
	ROCK USEABLE	1,168,000	CY				
	ROCK WASTE	0	CY				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.532	FILL FUSE PLUG	43,000	CY				
.536	SAFETY PROTECTION ROCKBOLTS	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.538	CONSTRUCTION ROADS CONSTRUCTION ROADS	0	MILE				
.6	INTAKES						
.61	INTAKE STRUCTURE						
.611	EXCAVATION OVERBURDEN	43,500	CY				
	ROCK USEABLE	394,200	CY				
	ROCK WASTE	0	CY				
.612	FILL BACKFILL	4,200	CY				
.613	FOUNDATION PREPARATION HORIZONTAL	0	SF				
	INCLINED	0	SF				
.614	CONCRETE & SHOTCRETE STRUCTURE						
	CONCRETE STRUCTURE	38,000	CY				
	CONCRETE MASS	11,600	CY				
	REINFORCING STEEL	1,900	TON				
	APPROACH						
	CONCRETE	0	CY				
	REINFORCING STEEL	0	TON				
.615	SUPPORT STRUCTURE						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	ROCKBOLTS	48	TON				
	TIEBACKS	0	TON				
	APPROACH						
	ROCKBOLTS	0	TON				
	TIEBACKS	0	TON				
.616	SAFETY PROTECTION						
	ROCKBOLTS	0	TON				
	STEEL MESH	0	TON				
	SHOTCRETE	0	SF				
.61B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS	0	MILE				
.61C	MECHANICAL						
	GATES & RACKS	1	LS				
.7	SURGE CHAMBER						
.71	SURGE CHAMBER						
.711	EXCAVATION						
	ROCK	70,000	CY				
.714	CONCRETE & SHOTCRETE						
	CONCRETE CHAMBER	1,300	CY				
	REINFORCING STEEL	65	TON				
.715	SUPPORT						
	ROCKBOLTS	50	TON				
.71C	MECHANICAL						
	GATES	1	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.8	PENSTOCKS						
.81	PENSTOCKS						
.811	EXCAVATION						
	TUNNELS						
	HORIZONTAL	10,000	CY				
	INCLINED	37,000	CY				
.814	CONCRETE & SHOTCRETE						
	CONCRETE LINER	21,100	CY				
	REINFORCING STEEL	850	TON				
.815	SUPPORT						
	ROCKBOLTS	200	TON				
	SUPPORT STEEL	0	TON				
.818	STEEL/METALWORK						
	STEEL LINER	1,600	TON				
.9	TAILRACE WORKS						
.91	TAILRACE TUNNELS/PORTALS						
.911	EXCAVATION						
	TUNNELS [MAIN]						
	ROCK	271,000	CY				
	TUNNELS [SECONDARY]						
	ROCK	20,800	CY				
	PORTALS [MAIN]						
	OVERBURDEN-DRY	42,000	CY				
	OVERBURDEN-WET	0	CY				
	ROCK USEABLE	15,000	CY				
	ROCK WASTE	0	CY				
	PORTALS [SECONDARY]						
	OVERBURDEN-DRY	21,000	CY				
	OVERBURDEN-WET	0	CY				
	ROCK USEABLE	7,500	CY				
	ROCK WASTE	0	CY				
.913	FOUNDATION PREPARATION						
	PORTALS						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	HORIZONTAL	A	0	SF			
	INCLINED	A	0	SF			
.914	CONCRETE & SHOTCRETE						
	TUNNELS [CHAIN]						
	CONCRETE LINING		17,700	CY			
	CONCRETE SLAB	A	0	CY			
	CONCRETE PIERS	A	0	CY			
	REINFORCING STEEL		355	TON			
	STEEL MESH		0	TON			
	SHOTCRETE		0	SF			
	TUNNELS [SECONDARY]						
	CONCRETE LINING		8,800	CY			
	CONCRETE SLAB	A	0	CY			
	CONCRETE PIERS	A	0	CY			
	REINFORCING STEEL		180	TON			
	STEEL MESH		0	TON			
	SHOTCRETE	A	0	CY			
	PORTALS [CHAIN]						
	CONCRETE BASE SLAB		100	CY			
	CONCRETE WALLS		650	CY			
	REINFORCING STEEL		30	TON			
	PORTALS [SECONDARY]						
	CONCRETE BASE SLAB		50	CY			
	CONCRETE WALLS		400	CY			
	REINFORCING STEEL		15	TON			
.915	SUPPORT						
	TUNNELS [CHAIN]						
	ROCKBOLTS		310	TON			
	STEEL SUPPORT		1,080	TON			
	TUNNELS [SECONDARY]						
	ROCKBOLTS		55	TON			
	STEEL SUPPORT		150	TON			
	PORTALS [CHAIN]						
	ROCKBOLTS		15	TON			
	PORTALS [SECONDARY]						
	ROCKBOLTS		7	TON			
.916	SAFETY PROTECTION						
	PORTALS						
	ROCKBOLTS	A	0	TON			
	STEEL MESH	A	0	TON			

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	SHOTCRETE	4	0	SF			
.91B	CONSTRUCTION ROADS						
	CONSTRUCTION ROADS						
	MAIN TUNNEL	0	0	MILE			
	SECONDARY TUNNEL	0	0	MILE			
.91C	MECHANICAL						
	GATES						
	MAIN	1	1	LS			
	SECONDARY	1	1	LS			
333	WATERWHEELS, TURBINES, GENERATORS						
.1	TURBINES GOVERNORS						
.11	TURBINES GOVERNORS						
	TURBINES GOVERNORS	1	1	LS			
.2	GENERATORS EXCITERS						
.21	GENERATORS & EXCITERS						
	GENERATORS & EXCITERS	1	1	LS			
.3	MISC MECHANICAL						
.31	MISC MECHANICAL						
	MISC MECHANICAL	1	1	LS			
334	ACCESSORY ELECTRICAL EQUIPMENT						
.1	CONNECTORS, SUPPORTS, STRUCTURES						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.11	STRUCTURES STRUCTURES	0	LS				
.12	CONDUCTORS & INSULATORS CONDUCTORS & INSULATORS	0	LS				
.13	CONDUITS CONDUITS	0	LS				
.2	SWITCHGEAR & CONTROL EQUIPMENT						
.21	SEPARATE EXCITERS SEPARATE EXCITERS	0	LS				
.22	TRANSFORMERS TRANSFORMERS	1	LS				
.23	CIRCUIT BREAKERS CIRCUIT BREAKERS	0	LS				
.24	SURGE PROTECTION SURGE PROTECTION	0	LS				
.25	SWITCHBOARDS SWITCHBOARDS	0	LS				
.26	AUX. POWER EQUIPMENT AUX. POWER EQUIPMENT	1	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.3	CUBICLES & APPURTENANCES						
.31	CUBICLES & APPURTENANCES						
	CUBICLES & APPURTENANCES	0	LS				
.4	TESTING						
.41	TESTING						
	TESTING	0	LS				
.5	ELECTRICAL & ASSOCIATED						
.51	ELECTRICAL & ASSOCIATED						
	ELECTRICAL & ASSOCIATED	1	LS				
335	HISC. POWERPLANT EQUIPMENT						
.1	AUX. EQUIPMENT						
.11	UNWATERING						
	UNWATERING	0	LS				
.12	GAUGE/INDICATING DEVICES						
	GAUGE/INDICATING DEVICES	0	LS				
.13	AIR & COOLING SYSTEM						
	AIR & COOLING SYSTEM	0	LS				
.14	COMPRESSOR AIR						
	COMPRESSOR AIR	0	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.15	FIRE PROTECTION SYSTEM FIRE PROTECTION SYSTEM	0	LS				
.16	CRANES CRANES	1	LS				
.19	OTHER OTHER	0	LS				
.2	GENERAL STATION EQUIPMENT						
.21	GENERAL STATION EQUIPMENT GENERAL STATION EQUIPMENT	0	LS				
.3	COMMUNICATION SYSTEM						
.31	COMMUNICATION SYSTEM COMMUNICATION SYSTEM	0	LS				
336	ROADS						
.1	ROADS						
.12	SITE ROADS SITE ROADS MAINTENANCE	5 5	MILE MILE				
	GOLD CREEK-DEVIL CANYON MAINTENANCE	1	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	TRANSMISSION PLANT						
350	LAND & LAND RIGHTS LAND & LAND RIGHTS 0						
352	SUBSTATION & SWITCHING STATION SUBSTATION & SWITCHING STATION STRUCTURES & IMPROVEMENTS						
.1	SWITCHYARD						
.11	SWITCHYARD SWITCHYARD	1	LS				
353	SUBSTATION/SWITCHING STA EQUIP SUBSTATION/SWITCHING STA EQUIP						
354	STEEL TOWERS & FIXTURES STEEL TOWERS & FIXTURES						
356	OVERHEAD CONDUCTORS & DEVICES OVERHEAD CONDUCTORS & DEVICES						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
359	ROADS & TRAILS ROADS & TRAILS						
	GENERAL PLANT						
389	LAND & LAND RIGHTS LAND & LAND RIGHTS						
390	STRUCTURES & IMPROVEMENTS STRUCTURES & IMPROVEMENTS						
391	OFFICE FURNITURE/EQUIPMENT OFFICE FURNITURE/EQUIPMENT						
392	TRANSPORTATION EQUIPMENT TRANSPORTATION EQUIPMENT						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
393	STORES EQUIPMENT STORES EQUIPMENT						
394	TOOLS SHOP & GARAGE EQUIPMENT TOOLS SHOP & GARAGE EQUIPMENT						
395	LABORATORY EQUIPMENT LABORATORY EQUIPMENT						
396	POWER OPERATED EQUIPMENT POWER OPERATED EQUIPMENT						
397	COMMUNICATIONS EQUIPMENT COMMUNICATIONS EQUIPMENT						
398	MISCELLANEOUS EQUIPMENT MISCELLANEOUS EQUIPMENT						

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
399	OTHER TANGIBLE PROPERTY OTHER TANGIBLE PROPERTY						
	INDIRECT COSTS						
61	TEMPORARY CONSTRUCTION FACILITIES TEMPORARY CONSTRUCTION FACILITIES						
62	CONSTRUCTION EQUIPMENT CONSTRUCTION EQUIPMENT						
63	CAMP & COMMISSARY CAMP & COMMISSARY						
	.1 MAIN CAMP MAIN CAMP	3,150	UNITS				
	.2 VILLAGE VILLAGE	350	UNITS				
	.4 CATERING & SUPPORT CATERING & SUPPORT	2,680,000	H-DAY				
	.5 CONSTRUCTION POWER CONSTRUCTION POWER	1	LS				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
64	LABOR EXPENSE LABOR EXPENSE						
65	SUPERINTENDENCE SUPERINTENDENCE						
66	INSURANCE INSURANCE						
69	FEEES FEEES						
SUBTOTAL							
	CONTINGENCY		%				
71	ENGINEERING		%				
72	LEGAL EXPENSES		%				
75	TAXES		%				
76	ADMINISTRATIVE & GEN. EXPENSES		%				
77	INTEREST		%				

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ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
					\$ 000	\$ 000	
80	EARNINGS/EXPENSES DURING CONSTR.		%		0		
						=====	
	TOTAL PROJECT COST						

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(drawings that go with report unable to be microfilmed with report)

The following drawings can be found on drawing Index for Drawings being Microfilmed.

PLATE 8.1 Watana Valve Type Spillway Alternative General Arrangement (SK-5700-C6-218 Revision A)

PLATE 8.2 Watana Valve Spillway Alternative Main Dam & Diversion (SK-5700-C6-220 Revision A)

PLATE 8.3 Watana Valve Type Alternative Power Facilities & Spillway (SK-5700-C6-222 Revision A)

SK-5700-C6-225 Watana Underground Powerhouse 6 x 165 MW Units Section

SK-5700-C6-226 Watana Diversion Plan at Intake

SK-5700-C6-236 Watana Underground Powerhouse 6-165 MW Units General Arrangement & Section

SK-5700-C6-237 Watana Underground Powerhouse 6-165 MW Units Plans and Section

SK-5700-C6-305 Devil Canyon Thin Arch Dam Geometry

PLATE 9.2 Devil Canyon Scheme 1 Sections (SK-5700-C6-312)

PALTE 9.1 Devil Canyon Scheme (SK-5700-C6-313)

SK-5700-C6-314 Devil Canyon Scheme 1 Site Layout

SK-5700-C6-621 Devil Canyon Main spillway General Arrangement Plan & Profile